Teachers' Experiences of the teaching of Personal Capabilities through the Science Curriculum

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ABSTRACT

This thesis represents the study of teachers' perceptions and experiences of the teaching of Personal Capabilities (PCs) through the Science curriculum. It documents the process by which teachers were successfully enabled to incorporate the teaching of PCs through the Science curriculum. An action research methodology provided the basis for the development of the study which benefited from flexible, collaborative partnerships between teachers and the researcher. Facilitation and support prompted action and continuous reflection on research interventions, their outcomes and influence on pedagogy, student development and learning. Emphasis on regular teacher-researcher interactions during curriculum innovation had significant implications on teachers' professional development, and was critical in affecting pedagogic change. Collaborative partnerships emerged as a powerful tool for understanding the teaching and learning of PCs.

Semi-structured interviews and questionnaires, classroom observations, reflective logbook entries and discussions formed the main sources of data, represented in case studies which provide contextualised representations of teacher activity.

Using ten operationally-defined PCs, it is shown that students' development can be enhanced through the Science curriculum. A process model including: knowing, self-assessing, action planning, acting and reviewing, illustrates the teachers' and students' actions during PC development. Strategies for facilitating students' PC improvement are illustrative of the teachers' modified pedagogic approaches to subject teaching, which encourage self-awareness and prompt behavioural change.

Findings from this study suggest further research and provide recommendations for policy makers, teachers and educational researchers, highlighting the constraining nature of current National Curriculum (NC) assessment strategies.

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ABBREVIATIONS

AVCE	Advanced Level Vocational Certificate of Education
BCC	British Chambers of Commerce
CBI	Confederation of British Industry
CCEA	Council for the Curriculum, Examinations and Assessment
CPD	Continued Professional Development
DfEE	Department for Education and Employment
DFES	Department For Education and Skills
DT	Design and Technology
DTI	Department for Trade and Industry
GCSE	General Certificate of Secondary Education
GRASP	Getting Results and Solving Problems
ICT	Information and Communication Technology
IQ	Intelligence Quotients
KS	Key Stage
KS2	Key Stage 2
KS3	Key Stage 3
LEA	Local Education Authority
NC	National Curriculum
PC	Personal Capability
PCs	Personal Capabilities
PSHE	Personal, Social and Health Education
QCA	Qualifications and Curriculum Authority
RE	Religious Education
RSA	Royal Society of Arts
SATs	Standard Assessment Tasks
SEAC	Schools Examination and Assessment Council
OCR	Oxford and Cambridge and RSA Examinations
OFSTED	Office for Standards in Education
UK	United Kingdom
ZPD	Zone of Proximal Development

Glossary of Terms

Buddy Partnerships	a long-term partnership of two students, promoting cooperation and peer reflection
capability	the capacity to demonstrate a range of behaviours
Circle Time	a means of promoting self-esteem, self-discipline and responsibility towards others, enhanced through the use of structured activities with groups of people
competence	demonstrating a level of aptitude in a practical ability in a range of circumstances
differentiation	to adapt or make different approaches for a particular context or individual
Jigsaw approach	A technique highlighting the importance of small group discussion and collaborative learning, requiring group members to take responsibility for researching and carrying out a particular piece of a broader task. Each member contributes to the task in order to complete it successfully (for more information ref. The Centre for Science Education, 1992: 30)
Peer Mediation	a method to assist conflict resolution through a mediated process involving students as mediators
Personal Capabilities	The generic life-work skills and characteristics that are considered influential to the social, academic and professional lives' of individuals
personal capability	an individuals' capacity to demonstrate the behaviours associated with the skills and characteristics of the ten 'Personal Capabilities'
skill	a practical ability
skilled	demonstrating aptitude in a practical ability

REFERENCING

Throughout the thesis data has been referenced. Interviews, questionnaires, observation schedules, researcher's logbook entries and survey results have been referenced as follows.

• data set within squared brackets	[______]
• data set with corresponding number (if appropriate)	[Interview 32: ____]
• date of collection	[Interview 32: 13.12.00: __]
• item/part of data set:	
- quote reference number in interview	[Interview 32: 13.12.00: 15]
- this may refer to specific answers	[Questionnaire: 13.12.00: A5]

- where it is relevant to identify the respondent, a name may also be included

[Interview 32: 13.12.00: 15: Andy]
[Andy: Questionnaire: 13.12.00: A5]

Case Studies have been reference as follows, with representative section numbers.

Case Study School A, section 16 = [CSA: 16]

Anonymity

All names have been changed to maintain the anonymity of those involved.

CHAPTER 1

Introduction

This chapter reviews the stimulus for the research, its aims, intended outcomes and potential contribution to knowledge. An overview of the research approach and assumptions on which the study is based are presented. This chapter aims to provide a brief introduction to the study and reviews the contents of the thesis.

1.0 INTEREST IN THE RESEARCH AREA

The study stemmed from an interest in youngsters' personal, social and academic development in schools. The researcher was particularly interested to explore the links between these areas of development, and how Personal Capability (PC) development could be effectively combined with mainstream Science teaching in lower-secondary school. Indications of concerns, arising from the review of contemporary teaching practices (Jenkins 2000a, Donnelly 2000c), coupled with the increased demands for generic skill development in employment-related literature (Department for Trade and Industry 1998), stimulated the interest in PC development. As Science was the area of expertise for the researcher and supervisory team, it was chosen to be the main subject focus for the research.

Awareness of models of teacher expertise also influenced the study in the early stages (Berliner 1986, Olsen 1992, Clark 1999, Younger & Warrington 1999), when emerging evidence from the 'Model of Effective Teaching Report' (HayMcBer 2000) and the 'Expert Teacher Study' (Bevins 2000) indicated the characteristics of teacher expertise. These documents stimulated thought, discussion and reflection on whether teachers generally encouraged students' personal development through Science teaching, and whether they themselves demonstrated a range of personal capabilities.

The latter two reports highlighted that expert or highly able teachers effectively enhanced the personal, social and academic development of their students, through the development of strong interpersonal relationships and constructing well-managed learning environments. Highly effective practice was considered to be demonstrated in a variety of ways which were dependent on individual teachers, but were generally linked to the quality of their technical skills and personal characteristics. HayMcBer's (2000) analysis of teachers' characteristics of effectiveness, suggested that a range of 'deep-seated' qualities directly influenced behaviour and teaching. Such qualities were reflected mainly by teachers' self-image, morals, values, motivation levels and personal traits. They suggested that:

> These personal characteristics matter because when combined with subject and other knowledge and skills described in the National Standards, they lead to effective results in the job. (HayMcBer 2000:1)

Links can be drawn between the characteristics HayMcBer (2000) identify as indicators of teacher expertise and the Personal Capabilities (PCs). Their findings identified sixteen characteristics, clustered into five groups, which relate to a range of PC behaviours (ref. Appendix A10). The characteristics outlined in their study highlight how personal, social, management and thinking skills can, or may, contribute to teachers' professional effectiveness, and the personal development of their students. The consideration of these findings, and the review of related literature, led the researcher to consider the extent to which students' effectiveness in learning is influenced by their personal skills and characteristics, and to what extent efforts were made to regularly enhance them through subject teaching. Preliminary discussions with teachers, educationalists and teacher trainers indicated a broad consensus of concern in this area, suggesting that little emphasis was currently explicitly placed on students' personal and social development during subject teaching. Many considered this to result from increased pressures from National Curriculum (NC) testing.

On the basis of these interests the study sought to research the influence of teaching Science with specific emphasis on developing a range students' personal skills and characteristics. The study aimed to gather and learn from teachers' perceptions and experiences of the teaching of PCs through Science.

1.1 ASSUMPTIONS

The study was designed on the basis of three main assumptions, which emerged predominantly from reviewing current literature, but also from the experience, prior research and general interest of the supervisory team, the researcher and the teachers. Firstly, it was considered that Science teaching was becoming too content driven, and, as such, the opportunities for personal skill development were compromised. Secondly, it was of concern that, due to this, a tension had been created between the teachers' role in teaching for students' personal skill development and for purely academic development. Thirdly, the employment sector increasingly recognised the need for interpersonal and intrapersonal skill development, as generic skills were considered highly valuable, although increasingly lacking in new employees (see Chapter 3).

It was considered that:

1. students' personal characteristics, coupled with, and enhanced through subject knowledge acquisition may lead to generally more 'effective' students, lifelong learners and overall individuals
2. subject teachers were being steered towards delivering subject content knowledge, with little or less emphasis on integrating personal development, due to external constraints and influences
3. all students should be provided with regular opportunities to develop their PCs within Science learning. It was considered fundamental that Science teachers highlight and facilitate the development of a range of broader skills and characteristics.

1.2 AIMS OF THE STUDY

The study was built around three main aims.

1. **To establish the relevance and operational definitions for the Personal Capabilities for use within a curriculum context.**

The researcher endeavoured to arrive at an understanding of 'Personal Capability', such that it could be used, applied and evaluated in teaching and learning settings. Review of a wide range of associated literature, and discussion with teachers and employers, enabled a framework to be identified and refined, providing the basis for the development of research materials.

2. **To research the extent to which practice at school and classroom levels enables the integration of Personal Capabilities through the Science curriculum.**

Addressing these issues aimed to provide insight into the status of PCs in contemporary schooling, and most specifically within Science education. Evaluative studies of the Science curriculum indicate a compounding emphasis on academic development (Jenkins 2000a, b, Donnelly 2000a, b, c), such that an exploration of this area was pertinent, especially given increasing requests from the employment sector for generic skill development.

3. **To research teachers' experiences and perceptions of the teaching and learning of Personal Capabilities through the Science curriculum.**

This formed the main aim of the study. Interventions and approaches were designed, trialed, and evaluated, through collaborative action research with practising teachers in mainstream schools, to enhance Science teaching through the development of PCs. The outcomes from this aim form the main source of recommendations for the integration and development of students' PCs through NC Science teaching and learning, with implications to other subject areas.

1.3 INTENDED OUTCOMES

The study was designed to encourage the gathering, analysis and interpretation of teachers' experiences and perceptions, in order to improve understanding of how teachers can support students' PC development through the Science curriculum. The outcomes are intended to provide recommendations for teachers in secondary education, with implications for primary and post-16 age phases, as to how to develop students' PCs through Science teaching.

The study's intended outcomes were to have:

- identified the theoretical basis, relevance and operational definitions of the PCs

- reviewed the NC (England and Wales) secondary Science curriculum, and identified aspects through which the PCs could be effectively integrated, promoted and developed
- reviewed the opinions of employers and teachers with reference to the significance and current development of PCs in their practices
- reviewed the extent to which Science teaching influences the development of students' personal skills and characteristics
- worked collaboratively with practising Science teachers (mainly secondary) to identify, trial and evaluate a range of strategies which provide opportunities for the development and self-assessment of students' PCs.

1.4 THE ORIGINAL CONTRIBUTION TO KNOWLEDGE

The study aimed to provide a significant contribution to the existing knowledge and understanding of personal development within mainstream education. Its originality stems from the lack of detailed research into the development of students' PCs through the subject curriculum, especially in Science, and a pertinent need for practical teaching and learning approaches which enable teachers to intervene, monitor and assess personal skills and characteristics. The contribution to knowledge aimed to arise from:

- gaining a clearer understanding of the relevance of the PCs within the Science curriculum
- generating operational definitions for the use of PCs within the subject curriculum
- reviewing the debate generated amongst teachers, educators and employers about the role of subject teachers in the development of students' PCs, e.g. the tension between Science teachers' responsibility to teach 'Science' and their role in assisting the development of a broad range of students' personal skills and characteristics
- gaining a deeper understanding of teachers' experiences and perceptions associated with the development of PCs through the Science curriculum, e.g.
    - improved knowledge and understanding of teachers' role in raising students' awareness of the importance of PCs in their development

and creating a teaching and learning environment which effectively promotes PCs development
  - improved knowledge and understanding of the types of teaching and learning strategies that facilitate or inhibit the achievement of PC objectives, for example, target setting, self-review, monitoring and evaluation, project work, teamwork, etc.
- gaining a deeper understanding of how teachers' perceptions are articulated and supported
- demonstrating the potency of collaborative action research.

The extent to which these areas have been fulfilled is displayed throughout the thesis and summarised specifically in sections 14.0 and 14.1.

1.5 APPROACH

Implicit in the research approach was the notion of teachers as action researchers, focusing on reflection-in and on-action (Schon 1983). Teachers were encouraged to be integrally involved in reviewing Science teaching practices, tailoring and adapting resources and interventions, and focusing and sharing evaluation on their perceptions and experiences. Establishing teachers' sustained support was central to the study, and required a high level of voluntary commitment to gain substantiated understandings of the strategies and influences on students' PC development. A positive contribution to teachers' professional development was inherent in their involvement, where the undertaking of the research was coupled with reflection on personal understandings, pedagogy and curriculum change.

Qualitative research methods of semi-structured interviews, questionnaires, surveys, observations and diaries provided the main sources of data (ref. Chapter 7). Analysis and interpretation was undertaken primarily by the researcher, in association and collaboration with the teachers and supervisory and advisory team. The collaborative nature of data collection and interpretation facilitated teachers' sense of ownership and involvement in the study, encouraging openly reflective discourses to be maintained between the teachers and the researcher. As teachers' involvement in the study continued, and understanding of PCs improved, reflections on experience became more detailed and were articulated more clearly in relation to their personal development, that of their students, and the impact on teaching and learning. Collaboration between and across schools, encouraged teachers to consider their experiences with others, enabling increased clarity and objectivity of thought and interpretation.

1.6 EXPECTED DIFFICULTIES ASSOCIATED WITH THE STUDY

Teaching and learning is a complex interaction between teachers' and students' personal and academic skills, characteristics, competences and capabilities. The teaching and learning of Science brings with it additional complexities relating to the nature of knowledge and understanding in the field. Where this study aimed to influence teaching and learning, through a process of reflection, leading to a change in pedagogy, a wide range of issues were likely to arise with respect to teacher expertise, student ability, student age, school and classroom management, curriculum demands, assessment requirements etc.. Although inevitable, the study endeavoured to appreciate, yet not be inhibited by, such influences. By working in collaboration with teachers, and adopting a flexible, yet focused, approach to research, the study aimed to overcome existing curriculum and teaching pressures, to actively learn from the research interventions.

By its very nature, the social and educational focus of the study required considerable interaction between the researcher and the teachers, which demanded that teachers allocate time for undertaking on-going reflection, intervention and evaluation. Although challenging amidst existing school and personal responsibilities, teachers voluntarily agreed to sustain involvement in the study. The geographical location of schools required to be within a reasonable distance of travel for the researchers' ease and frequency of access.

1.7 OUTLINE OF THE THESIS

The thesis is organised into fourteen chapters which report on the: existing literature associated with the content of the study and its methodology; research strategy; findings and discussions; conclusions; areas for further study. Each chapter is organised into a series of subheadings, and cross-references between different chapters and the appendix are made where necessary.

Chapter 2 outlines the current status of Science teaching in mainstream schools. The chapter presents an overview of the requirements and demands on secondary Science teachers, and emphasises the influence of the NC and its associated assessment strategies.

Chapter 3 reviews the issues concerning the demand for skills within the 21st Century workplace. It emphasises the increased requirements of employees' generic skills in work environments, which are influenced by rapid technological advancements. The relationship between such skills and PCs is recognised. This chapter, and the subsequent two, represent the way in which the research addresses the first aim of the study.

Chapters 4 and 5 establish the basis and form of PCs, such that their definitions and characteristics are explained and condensed into a working framework for the study. This chapter reviews a wide range of associated literature in specific fields and provides the reader with an overview of each PC.

Chapter 6 concentrates on the representation and justification of the research methodology. It reviews the nature of action research, relevant research methods and analysis techniques, and reviews the importance of addressing reliability and validity within the study.

Chapter 7 describes the study's research strategy detailing the researcher's and teachers' roles, the nature of the research sample, and the five-phase model of research.

Chapter 8 presents employers' and teachers' perceptions of the relevance and nature of PC development in employment and in schools. It illustrates the demand for PC development in employment and the impact currently being made on encouraging youngsters' PC improvement. These findings represent the way in which the research addressed the second aim of the study (ref. section 1.2).

Chapter 9 provides an exemplar case study report and discussion to illustrate the action research process which was typical of all cases. The chronological report highlights the teacher-researcher interaction, from which the discussion draws meaning and considers the implications of the actions.

Chapter 10 presents an overview of activity and impact in all the schools, with discussions of the key findings from Schools B, C and D.

Chapter 11 provides a series of recommended strategies for improving students' PCs through the Science curriculum, which have been drawn from the regularly used activities across the case schools.

Chapter 12 reflects the impact of teacher collaboration and participation on their continued professional development.

Chapter 13 critically reviews the key issues of the study. It considers: the role the teachers-researcher interaction in the action research process; the way a unified understanding of PCs was arrived at; the process model of PC development; the implications of developing PCs through the Science curriculum.

Chapter 14 draws a conclusion to the issues raised in the thesis, highlighting opportunities for further work and the main strengths and limitations of the study, closing with final remarks.

CHAPTER 2

Contemporary Science Teaching under the National Curriculum

This chapter reviews the teaching context in which the study took place. It considers the issues emerging from the introduction of the NC, specifically recognising its impact on Science teaching. It reflects how this has affected students' learning experiences, particularly in relation to the impact on opportunities for PC development.

2.0 THE NATIONAL CURRICULUM

The NC originally evolved as a result of the government's 1987 announcement of its intention to implement statutory controls over the school curriculum. It sets out a clear, full and statutory entitlement to learning for all pupils of compulsory school age. Since its first publication in 1989 (Department for Education and Employment, DfEE, 1989), the NC has undergone four changes, with the most recent edition issued in September 2000 (DfEE 1999b). Often regarded as the most significant intervention affecting practitioners in schools, its impact on classroom teaching has been substantial. However, implementation and repeated revision has led to over a decade of ongoing change, refinement and development.

The four key purposes of the NC were:

> **'To establish an entitlement**
> The National Curriculum aimed to secure for all pupils, irrespective of social background, culture, race, gender, differences in ability and disabilities, an entitlement to a number of areas of learning and to develop knowledge, understanding, skills and attitudes necessary for their self-fulfilment and development as active and responsible citizens.
>
> **To establish standards**
> The National Curriculum made clear expectations for learning and attainment explicit to pupils, parents, teachers, governors, employers and the public, and establishes national standards for the performance of all pupils in the subjects it includes. These standards are used to set targets for improvement, measure progress towards those targets, and monitor and compare performance between individuals, groups and schools.
>
> **To promote continuity and coherence**
> The National Curriculum aimed to contribute to a coherent national framework to promote curriculum continuity and be sufficiently flexible to ensure progression in pupils' learning. It aimed to facilitate the transition of pupils between schools and phases of education and to provide a foundation for lifelong learning.

To promote public understanding
The National Curriculum aimed to increase public understanding of, and confidence in, the work of schools and in the learning and achievements resulting from compulsory education. It aimed to provide a common basis for discussion of educational issues among lay and professional groups, including pupils, parents, teachers, governors and employers.'

(Her Majesty's Stationary Office, 1999)

The provision for England and Wales of standardised guidelines for curriculum provision, across four age phases, has improved the coherence of content delivery at specific stages of development. Jenkins (2000b) reported on the practical usefulness of the NC in providing a structure for pupil entitlement and improving progression across the curriculum.

Hargreaves (2001: 4) explained:

> The National Curriculum and the associated assessment regime, together with the GCSE, have provided both primary and secondary teachers with a much clearer understanding of the standards involved... These have transformed teachers' understanding of what is to be taught and learned and their competence to assess what pupils or students achieve. This is at the heart of how and why there has been a rise in student achievement.

The NC has also benefited the monitoring and assessment of student development through the introduction of standardised national testing. Where all students within particular Key Stages (KS) should receive tuition in specific areas of work aimed at particular levels of attainment, the standardised tests provide a clearer indication of students' performance against national norms and standardised criteria. Concern has grown, however, over the degree of comparability between schools' performance, especially those with differing social and economic status. Despite these difficulties, the NC has led to significant improvements in the overall provision of a 'broad and balanced' curriculum.

2.1 CONTEMPORARY ISSUES RELATING TO THE NC

Despite its benefits, the NC has given rise to a number of significant concerns. Although being established as a curriculum of minimal entitlement, it is viewed differently by schools and teachers. While promoting subject diversity, the NC is considered to be overly prescriptive, demanding of time and heavily influenced by statutory assessment. In practice, these issues have significantly altered the perceived purpose of learning within the NC.

'Beyond 2000' (Millar & Osborne 1998) emphasised that the intended purpose of the specific content in the curriculum had not been realised, and as such the authors suggest that the selection and organisation of content has no obvious basis. Frequently teachers view the statutory assessments as the purpose of teaching and learning, such that subject delivery has become largely structured to fulfil assessment requirements.

Although 'assessment' is essential to the monitoring and safeguarding of a broad and balanced approach to learning, the unintended outcomes of its statutory system has ultimately been criticised. Whereas effective assessment should assist students' development by highlighting progress, the tendency to deliver the curriculum on the basis of the statutory requirements is increasingly considered to be the norm (Osborne 2000). The use of such summative assessments provides minimal developmental feedback to students, and although assessment grades are of personal significance to the student, the higher stake is the perceived effectiveness of the school within the national league tables.

Osborne (2000: 1) summarises:

> The consequence is that whilst the quite reasonable intention of the assessment regime was to make the *important measureable*, only the *measureable* has become *important* with the ensuing excision of much that interests young people.

This is contrary to the intended outcome of the NC. However, while teachers' professional abilities are judged mainly by students' test scores, they will increasingly be obliged to ensure that examination preparation is dominant within teaching. This approach has favoured more didactic, assessment-led teaching strategies, compounding the notion of 'teaching to the test' (Jenkins 2000a). Within this type of 'learning experience', students are unlikely to develop a broader range of the skills and characteristics, so important for their continuing education, life and work.

2.2 THE SCIENCE NC

Science, a 'core', statutory subject for 5-16 year olds, maintains its position alongside literacy and numeracy in being allocated around 20% of curriculum time. Encompassing aspects of Physics, Chemistry and Biology, the Programmes of Study for NC Science encourage the development of investigative and process skills. Recent changes focus on improving the status of practical and experimental Science and scientific literacy, the former having proven difficult to standardise and assess.

In a reassessment of Science education, Millar & Osborne (1998) emphasised that although curriculum change has been continuous since the introduction of the NC, it has not been accompanied by a corresponding revision in the Science 'content'. They consider that the current curriculum still retains 'its past, mid-twentieth-century emphasis, presenting science as a body of knowledge which is value-free, objective and detached' and to be predominantly 'a succession of 'facts' to be learnt' (ibid.: 2004). Indeed, strongly influenced by its assessment procedures, the Science curriculum has increasingly become focused on factual recall which bears little relationship to reality beyond the classroom (Millar & Osborne 1998).

Consequently, whilst the implementation of the Science NC was intended to deliver a standardised pupil entitlement, it has come to be viewed as inflexible and limiting to teachers' professionalism. Jenkins (2000b, *adapted from pg 19*) summarises these fundamental difficulties in terms of four areas. The NC has:

1) <u>become constraining and inflexible,</u> limiting the possibility of adjusting the Science curriculum to suit particular localities or students' needs, especially those of less-able students.
2) <u>lessened professional authority</u> especially in terms of the discretion teachers exercise over choice of content and pedagogy. This has been compounded by increased bureaucratic and administrative responsibilities demanding more of teachers' time, almost certainly to the detriment of their Science teaching. These responsibilities are associated significantly with the assessment and monitoring systems.

3) reduced laboratory work, with teachers tending to focus mainly on assessment-oriented activities and to avoid where possible, practically based laboratory experiments.
4) diminished personal satisfaction for students' and staff in relation to their enjoyment of Science.

The impact of such difficulties reduces the diversity of pedagogy, where Science is delivered mainly as an information-giving, rather than an information-finding subject (Osborne 2000). Repetition of material is increasingly common in order to maximise achievement. These teaching and learning strategies affect students' view of Science, by focusing less on innovative and creative processes, and more to fact acceptance and retention. The opportunity for development of scientific process and personal skills is subsequently limited, in turn influencing students' perceptions of the nature of Science.

Although students may have benefited from a broader and more balanced spectrum of scientific content, the implementation of the NC has increasingly marginalised the opportunity to explore personal interests (Donnelly 2000b, 2000c, Jenkins 2000a). Teachers consider the Science curriculum to have fewer opportunities to relate learning to 'real-life' or familiar contexts. The opportunity for innovation within Science teaching thus is curtailed, as teachers reduce activities considered to be extraneous and potentially time-consuming, such as practical work or discussion opportunities (Osborne & Collins 2001). Although recognising its potential in aiding the understanding of scientific principles, and in motivating and enthusing students, teachers increasingly refer to practical work as time-consuming and difficult to manage effectively (Donnelly 2000c). More commonly, investigative Science is undertaken as an assessment-driven exercise, and less frequently as an integral learning experience aimed at promoting the development of process skills and attitudes (Nott & Wellington 1999).

Henderson (2000: 26) reflects this concern, suggesting:

> One of the major failings of the National Curriculum is the amount of content it has tried to force into the teaching time available. This has had the effect of making many schools deliver science in a hot-house fashion, where facts are crammed into pupils' minds... Also, in spite of the efforts of Science 1, [the investigative science programme of study], there is seldom the opportunity to do genuine investigative work. The Sc1 model of scientific investigation is philosophically flawed and pupils take little pleasure in jumping through the artificial hoops that the assessment criteria of Sc1 demand.

Nott and Wellington (1999) also highlight how the level of differentiation within the curriculum has been negatively influenced. They consider that content differentiation is often related to setting or banding students on the basis of academic ability, and rarely from offering students' different learning activities. This proves increasingly challenging for less-able students who lack adequate skills or understanding, or conversely higher ability students who lack sufficient challenge in their work. Such limiting opportunities can impact negatively on students' self-esteem and may lead to frustration, disinterest or disaffection towards Science.

Osborne & Collins (2001) reported that parents and students view Science as a valued and prestigious subject which has relevance to future career planning. Disparagingly, however, Osborne (2000) also found that many students find the latter years of their Science education to be a rushed experience, dominated by content, repetitive of other year groups, fragmented and demotivating. It could be suggested, therefore, that where the NC continues to focus heavily on consensual, well-established Science learning, with little opportunity to consider the importance of Science in contemporary society, its relevance and influence on students' motivation may be compromised. The impact of this may ultimately be reflected in the uptake of Science at post-16 level, which has already been found to be declining. Osborne & Collins (2001: 461) recognise that the increasing use of didactic teaching strategies, intentionally or otherwise, is 'harming the long-term interest of science in our culture'. Where teaching is directed purely as a process of acquiring the 'correct' facts for passing examinations, students' interest and curiosity may be stultified and lead to Science inevitably being viewed as a more traditional, and less creative subject.

Jenkins (2000b) also highlights teachers' feelings of diminished professionalism that has resulted from judgements being made about their proficiency based on students' test scores, suggesting:

> ...that more is needed, and that this 'more' must restore to science teachers a stronger sense of professional ownership of, and greater control over, their own work. Arguably, achieving this within a system of public accountability that commands the confidence of government, parents and others, is a major challenge facing government in the early years of this new century. (Jenkins 2000b: 20)

Donnelly (2000c: 33) suggests that, for the situation to improve, a balance must be achieved between teachers' authority over their work and their accountability. He considers that Science teachers may benefit from endeavouring to maintain authority over their styles and pedagogies, despite the increasingly prescriptive guidelines, to avoid mainly focusing on predetermined reliable activities aimed mainly at ensuring good performance (Donnelly *et al* 1996).

2.3 TOWARDS IMPROVEMENT IN SCIENCE

At a national level, the Key Stage 3 (KS3) Strategy and Science literacy initiatives have focused increasingly on teachers' and students' scientific abilities.

The KS3 Science Strategy (2000) attempts to provide a comprehensive strategy for the professional development of teachers, focused on addressing students' declining engagement with Science and improvement of examination standards. It emphasises the use of a wider range of teaching and learning approaches, such as those promoted within the active teaching and learning community (Centre for Science Education 1992), with differentiation, progression and continuity targeted at improving attainment in national scores at age 14.

Scientific literacy initiatives aim to steer the curriculum to provide 'sufficient scientific knowledge and understanding to enable students to read simple newspaper articles about science, and to follow television programmes on new advances in science with interest' (Millar & Osborne 1998: 2000). This has been described as a way in which young people may have an increasingly relevant experience of Science. Through encouraging the development of understanding in 'everyday' Science in such initiatives, it is hoped that a larger number of people will have access to Science within society and be better motivated towards learning and achievement.

2.3 SUMMARY

The introduction and implementation of the NC undoubtedly had a major influence on how Science is taught and impacts on students' experience. Millar & Osborne (1998: 2030) reflect the view of a vast majority of teachers, educational researchers and educationalists.

> Essentially, the fundamental problem for the current system, which is not unique to science education, is that there exists no mechanism for systematically encouraging innovation and curriculum development. Indeed, the climate of league tables, inspection and National Curriculum tests is a significant disincentive to any school or individual to step outside the normal framework of provision.

As Science continues to be a significant and increasingly integral part of the modern world, the school curriculum must recognise its progressive and creative culture. Recent reforms have focused on improving the relevance of the subject matter, by prompting pedagogy aimed at increasing students' motivation, interest and engagement. Continued commitment to improvement and diversity will benefit teachers who search to work flexibly with the NC, avoiding a prescriptive approach.

The current emphasis on students' personal development through subject teaching is minimal, as focus is placed mainly on the assessed curriculum. This is a great opportunity missed, where the development of creativity, problem solving and other skills can potentially be promoted whilst learning Science. This study promotes the explicit recognition of PCs, suggesting that where Science is delivered in a manner which is dissociated from students as individuals, the relevance and purpose is compromised. It suggests that whereas the NC has been useful in ensuring provision and entitlement of Science, it has lacked sufficient focus on students' personal development. This study has assumed that all teachers are responsible for planning for students' personal improvement through their subject teaching, and has endeavoured to find methods to promote this change.

CHAPTER 3

The Demand for Skills

This chapter reviews the changing requirements of the employment sector, due to the increasing advancements in technological and digital systems. The improved access to information and reduction in labour-intensive work practices has been found to require employees to utilise a diversity of generic and personal skills in the workplace. The education sector has a crucial role to play in the development of these skills, which are said increasingly to be of influence for commercial success. This chapter, and the following two, represent the way in which the research addresses the first aim of the study, to establish the relevance and operational definitions for the Personal Capabilities for use within a curriculum context.

3.0 INTRODUCTION

> Learning is the key to prosperity.... Investment in human capital will be the foundation of success in the knowledge-based global economy of the twenty-first century. (The Secretary of State, DfEEa, 1998: 7)

The world of work is fast changing. Over the past decade the government, policy makers and businesses have placed increasing interest on the influence of rapid technological advancements in workplace systems (Confederation of British Industry 1989, British Chambers of Commerce 1989, Department for Trade and Industry 1998, 1999, Davies 2002). Employers progressively demand high levels of competence and skill from their new employees in order to maintain a competitive edge in the global economy (Campbell 2001, Felstead *et al.* 2002). Unfortunately, however, in some sectors it is widely believed that Britain has experienced a decline in the number of high-quality employees with the necessary skills and competences to allow them to compete successfully in an increasingly demanding workplace (Campbell 2001). These occurrences are seen as contrary to the needs of the economy and have led to substantial investment by government and key stakeholders, in an attempt to redress the skills gap through additional training.

The 1989 Confederation of British Industry (CBI) report, 'Towards a Skills Revolution', expressed the concerns of the business sector, stating that:

> The skills of the United Kingdom workforce compare poorly with those of our principle competitors. Skills shortages combined with falling numbers of young people and the accelerating pace of technological change all add to the seriousness of the situation... To maintain and improve Britain's position in an increasingly competitive world nothing short of a skills revolution is required. Action is urgently needed. (CBI 1989: 7-9)

That was the view then, and over a decade later major skills shortages continue to be reported in the United Kingdom (UK). It is increasingly considered that for youngsters to possess the adequate knowledge and skills for success in the developing knowledge society, they must be encouraged through relevant and focused opportunities whilst in mainstream education. Seltzer and Bentley (1999) consider that not only must youngsters acquire academic knowledge and qualifications, but they must be equipped with vocational and 'transferable' skills relevant for real workplace environments. It is increasingly important for youngsters from a broad range of disciplines to capitalise on their knowledge and skills and be able to apply them in creative and innovative ways. Youngsters' abilities to work effectively in teams, solve problems, communicate, be creative and forward thinking, are seen as fundamental to individuals' and business' success. Much of the evidence is anecdotal, and there appear to be no long-term comparative studies of school-leaver skills. However, the views just outlined are widespread.

3.1 THE WORKPLACE

It is widely accepted that business and commercial practices have undergone significant changes over the past decade, with further developments forecast in line with technological developments and global competition (Department for Trade and Industry 1999). Although the future requirements of the employment sector are difficult to predict, there is a growing consensus regarding the need for skills, competences and attributes required from most employees (Haskel & Holt 1999, National Skills Task Force 2000). A number of skills 'hotspots' continue to plague this development, notably 'intermediate' level skills, ICT skills, generic and 'transferable skills', numeracy and management skills (Campbell 2001).

Technical abilities were previously given more prominence within industry, but the contemporary workplace has come to rely more significantly on personal competences and inter-personal skills. The Department for Trade and Industry (DTI) 1998 White Paper, 'Our Competitive Future', highlighted the government's concerns in this area and called for education and business to recognise that, 'the UK's distinctive capabilities are not raw materials, land or cheap labour [but] must be our knowledge, skills and creativity' (1989: 3).

The DfEE (1998a) also endorsed these motives in the consultation paper, 'The Learning Age: a renaissance for a new Britain'.

> The information and knowledge-based revolution of the twenty-first century will be built on a very different foundation – investment in the intellect and creativity of people. (DfEE, 1998a: 9)

This document focused particularly on the need for skill development to be underpinned by a good level of knowledge and understanding. It was suggested that opportunities for improving a range of competences, be they academic, technical or vocational skills, and should be enhanced to engender an ethos of lifelong learning.

3.2 INFORMATION AND KNOWLEDGE

Availability and access to information is significantly improving with the wider-scale use of television and the Internet, thereby altering the form in which knowledge can be acquired. Potential access to cross-global information databases in relatively short periods of time means that the need to access paper-based archives to acquire information and knowledge are likely to decline. This improved access to information has the potential to limit the need for people to memorise and retain large amounts of information.

The availability of information, however, will not in itself result in the formation of knowledge. The Internet makes accessible vast information sources which, however, remain dormant until individuals interact with them, associating new information with existing knowledge and previous experiences. Knowledge, however, can only be acquired when it is effectively accessed, processed and refined within particular contexts. Due to this, increased attention is being paid to the skills which enable individuals to effectively find, interpret, use, manage and develop new knowledge, as opposed to its memorisation and retention. The style of working within businesses subsequently requires rapid alteration from labour-based jobs, in line with the use and advances of digital technology. Businesses are increasingly becoming aware of the relevance of peoples' competences and skills, identifying the role of 'knowledge workers' in the contemporary workplace.

'Knowledge-workers' is a term used to describe, 'people who use their heads more than their hands to produce value' (Horibe 1999: xi). It is a relatively new concept which describes a relatively small sector of individuals at present, however is forecast to be of increasing influence. It is used to characterise individuals, who, having developed a high level of proficiency in their work, capitalise on their own knowledge within the company for the benefit of others and overall productivity. They are influential due to their innovative and forward-thinking approaches, supported by confidence in their abilities. The generation of creative and innovative ideas, the efficient use of human and structural resources, and a commitment to explore new opportunities whilst striving to maintain good interpersonal relationships, are characteristic features of this worker. Knowledge workers specifically endeavour to pursue optimum productivity and quality in the workplace, by diversifying the knowledge and expertise within it. They efficiently identify, select and capitalise on wide ranging information, and effectively manipulate it towards achieving a competitive advantage. The increased diversity and accessibility to information sources is crucial to these workers who rely on up-to-date, broad-ranging knowledge, for on-going commitment to life-long learning.

The skills required by knowledge-workers are not exclusive to their role, and are increasingly relevant to most individuals. Honey (1995: 5) categorised eight process skills which he considered to be 'universal to all knowledge workers...

transcend horizontal and vertical organisational divisions, occupational barriers, company and industry lines, and regional and national borders... and remain constant during periods of rapid and unpredictable change.' He recognised these to be, the ability to:

- define purpose
- establish goals
- focus resources
- manage priorities
- measure effects
- own the performance
- influence the participants
- continue the improvements.

Similar competency frameworks outline skills and characteristics which are considered to be influential in improving productivity, personal and corporate success, and lifelong learning (Boyatzis 1982, Goleman 1996, Smith & Spurling 1999). Many of these frameworks highlight the influence of personal skills alongside those of professional and technical abilities.

3.3 THE DEMAND FOR SKILLS

Over the past fifteen years government-commissioned reports have stressed the influence of technological advancements on industry and businesses (Felstead *et al.* 2002). They have increasingly focused on the skills and competences required within this sector, and the level of provision that has been achieved. The National Skills Task Force (2000) research report continued to echo the relevance and demand for skills, specifically targeting generic and personal skills, and encouraging the education sector to focus attention on their development.

The 'Labour Market and Skills Trends in Britain Report' (1997) suggested that:

> Overall, new jobs are likely to arise in skill-intensive, knowledge-based occupations, in services and manufacturing. An increase in higher level qualifications and skills will be needed to match such occupational change. (Skills & Enterprise Network 1997: 3)

Key organisations such as the British Chambers of Commerce (BCC), DTI and CBI, continued to express concern with these shortages, recognising the potential the education sector could have on targeting improvement (BCC 1998).

More recent reports have reiterated similar issues, stating that:

> Over the last four years, most generic skill requirements of jobs have risen. Nine out of ten of the measures of generic skills show a rise, the exception being the use of physical skills which has not changed. (Felstead *et al.* 2002: 10)

Currently, the main deficiencies lie in generic skills, relating to technical and practical skills. Beyond these, employers identify communication, team working and problem solving to be prominent areas of skill shortage, especially in managerial, personal service, operator and professional services (National Skills Task Force Report 2000). The impact of these and other skill deficiencies is found to significantly influence employer productivity.

> [The skill shortages] have negative consequences for *one in four* of all establishments which are actually undertaking recruitment, particularly faster-growing establishments. The principal effects of such shortages are difficulties in meeting customer service objectives, delays in developing new products or services, increased operating costs and difficulties meeting required quality standards. (National Skills Task Force 2000: 98)

The BCC endorsed the provision of skill development within mainstream schooling, suggesting that personal and social education 'could provide the vital ingredient in the development of transferable and personal skills' (BCC 1998: 21). They suggested that attention should be paid to them during primary years, since young peoples' behaviours and attitudes were significantly well grounded by the age of eleven.

In light of these demands, the government has endeavoured to direct specific support to address the skills shortages. The establishment of the National Skills Task Force has contributed to the development of the National Skills Agenda, the founding of the Department for Education and Skills (DFES) 'Skills Unit' focuses primarily on the integration of Key Skills, the University for Industry also provides a learning network using modern communication systems, the Basic

Skills Agency and various youth and adult support programmes such as New Deal and Aim Higher.

Developments in mainstream education, especially at this young age, are, however, relatively slow and are manifest mainly in Personal, Social and Health Education (PSHE), Religious Education (RE) and the new Citizenship curriculum (QCA 2001). The BCC also suggested a strategy, pertinent to this study, of the integration of skill development *through* the subject curriculum, however it continues to lack exploration on a wider scale.

> In order to make a more effective impact on all young people, a more comprehensive approach to teaching key skills in the curriculum is required. Where possible, the teaching of key skills should be incorporated into the teaching and assessing of all curriculum subjects rather than adopting a bolt-on approach which the Key Skills certificate could produce. (BCC 1998: 21)

3.4 THE ROLE OF EDUCATION

Despite the increased emphasis described above, the notion of intelligence encompassing the interrelationship between personal, academic and professional skills is not fully exploited within current educational settings. Most commonly, initiatives aimed at raising educational standards have resulted in government policies focusing mainly on the standardised assessment of subject knowledge. Teachers are increasingly directed by government to improve academic standards, specifically in terms of the basic skills of literacy, numeracy and information technology, and although highly significant, these initiatives do not fully recognise or accredit the development of a broader range of personal skills, attributes or characteristics.

The prescription and integration of skill development initiatives within existing curriculum structures was stimulated by the Dearing Review (1996) of Advanced (A') Level syllabuses, following which 'Key Skills' were designed to be incorporated into regular course delivery. 'Key Skills' was the term given to a range of skills previously identified as 'core skills' by Kenneth Baker, the Secretary of State in 1989. The Key Skills curricula were aimed at post-16 education, targeting six areas of development: communication, application of number, information and communication technology (ICT), working with others, problem solving and improving own learning and performance. These skills have long been established in vocational training courses, however Dearing recommended that they should be 'signposted' in A' Level courses, with assessment material provided by examination boards, in line with guidance by what is now called the Qualifications and Curriculum Authority (QCA). To date Key Skills qualifications are optional for students undertaking full-time post-16 study, however Millar and Osborne (1998) highlight their inclusion in future A' Level modules in the 'Curriculum 2000' publication.

The Secretary of State's Proposals for the revised NC (QCA 1999a) also highlighted the need for the integration and focused development of a range of broader skills and aptitudes within compulsory schooling for primary and secondary schools. Blunkett (QCA 1999a: 12) requested that the QCA:

- provide guidance with the revised National Curriculum [for Key Stages 1-4] on ways in which key skills can be developed in individual subjects and across the school curriculum;
- provide guidance with the revised national curriculum [for Key Stages 1-4] on ways in which schools can develop a range of broader skills and aptitudes through individual subjects and across the school curriculum.

Despite these recommendations, little has been achieved, the fruition of these suggestions is slow coming, and, availability of research to inform policy is minimal. Key Skills remains focused at post-16 or vocational course level, and it is undoubted that the constraints on time and the requirements of heavily prescribed curricula create obstacles for the whole-hearted inclusion of personal skill development in core subject areas, as described in Chapter 2.

Key Skills have emerged from previous references to 'core' or 'common' skills, and has been used since Dearing's 1996 report. In February 1989 the merits of incorporating core skills into post-16 education were outlined by the Secretary of State for Education, from which a wide range of associated organisations, i.e. the National Curriculum Council, Council for National Academic Awards, Schools Examination and Assessment Council (SEAC) and the Further Education Unit, were consulted to report on core Skills for A/AS levels. Early specifications were developed by a task group, since which they have frequently been referred to as transferable or generic skills and linked most typically with vocational initiatives such as the Youth Training Schemes in the 1970's and 80's, and more recently as Key Skills within the General National Vocational Qualifications and Advanced Level Vocational Certificates of Education (AVCEs). The integration of the Key Skills in post-16 education is now becoming increasingly commonplace, and support is expressed that:

> ...it is far better to possess the skills required for how to improve knowledge than to have an enormous body of knowledge at one's disposal which is seen to be finite...Skills development complements the growth of knowledge and cannot be separated from it. (Duckett 1998: 56)

Alternatively, others have also voiced strong opposition, suggesting that 'the pursuit of general transferable core/key skills is a wasteful chimera-hunt and should now be abandoned' (Hyland & Johnson 1998: 163). They argued that debate about skill development was redundant due to their undefined nature, and contested the manner in which Key Skills are promoted for development. They suggested that grouping context-independent skills was atypical of their nature, especially high-level skills and qualities which are context-bound. Hyland & Johnson (1998: 170) stated that:

> ... during the last two decades, millions of young people have suffered inadequate vocational education and training... largely because that education and training has been based upon non-existent entities, i.e. general transferable skills. Belief in these entities is based on wishful thinking; transferable skills hold out the promise of producing a flexible and adequate workforce, and of solving problems associated with training people for an uncertain future. Such skills are simply too good not to be true! On the basis of the available evidence, however, drawn from many very different disciplines, we believe that the pursuit of such skills is a chimera-hunt, an expensive and disastrous exercise in futility.

Their views are in the minority, and Quicke (1999) highlights a more common viewpoint, suggesting that the Key Skills are features of knowledge acquisition in any domain, and that communicating and problem solving in collaboration with others is an inherent feature within successful learning opportunities. Quicke suggested that 'knowledge' and 'skills' should be viewed as integral and interdependent discourses in learning, and also accepts the difficulties inherent in their development, appreciating the dictonomy between the rhetoric and practical application of such skills.

3.4.1 Curriculum endeavours

Some curriculum endeavours have initiated the trialing of approaches to include skills and competences in the school curriculum, such as the 'Opening Minds' project (Bayliss 1999, Royal Society of Arts). The think tank, DEMOS, and the Royal Society of Arts (RSA) have requested a re-evaluation of the current curriculum, in order to encourage students to develop personal skills and aptitudes for success in increasingly diverse workplaces (Seltzer and Bentley 1999, Bayliss 1999). There is a growing recognition of the need for the school curriculum to address the development of students' creative, enterprise and entrepreneurial skills, with a view to innovation and change becoming more forthcoming in future work and society.

Encouragingly, the government's education strategy for 2006 (DFES 2001) highlights this as a key objective, seemingly recognising and valuing the potential influence of students' personal qualities alongside subject knowledge development. Millar & Osborne (1998) consider that sustained and systematic provision to develop these skills should come through the 5-16 curriculum.

Radical changes in curriculum design, moving towards a competency-led curriculum have been suggested (Bayliss 1999), however remain in their pilot phases. A larger initiative began in the Republic of Ireland, where a 'Transition Year' was introduced in 1994 for 16 year-old students. This provides an optional one-year programme between secondary and sixth form years, aimed specifically at broadening the scope and educational experience of youngsters. It has been designed to bridge the transition from highly structured learning environments of secondary school, to those requiring increased personal responsibility for learning during sixth form and university years. Students are encouraged to develop a range of transferable, critical thinking and creative, problem-solving skills, to prepare for the changing demands of the adult work place and relationships (Woods 1998). Such changes are also beginning to permeate the primary and secondary curriculum in Northern Ireland, and the latest Curriculum Review (Council for the Curriculum, Examinations and Assessment 2001) has indicated further changes in the delivery of all subjects across all Key Stages.

These initiatives, and others, e.g. Progress File (2002), have recognised the role the education sector has in explicitly developing youngsters' personal skills. However, the challenges of assessment and delivery continue to be explored. It is true to say that personal skill development has, for many years, permeated students' learning experiences, however explicit and more focused interventions aim to recognise the importance of these areas, and, as such, aim to contribute to addressing the skills shortages in the workplace.

3.5 SUMMARY

The demands on individuals entering employment seem increasingly competitive. Recruitment and job progression relies heavily on both good academic and personal skills, and the change in work-related systems places increased emphasis on the manipulation and transmission of information and knowledge. The education sector has been stimulated to better appreciate its influence on engendering youngsters' communication, teamwork, problem solving, ICT skills etc., through the design and introduction of skill-related initiatives. Further development, however, will be required if they are to improve generic and personal skills to the extent that they impact on the identified skills shortages. Focused inclusion within regular subject teaching, within the primary, secondary and tertiary years, could positively influence these attempts, and add value to their impact.

CHAPTER 4

Defining the Personal Capabilities

This chapter explores the relationship and differences between the concepts of skill, competence and capability. The basis and theoretical background to PCs is reviewed.

4.0 DIFFERENTIATING SKILLS, COMPETENCE AND CAPABILITY

The interplay of usage between terms, such as 'skills', 'competences', 'capabilities', 'aptitudes', 'characteristics' and 'intelligences', often shrouds the fundamental differences between the concepts. Associated literature makes distinction between 'transferable', 'generic', 'core' and 'key' skills - terms which have established meanings in particular fields. However, the difficulty of defining these terms often lies in attempting to capture various elements of human nature.

The following section clarifies the working definitions of terms used in this study.

4.0.1 Skills and Competence

Skills can be viewed in relation to their method of assessment, which identifies them as highly mechanistic behaviours, often disassociated from the individual or context within which they are displayed. Their assessment may be undertaken in a knowledge-free, value-free, emotion-free and context-free manner. Individuals may therefore be considered 'skilled' or 'skilful' in isolated environments, using performance-specific indicators. In this way, the definition of skills has paid little regard to individuals' understanding, disposition, values and emotional maturity (Barrow 1987).

The working definition used in this thesis for *'skill'* is *'a practical ability'.*

'Skilled' individuals therefore demonstrate aptitude in a particular behaviour or performance. The quality or frequency of performance may, however, not be taken into consideration at this stage. For example, individuals may demonstrate the ability in a skill, and therefore be identified as 'skilled', irrespective of the proficiency or frequency of their performance it. To this end the level of skill is not necessarily acknowledged.

The working definition used in this thesis for *'skilled'* is *'demonstrating aptitude in a practical ability'.*

The relationship between skills and competence relates, therefore, to the level of proficiency with which an individual is able to demonstrate a skill. It is assumed that individuals are more or less competent, dependent on the dexterity they show during performance. This suggests that competence is an indicator of developing skills, and differentiated by the quality and frequency of performance.

Eraut (1994: 164) identified the difficulties associated with the use of 'competence', explaining that:

> ... the very use of the term 'competent' carries some performance-referencing, although it may be neither extensive nor specific. It tends to be treated as a characteristic of the person rather than a statement about the range of their competence.

He considers competence to be defined by two dimensions, its scope and quality. Eraut (1994) suggests that the scope of competence illustrates what individuals are competent 'in', i.e. the range of roles, tasks and situations in which they show competence. The quality of competence relates to the level of proficiency individuals display within the performance, which enables comparisons to be made between individuals.

Being identified as 'competent', however, does not ensure consistently high performance, and Messick (1984) relates 'having competence' to what individuals know or can do under *ideal* circumstances. Individuals may illustrate varying levels of competence in different circumstances, such that 'performance is what is directly observable, whereas competence is not directly observable, rather it is inferred from performance' (Gonczi 1997).

The working definition used in this thesis for *'having competence'* is *'demonstrating a level of aptitude in a practical ability in a range of circumstances'.*

Ashworth (1992) considers that competency models have focused too strongly on performance indicators, and not enough on the understanding and knowledge underpinning the function. He suggests that for individuals to 'be competent', is to merge the three concepts of performance, understanding and knowledge. The National Skills Task Force (2000: 21) recognises that skills 'go hand in hand with knowledge', and endorse that although 'some skills can be performed without a good level of underpinning knowledge and understanding... to apply skills in a wide range of contexts and situations demands a fundamental level of knowledge related to that skill'.

Ashworth (1992) also suggests that competence is often assumed to be an individual's property, thus adopting an individualistic orientation. In making this assumption, competence, which is shown in collaborative interactions, is often interpreted without appreciating the influence of the relationships between the individuals. The components of success and competence are thereby directed to particular individuals, which detracts from the very nature of the teamwork in which it was exhibited.

He describes how 'competences' are often defined within the analysis of behaviours, referring always to activities which individuals can perform. Although not fully accepting of this, Ashworth (1992) confirms the synonymous relationship between the defining features of competences and skills.

The range of discussion in this area is broad, and further explained through the identification of models of competences by writers such as Dreyfus & Dreyfus (1986: 123) and Berliner (1986). For further discussion read respective documents, however the current study considers the definition of Fredric *et al.* (1982: 60-61) to be pertinent to its needs.

> Competence… is the ability to carry out a set of tasks or a role adequately or effectively; performance is the actual carrying out of tasks or role; and competent performance is the actual carrying out of the tasks or role adequately… Competence is generally neither wholly possessed by someone nor wholly lacked, it exists in degrees, and a person is either more or less competent in relationship to some standard or frame of reference…[Therefore] definitions of competence can be couched in terms which set minimally acceptable levels which require excellence (maximal competence) or anywhere in between.

The notion of competences and skills being an interplay between performance, knowledge and understanding within varying contexts, has been incorporated into this study and is illustrated in the interventions devised for PC development (ref. section 7.3.2).

4.0.2 Capability

Ashworth (1992) considers 'skills' and 'competences' to relate to highly mechanistic activities, posing difficulty in categorising less tangible activities, such as being creative, innovative, assertive or compassionate. Where the nature of performance is more elusive, relying on instinctive or intuitive mental process, the identification and assessment of particular skills is problematic. The implications of this are the inadequate defining of such aptitudes as skills or competences. As this study focused on areas of personal development, including skills, competences and other aptitudes, the term 'capability' was explored.

The notion of capability was encouraged by the RSA in 'Education for Capability' (Burgess 1986: 55), where capability was defined as:

> A person's general capacity to manage his own life, to cope with his environment, to profit from experience, to master what used to be called the art of living, to reach sensible decisions and act on them.

Burgess' definition focused specifically on selected areas of development, however, this study required his notion of 'general capacity' to extend the range and scope of individuals' performance of any behaviour.

Dictionary definitions identify capability as the 'ability for action', recognising the developmental nature of the term, and also its applications towards performance (MacDonald 1981). Within this study, the notion of 'capability' aimed to describe the capacity to perform a range of behaviours. It was accepted that individual differences, varying contexts, and level of provision and preparation, may affect individuals' development and performance, and that individuals may also implicitly or inherently acquire capability.

The working definition used in this thesis for '*capability*' is '*the capacity to demonstrate a range of behaviours'.*

4.0.3 Context

The issue of context is particularly significant to this discussion, as the transferability of skills has increasingly been accepted within the education sector, despite lacking empirical evidence to support these claims (Neath 1998).

Contexts are made distinctive by the specific elements that individuals are exposed to, and which impact on performance. It is questionable whether individuals demonstrate similar skill dexterity or proficiency in different environments, which may subsequently affect their perceived competence. This can be influenced by various factors such as emotional state, health and familiarity. Skills, competences and capabilities cannot therefore be viewed as isolated mental or physical activities, but gain meaning from individuals' contexts, and disposition during the performance. Consideration of the implications of context on individuals' capacity to demonstrate personal capability has been recognised within this study.

4.0.4 Summary

The problematic nature of identifying and assessing skills, competences or capabilities is increasingly apparent through the review of literature, and is compounded by the inconsistent use of the terms within associated literature. The working definitions within this chapter provide the clarification of terms used in the study.

'skill' – a practical ability

'skilled' - demonstrating aptitude in a practical ability

'having competence' – demonstrating a level of aptitude in a practical ability in a range of circumstances

'capability' – the capacity to demonstrate a range of behaviours

4.1 ESTABLISHING THE PERSONAL CAPABILITY FRAMEWORK

4.1.1 Relevant capabilities for personal success

> In the Learning Age, equipping people with the right knowledge and skills will be crucial to maintaining high and sustainable levels of employment and price stability. It will also improve productivity. (DfEE 1998a: 33)

Many attempts have been made to categorise, list and group the behaviours, characteristics, skills or competences, which are considered to be influential to successful personal, professional and social development. Competence frameworks are plentiful for different aspects of employment and education, such as Honey (1995) who identified twenty-three core competences from a range of eight process skills; Bayliss (1999) who considers five broad categories for competence development; Goleman (1998) who identifies five main areas of personal and social competence. Within current educational policies, skill and competence development is identified in the NC, and also in Key Skills (QCA 1999b), PSHE (DfEE 1999b) and Citizenship (QCA 2000) curricula. For a review of the range of competency frameworks reference Bradshaw (1992).

During the initial stages of this study, the range of skills and competences within such frameworks were reviewed, to categorise and identify the most commonly identified areas. Table 4.1.1 provides an illustration of five of the frameworks, highlighting their relationship with the PCs, which contributed to the identification of the framework.

The current study: PCs (2002)	Honey (1995)	Goleman (1998)	Bayliss (1999)	Key Skills (QCA 1999b)	PSHE (DfEE 1999b)
Positive Self Image	Positive Self Image Independence	Self Confidence, Optimism		Self Awareness *(inherent within all Key Skills units)*	Developing confidence and responsibility and making most of their abilities, feel positive about themselves
Self motivation		Achievement drive		Improving own learning and performance	
Self Management	Self development orientation		How to take charge of your learning, How to manage risk, How to mange your time	Improving own learning and performance	
Teamwork		Building bonds Collaboration and cooperation Team capabilities Leadership	How to work well in teams	Working with others	Take responsibility, Developing good relationships between people, participate, meet and work with people, negotiate,
Verbal Communication		Communication	How to communicate effectively with others	Communication	Communicate confidently with peers
Tenacity	Tenacity Adaptability Flexibility Thoroughness	Adaptability Conscientiousness Commitment	How to cope with change coming at you	*Related skills included in various units, e.g. dealing with difficulties*	
Problem Solving				Problem Solving	
Creativity	Innovativeness, Initiative	Innovation Initiative	How to make the best of creative talents	*Mainly in higher level Key Skills units*	
Critical Thinking	Critical information seeking, Conceptual, strategic & analytic thinking		How to evaluate and appreciate information	*Mainly in higher level Key Skills units*	Find information and advice
Social Intelligence	Interpersonal Awareness	Adaptability Influence, Understanding others	How to deal with other people and value them	Working with others	Developing good relationships between people, recognise good will is essential for positive relationships, to respect the differences between people. Prepare for change

Table 4.1.1: **Summary of commonality between competency frameworks**

4.1.2 The basis for Personal Capabilities

The PC framework drew on the cross-referencing of a range of related literature (ref. section 7.3.1), and is associated with the concept of 'multiple intelligences' (Gardner 1983, 1993).

Multiple intelligences are representative of Gardner's (1983) considerations that the human mind is an amalgamation of autonomous psychological processes which interact to form human intelligence. His work on the plurality of human intelligences proposes the existence of seven or more forms of intelligence, which extends the views emerging since the early 1900's, from the introduction of factor analysis by the English psychologist Spearman (1904) and Thorndike's (1920) work on the complexity of human intelligence. Spearman supported the notion of a single general factor of intelligence (*g*), however also considered a range of specific factors, to influence performance in single forms of mental ability, such as arithmetic computations. He considered that 'g' pervaded all tasks, and therefore was the most important form of information to have about a person's intellectual ability. Thorndike's work de-emphasised the notion of a general intelligence, considering it to be analysable as three classes, that of abstract/analytical intelligence, mechanical/performance intelligence, and social/practical intelligence, considering that:

> ... the facts of every-day life, when inspected critically, indicate that a man has not some one amount of one kind of intelligence, but varying amounts of different intelligences. (Thorndike 1920: 228)

These views competed with others of the time, such as Terman (1916), who considered intelligence to be proportionate to an individual's ability to carry out abstract thinking. Thurnstone's Multiple-factors theory (1924) further indicated that intelligence is made up of several primary mental abilities rather than a general or several specific factors. He proposed seven primary mental abilities, such as verbal comprehension, word fluency, number facility etc., which have been used to profile individuals' performance. Later work by Wechsler (1940) and Sternberg (1977) also illustrated marked differences in performance between individuals with suggested identical Intelligence Quotients (IQs), thus demonstrating a more sophisticated view of intelligence than that offered by the notion of general intelligence.

These observations, and his own, led to consideration of multiple forms of intelligence (Guildford 1936) to indicate the individual differences among people. Gardner's more recent work has led to the broader acceptance, of a range of intelligences, including logical-mathematical, linguistic, musical, spatial, bodily-kinaesthetic, interpersonal and intrapersonal intelligence. More recently naturalist intelligence, spiritual intelligence (Gardner 1999), artificial intelligence

(Negnevitsky 2001), and emotional intelligence (Mayer and Salovey 1993, Goleman 1996) have also received interest.

Gardner considers the range of intelligences to explain the differences in human personality and performance and has illustrated the potential impact of his work in educational sectors (Gardner 1989). His research has undoubtedly broadened the scope of the concept of intelligence, and illustrates how academic performance is less adequately related to one form of general intelligence. Other fields of research, e.g. that focusing on 'accelerated learning' (the development of thinking strategies to enhance learning potential), is strongly based on Gardner's work, emphasising the need for educationalists to be aware of the many facets of human intelligence (Smith 2000).

4.1.2.1 The Personal Intelligences

The 'Personal Intelligences' (Gardner 1983) are of particular significance to this study, endorsing the relevance and importance of a range of interpersonal and intrapersonal skills and characteristics.

'Intrapersonal intelligence' relates mainly to the thoughts, opinions, values and feelings an individual has about him/herself, and his/her status in life. It is influenced by their ability to reflect on and focus emotions and feelings, in order to understand and guide behaviour and performance. 'Interpersonal intelligence', however, focuses more specifically on interactions with others, such that individuals are better able to understand and interact effectively with others. The use of effective communication, as well as the ability to empathise, are skills associated with this area (Gardner 1993). Evers *et al* (1998) also consider intrapersonal intelligence and self-management to be prerequisites to the effective management of people, skills which Goleman (1996) endorses within the emotional intelligence literature. He considers both intra- and interpersonal effectiveness to be influential in all aspects of professional and social life.

The increased interest on these areas of intelligence implies that the education system to look towards broadening the scope and assessment of teaching and learning in schools, and Gardner (1993: 7) suggests that:

> We should get away altogether from tests and correlations among tests, and look instead at more naturalistic sources of information about how peoples around the world develop skills important to their way of life.

His work, and associated initiatives, provide a platform for educational reform by highlighting the need for broader scope, quality and value of school experiences in order to target a more diverse range of intelligences. This shift is being recognised in current teaching resources (Smith 2000, Hughes 1999), however is still not fully integrated in the majority of school practices.

This study aims to explore the potential of the integration of PCs in regular Science teaching, such that the perceptions of intelligence relating mainly to IQ and knowledge retention are influenced by an appreciation of the significance of broader skills and characteristics. In this way PCs relate strongly to notions of intrapersonal, interpersonal and multiple intelligences, as shown in Table 4.1.2.

Multiple intelligences		Personal Capabilities	
Logical-mathematical	Sensitivity to, and capacity to discern, logical or numerical patterns; ability to handle long chains of reasoning	Problem solving	Being able to analyse a problem and form strategies to work towards a solution
Linguistic	Sensitivity to sounds, rhythms, and meanings of works; sensitivity to the different functions of language	Verbal Communication	Being able to communicate one's opinions and feelings appropriately, by means of the spoken word
Musical	Abilities to produce and appreciate rhythm, pitch and timbre; appreciation of the forms of musical expressiveness		
Spatial	Capacities to perceive the visual-spatial world accurately and to perform transformations on one's initial perceptions		
Bodily-kinaesthetic	Abilities to control one's body movements and to handle objects skilfully		
Interpersonal	Capacities to discern and respond appropriately to moods, temperaments, motivations, and desires of other people	Social Intelligence Teamwork	Being able to respond appropriately to different situations and people; being able to work well in teams
Intrapersonal	Access to one's own feelings and the ability to discriminate among them and draw upon them to guide behaviour; knowledge of one's own strengths, weaknesses, desires, and intelligences	Positive Self Image Self-motivation Self-management Tenacity	Valuing oneself and one's achievements; being able to motivate oneself to do what needs to be done; being able to take charge of one's own learning; being able to persevere at a task in order to meet deadlines

Table 4.1.2: ***The relationship between multiple intelligences and PCs***

CHAPTER 5

The Personal Capabilities

This chapter reviews each of the ten PCs within the framework in relation to the associated literature in each field. Each PC has been reviewed separately in order to aid the understanding of each area and its influence on personal development.

5.0 THE PERSONAL CAPABILITIES

The approach used to identify the PC framework are described in section 4.1 and mainly in 7.3.1. The operational definition for PCs is:

The generic life-work skills and characteristics that are considered influential to the social, academic and professional lives' of individuals.

Demonstrating personal capability refers, in this thesis, to individuals' capacity to demonstrate the behaviours associated with the skills and characteristics of:

- **positive self-image:** Valuing oneself and one's achievements
- **self motivation:** Being able to motivate oneself to do what needs to be done
- **problem-solving:** Being able to analyse a problem and form strategies to work towards a solution
- **creativity:** Being able to think of and share new or novel ideas
- **verbal communication:** Being able to communicate one's opinions and feelings appropriately, by means of the spoken word
- **critical thinking:** Being able to critically review and evaluate practice in order to improve
- **social intelligence:** Being able to respond appropriately to different situations and people
- **teamwork:** Being able to work well in teams
- **self management:** Being able to take charge of one's own learning
- **tenacity:** Being able to persevere at a task in order to meet deadlines.

The study considers the PCs to be non-subject specific and to be applicable across a range of curricular and non-curricular activities. The PCs framework is non-hierarchical and not exhaustive of the range of skills that can contribute to personal success. It is recognised that differences in interpretation will arise across varying contexts, cultures and age groups and that circumstance and age play an influential role in determining appropriate behaviours for the PCs.

5.1 POSITIVE SELF IMAGE

PC Definition: Valuing oneself and one's achievements

5.1.1 Defining terms

Self-image is associated with the notion of 'self-concept', which is defined by Lawrence (1999) in relation to three aspects of self-perception – self-image, the ideal self and self-esteem. He describes self-image as how individuals perceive themselves with regard to various personal attributes, i.e. clever, stupid, loveable, unlovable etc. He suggests that people also form images based on their most desirable values and aspirations, which they assume to be their 'ideal self'. These images may alter over time and mostly remain in the unconscious. Individuals' perceptions of their ideal self and self-image interact to influence their self-esteem, which illustrates the way in which individuals cope with the discrepancy between the two. Individuals who cope well, illustrate positive or high self-esteem, whereas those who find difficulty coping with the differences are considered to suffer from a negative or low self-esteem.

Although self-esteem encompasses both self-image and ideal self, the PC framework focuses predominantly on the manner in which individuals perceive themselves, as such targeting the development of students' positive self-image.

5.1.2 Judging self-esteem

Wells & Marwell (1976: 3) suggest that self-esteem is:

> ... a vital and broadly relevant conceptual tool for both psychological and sociological perspectives... how people think and evaluate themselves, both as a consequence of basic social conditions and a predisposition for subsequent behaviours, is an essential behavioural construct for interpreting human conduct.

Mruk (1999: 26) also defines self-esteem, relating it to the 'lived status of one's competence in dealing with the challenges of living in a worthy way over time', which introduces two indicators of self-esteem: competence and worthiness. Mruk's definition translates what could be considered a feature of personality into identifiable features, open to judgement and assessment. He suggests that self-esteem is reflected in the proficiency of people's behaviours and actions, and that their 'competence' can be used as an indicator of self-esteem. He stresses, however, that competence cannot be used as the sole indicator of self-esteem, and that the worthiness of the behaviour plays a significant role in making such judgements. Worthiness in this respect relates to a social construct of 'worth' and relates to its value in particular contexts.

Mruk indicates that individuals can incorrectly be considered to have a high self-esteem by illustrating competent behaviour, but whose worthiness is misplaced, for instance, efficient mass murderers, competent liars or skilful abusers. Judging the value of behaviours is therefore important in determining its competence and worth, which, in turn, influencing how individuals' self-esteem is perceived.

5.1.3 The influence of self-esteem

Individuals with high self-esteem may therefore demonstrate competent and worthy behaviours, which can be reflected their ability to cope well with the difference between self-image and ideal self. The influence of self-esteem is reflected in many aspects of personality and directly affects the way in which people tackle tasks or activities. Characteristically, individuals who are considered to exhibit high self-esteem appear to be more independent, self-directed and autonomous. They are considered better able to accept positive and negative feedback well, focus on improvement-related activities, and illustrate self-knowledge.

> Having too little belief in ourselves means that we are so vulnerable that we have to direct our energy toward protecting what self esteem we do have, whereas holding positive (but not exaggerated) beliefs about ourselves and how effectively we conduct our life allows us to turn our attention and energies to more productive interests and activities. (Mruk 1999: 87)

In contrast, individuals who suffer from low self-esteem are considered to exhibit 'classical' or 'defensive' characteristics. 'Classically' low self-esteem describes feelings of inferiority, worthlessness, loneliness or insecurity. Individuals may be found to be anxious, timid, depressed or ineffective, and often sensitive to negative feedback or criticism. Feelings of worthlessness may be so prevalent that any positive information will habitually be dismissed in more severe cases. Alternatively, individuals with 'defensive' low self-esteem are highly sensitive to criticism, and manifest their feelings by seeming overly confident, bragging, putting others down, showing aggression, or becoming preoccupied with work. To illustrate such tendencies for prolonged periods of time can result in a deterioration of their health, possibly leading to depression.

People are considered to act mainly on the basis of their own perceptions of their ability, as opposed to their actual level of proficiency which may vary. Bandura's (1997) work into self-efficacy, exploring the significance of self-belief on overall behaviour, and identifies it as an important mediator between perceived self-image and ability, and actual performance. Bandura (1997) emphasises the difference between self-efficacy and self-esteem, highlighting clear distinctions.

> The concepts of self-esteem and perceived self-efficacy are often used interchangeably as though they represented the same phenomenon. In fact, they refer to entirely different things. Perceived self-efficacy is concerned with judgements of personal capability, whereas self-esteem is concerned with judgements of self-worth. (Bandura 1997:11)

An individual's self-efficacy directly influences behaviour through their choice of activity and its level of challenge, as well as their interest and perseverance towards it. Frequency of external feedback and experiences of success are recognised features of developing and maintaining interest and perseverance on tasks, and thus engenders positive self-efficacy (Coopersmith 1967, Mruk 1999). Improving self-efficacy, in turn, impacts on self-perception and can thus contribute towards improvement in positive self-image and displayed behaviours.

5.1.4 Significance to the PCs

As self-image, self-esteem and self-efficacy contribute significantly to the judgements individuals make about their capability, they have bearing on the way self-improvement is approached. Mruk (1999) considers an individual's perceptions of their abilities and personal attributes to be integral to their aptitude to develop knowledge, skills and understanding, and this can therefore be assumed to influence PC development.

Caine & Caine (1997) consider self-efficacy to be a quality that students need to operate effectively in the future. Those individuals with a strong self-belief in their abilities, who show competence in their behaviours, will more likely succeed within highly demanding environments. As such, the relevance of positive self-image within a framework of personal development emphasises the value and influence of positive self-esteem, self-efficacy and self-image.

Although the PC framework aims to be non-hierarchical, there is an assumption that individuals who are considered to exhibit positive self-image will be better able to outperform those who suffer from poorer self-images, given their improved self-belief. Positive self-image may therefore be assumed to underpin the concept of personal capability, and influences the development and use of the PCs. For evidence of its influence within the study, see section 9.3.8, which suggests that self-image had a significant effect on students' PC development.

5.2 SELF MOTIVATION

<u>PC Definition</u>: Being able to motivate oneself to do what needs to be done

> The degree to which an individual's ability and potential are manifest in performance hinges in the motivation to achieve high standards in the respective domain. High levels of motivation promote a process of selective optimisation in the chosen domain, which implies that personal resources (e.g. time, effort, finances, and social support) are selectively invested and refined in a given domain. (Maciel *et al.* 1994: 81)

Motivation is a feature of human nature which directly impacts on behaviour and performance. It seems to be influenced by individuals' self-image, which if positive, is more likely to result in motivation towards tasks which challenge their abilities. In contrast, individuals with poor self-image, who aim to protect themselves against failure, may be less motivated to undertake challenging tasks, even resulting in task avoidance.

Motivation is intrinsically or extrinsically influenced. Intrinsic motivation is thought to result from the need to satisfy personal curiosity and interests, based on innate psychological needs. Factors which influence this range from the level of challenge, feedback, choice, competition and autonomy in activities, and can lead to increased creativity, self-esteem and self-efficacy. Experiencing success and autonomy are positively influential in maintaining intrinsic motivation, and enable interest and drive to be sustained and perpetuated in other activities. Alternatively, activities which are perceived as placing pressure on individuals, goading them to perform in particular ways, are thought to limit opportunity to exhibit self-determined behaviours, which reduces intrinsic motivation in the long term (Pittman & Boggiano, 1992).

Extrinsic motivation stems from activities which are pursued for the achievement or acquisition of external rewards or public recognition. In this way, individuals exhibit motivation towards gaining pre-set targets, which may or may not suit their personal interests (Pittman & Boggiano, 1992). Externally motivated activities often result in individuals receiving public acclaim in the form of grades, trophies, medals, results or certificates. The motivating feature of such activities stems from the achievement of perceived ideals, where the sense of fulfilment and enthusiasm is dependent on the feedback the individual receives externally or in a wider social setting, as opposed to personal satisfaction.

Within society and education at large, extrinsically motivated activities seem to predominate. Students are encouraged to strive towards acquiring high grades at all levels of schooling, as well as achieving certification in a variety of competitive tasks. Judgements about ability are often made on the basis of externally motivated achievements, as opposed to recognising and nurturing intrinsic interests or curiosities. Given these embedded trends in educational practice, it is of concern that research suggests that, 'intrinsically motivated activities tend to be associated with greater conceptual learning, more creativity, increased cognitive flexibility, a more positive emotional tone, and high self-esteem, than externally controlled activities' (Deci & Ryan 1992: 32).

Marton & Saljo (1984) associate intrinsic and extrinsic motivation with the students' ability to learn. They suggest that 'deep' learning, where individuals construct links between their knowledge and new information, is enhanced when anxiety resulting from extrinsically related pressures are minimised. Their research illustrated that intrinsically motivated activities, where students are relaxed and interested in learning, promote deep learning, and limit 'surface' learning, in which superficial memorisation is most common. Their research suggests that:

> ... if we want to promote a deep approach, we should above all keep in mind the students' own interests at the same time as we should try to eliminate the factors that lead to a surface approach (irrelevance, threat and anxiety). (Marton & Saljo 1984: 52)

In a publication concerned with lifelong learning, Smith & Spurling (1999) highlight the fact that intrinsic motivational tendencies begin to decline during the secondary schooling years. They reason that the prescribed and structured curriculum, coupled with more competitive structures in academic assessment, represses students' abilities to conduct self-directed learning. During such formative years, schooling gives precedence to attaining high levels of academic achievement, concentrated on a narrow band of talents and intelligences. The impact on intrinsic motivation towards learning is likely therefore to be negative, as the improved pressure of extrinsically motivated goals results in self-initiated learning being compromised. It has been noted by the Council for Science and Technology (1998), that large numbers of students are becoming demotivated, where they fail to meet required levels of academic achievement, and lack encouragement or support to develop their own interests. Deci & Ryan (1992) consider the frailty of intrinsic motivation, which they suggest must be addressed in order to avoid demotivation and maintain psychological well being.

> Evidence… attests to the importance of intrinsic motivation as a human resource, and highlights the significance of intrinsic motivation for effective functioning and psychological well-being. However this research also attests to the frailty of intrinsic motivation and to people's susceptibility to social controls. It seems to us that the centrality of intrinsic motivation in psychological theories of achievement cannot be overemphasised, and that each of us concerned with children's learning and achievement needs to work toward social contexts that facilitate intrinsic motivation. (Deci & Ryan 1992: 32)

5.2.1 Significance to the PCs

Self motivation as a PC aims to encourage individual's to be aware and understand the types of activities they find intrinsically motivating, and how it can be used to enhance performance in a range of tasks. The setting of personal targets for success aims to enhance the opportunity to recognise intrinsic motives in learning, such that the purpose of tasks is redirected towards emphasising personal achievements which stem from individual interests. Increasing students' control within learning aims to encourage personally-focused achievement, which may not necessarily be linked to extrinsic reward. Although opportunities for achieving broader success remain predominantly extrinsically related, the PC framework highlights the importance for students to appreciate the nature and influence of self-motivation in learning, and to encourage its use and development.

5.3 PROBLEM-SOLVING

<u>PC Definition:</u> Being able to analyse a problem and form strategies to work towards a solution.

Problem solving has a long-standing history as a teaching and learning strategy. In a review of problem solving in Science, Watts (1991) highlighted that in the 1970's to mid-80's problem-solving activities were mainly calculations or mental problems, frequently mathematical or in the form of IQ games. As such, they were viewed as independent, pencil and paper activities, which were linked to didactic teaching styles. In the late 1980's, problem-solving broadened in diversity, encompassing puzzles, design-make activities and 'real-life' problems. These activities allow stronger emphasis to be placed on scientific and technological skills, and lend themselves to more discussion-based and collaborative work.

There are many interpretations of the term 'problem', depending on the context and application of its use. Distinctions can be made between activities based on specific problem questions, *e.g.* 'Why does 'x' happen?', activities routed in a puzzle *e.g.* 'Can 'x' be made to fit 'y'?', or those simply stemming from an intrinsic interest to find out more about a particular topic. Newell & Simon's definition (1972: 170) states that:

> A problem is a situation in which the individual wants to do something but does not know the course of action needed to get what he or she wants.

This illustrates the potentially open-ended nature of problem solving, highlighting the range and diversity of solutions that may ensue. Such activities provide opportunities to trial possibilities, experience failure, modify techniques and adapt thought processes in an endeavour to reach a solution. The manner in which problem tasks are presented however, can significantly influence the level of diversity within the approach and the outcome, and is dependent on the 'open' or 'closed' nature of the task (Watts 1994). More open-ended problems provide a limited degree of information, and therefore necessitate higher-order thinking skills, as individuals are given increased autonomy in their decisions. Problems considered to be 'closed', are more prescriptive in nature, possibly providing the individual with specified goals, strategies or outcomes.

Andre (1986) describes how the variations in the presentation of problems relates to four features - the goals, givens, obstacles and operations. The 'goals' refer to what the individual wishes to do in the particular situation; the 'givens' refer to what is known at the start of a problem; the 'obstacles' refer to the elements or factors which influence the solution; and the available 'operations' define the procedures or strategies that may be used to solve the problem. The four features can be manipulated to provide greater or less detail, as such, determining the open or closed nature of the task.

Garrett & Satterly (1990) explore further the processes involved in the operational solving of a problem. They consider these to fall into four areas, considering problems to be solved by:

(i) clarifying the problem – where the individual identifies as clearly as possible what is to be investigated

(ii) formulating a hypothesis - enabling consideration and elaboration of possible strategies, highlighting the most viable solutions

(iii) testing the hypothesis – systematically gathering information, avoiding trial and error approaches

(iv) analysis of results – undertaken in view of the context and other influential conditions in order to rationalise and validate the solution.

The categorisation of the process in such a way promotes a perception that problem solving is a series of linear and highly structured thought processes. This is not necessarily indicative of the cyclical, reflective process that characterises the practical nature of this work, and it is important that the creative and inspirational aspects of problem solving are not dismissed.

> The main difficulty with the idea of a chain or cycle of problem-solving processes is that in practice it can never be so linear. (Watts 1991: 36)

Problem solving is a teaching and learning strategy which can encourage students, at all levels, to engage and develop their thinking through the trialing of personal theories, especially where tasks are increasingly open-ended. The search for a solution encourages the formulation and refinement of knowledge, skills and understanding, where relevant subject matter can be utilised to interpret and understand observations and experiences. Such processes are supported by learning environments which promote discussion and collaboration, such that problem solving is undertaken in a social and teacher-facilitated environment.

The benefits of using problem solving as a teaching strategy lie in its potential to promote and enhance the transfer of knowledge and understanding within varying contexts and situations (Watts, 1994). Although challenging, this allows for the modification, improvement or consolidation of existing conceptions in the light of their application into different situations. If appropriately manipulated, problem-solving tasks can provide opportunities for students to actively engage in their learning, being physically and mentally involved in the construction of understanding. Watts (1991: 4-5) suggests that 'problem-solving *is* active learning', explaining that 'the pivotal virtue of problem-solving is as a means of transferring some of the responsibility and ownership for learning to the learner'. This is supported by Gagne's earlier research (1970), which concluded that:

> The results of using rules in problem solving are not confined to achieving a goal, satisfying as that may be for the thinker. When a problem is achieved, something is also learned, in the sense that the individual's capability is more or less permanently changed... Problem solving, then, must definitely be considered a form of learning.

The emphasis on developing problem solving strategies has been targeted within a knowledge working society (National Skills Task Force 2000), and is a specified area for skill development in the Key Skills initiatives. The ability to think analytically and strategically, whilst incorporating cognitive processes, are fundamental higher-order skills of problem-solving, and desirable outcomes of education, beneficial for personal and professional development. Rowlands & Holland (1991: 6) summarise the importance of such skills, thus endorsing their position within the PC framework.

> Problem-solving is a part of our lives and it is an essential skill for every future citizen which can only be learned by first-hand experience.

5.3.1 Significance to the PCs

The inclusion of problem solving in the PC framework supports Rowland and Holland's view, and also furthers the recognition being attributed to it within Key Skills and curriculum documentation. Problem solving is characterised in the PCs within the context of Science learning, such that the behaviours attributed to its development relate to those required within an investigative problem activity. Garrett & Satterly's (1990) operations for solving problems are incorporated into PC behaviours, such as 'finding out what the problem is really about', 'predicting strategies that might work', 'investigating a problem to find a reasonable solution' to consider other interpretations of a problem' and 'drawing understanding from what has been found'.

5.4 CREATIVITY

PC Definition: Being able to think of and share new or novel ideas.

A recent publication by the DfEE (1999a) 'All Our Futures: Creativity, Culture & Education' highlighted the continued difficulties in defining, identifying and enhancing creativity within current educational systems. In this document, creativity is defined in relation to the four elements of imagination, purpose, originality and value, and described as an:

> ... imaginative activity fashioned so as to produce outcomes that are both original and of value. (DfEE 1999a: 29)

Endeavouring to define creativity enables its ethereal and intuitive nature to be viewed in a more accessible way, although its definition remains widely debated. Bohm (1998: 1), a leading thinker in this field, argues that 'it is impossible to define creativity', and considers the abstract nature of its defining features, of imagination and originality, to compound its complexity.

The term 'creativity' is widely used in a variety of contexts and domains often to explain quite different behaviours, actions or performances. It can apply to processes, people, products, environments or ideas, or indeed a combination of these (Fryer 1996, Minkin 1997, Eysenck 1998). Fryer (1996: 26) highlights that, 'the nature of creativity is such that there can never be any definitive assessment criteria, but this does not mean that there are no relevant ones.' In this way, it is possible to identify and discuss features associated with creativity within its given contexts, without the necessary specific identification or limitation of its form.

There are various features associated with creativity, such as imagination, originality, novelty and newness. Imagination is considered synonymous with creativity, and, as such, the creation of anything novel or original is dependent on the opportunity and capacity to imagine alternative possibilities (Fox 1997). Imagination is considered to be a form of divergent thinking which needs no specified goal or purpose, however enables individuals to view alternatives in an open manner, thus enhancing the likelihood of creative processes

(Beetlestone 1998). Being imaginative allows opportunities for creativity, however there is a view that for the final outcome to be considered valuable or worthy it may require a degree of monitoring and controlling.

Newness, novelty and originality are also associated with creativity, such that the ability to reorganise, remodel, reorder, invent or imagine without imposed limitations are considered to facilitate its process. Openness to risk, and being prepared to experience failure, are features which enhance and enrich the opportunity for creative experiences (Fryer 1996, Craft 1997, Mumford & Simonton 1997, Minkin 1997, Bohm 1998, Uszynska 1998).

Creativity, originality and novelty are affected by the private and public purpose of the activity. Where the outcomes of the activity are considered solely with respect to the individual it is considered 'private', and its novelty relates to the previous experiences of the individual. In this way, a creative or novel outcome may only be perceived as such by the individual, and public appreciation would be dependent on more diverse judgements. For a creative outcome to be considered publicly creative, it is judged in relation to its newness or originality to a wide range of individuals, schools of thought or more global forms of knowledge. For public acclaim, the creative act must be seen as a contribution to the field and as such is less frequently achieved.

5.4.1 Enhancing creativity

Creativity is a mode of thought which can essentially be considered as generative, in that individuals attempt to expand the possibilities of given situations, look afresh at new perspectives, and envisage alternatives to the routine or the expected (DfEE 1999a). Within these processes a strong emphasis may be placed on the relevance, value or worth of creative outcomes or products, such that the notions of 'value' or 'appropriateness' have come to be considered fundamental features of creativity (Mednick 1962). The value or worthiness of an idea, product or process remains subject to the context in which it is undertaken, and its private or public nature. These judgements are also indicative of the time, such that perceptions of creativity in a particular field may change and develop.

Enhancing creativity is considered in a range of literature, such as Armstrong (1993), Mellou (1996), Soriano de Alencar *et al* (1997), and Mumford *et al* (1997). From these a range of factors are considered to limit or promote students' creative actions:

- freedom and autonomy – Students are considered to require opportunities to pose questions, discover and solve problems for themselves, without undue restrictions on the way they organise their time, priorities and responsibilities.
- challenges – Ensuring tasks have an appropriate balance between challenge and skill enhances the opportunity for students to engage creatively with a task. Where the level of challenge exceeds their skill level, frustration may ensue, or boredom if the challenge is too low.
- context – Providing students with stimulating and motivating contexts for their work, along with opportunities for the transfer of skills and knowledge across contexts is considered to assist the creative process. Drawing analogies with other problems or events promotes a broader and more open-minded approach to problems and tasks.
- trust – an ethos of trust between students and teachers inspires commitment to a task and provides students with the security to be more creative. Trust enables students to try out alternative possibilities without the fear of ridicule.
- avoiding judgements, comparisons or assessments – Rigorous evaluation is considered to inhibit the likelihood of creativity. Where students feel that their outcomes will inevitably be judged, they will display less inclination towards producing unique or creative products. Reversion to known solutions and systems may occur.
- time – Creative ideas can be generated under pressure, however it is considered valuable to take a more leisurely approach, during which the incubation of ideas and periods of solitude can enable creative process to develop incrementally. (Minkin 1997: 47) explains that 'the Eureka moment is often a misrepresentation of the creative process.'

* intrinsic motivation – Self-motivation (ref. section 5.2), primarily driven by personal interest, is considered more conducive to sustaining creative engagement with a task. This influences the degree of personal risk, and the time expended on the task.
* self-image and self-efficacy (ref. section 5.1) – Experiencing comfort within oneself and one's abilities will assist the degree to which ambiguity can be accepted, thereby enabling the 'courage of mind' to take risks to explore alternative opportunities.

Although useful to identify processes and opportunities in this way, 'we must never loose sight of the fact that ultimately the individual is the source of any creative new idea' (Mumford & Simonton 1997: 2). Creativity is influenced by the processes and stimulants surrounding individuals and ultimately their willingness and disposition towards it. For further insight into the development of creativity, read Shallcross (1985) or Parnes (1985) who considered staged processes of development.

Schools have been encouraged to provide opportunities for creative development for their students in different subject areas (Seltzer & Bentley 1999). The Arts have traditionally been the focus of such opportunities, where students have been encouraged to express creative talents through various media, such as dance, music and drawings. Recommendations within NC documentation encourage the development of creativity in all subjects, however many subjects currently experience limited opportunities due to the prescription inherent in NC subject knowledge development. Contemporary teaching approaches have been found, in subjects such as Science, to veer towards the less creative and imaginative styles due to the limitations of time and standardised assessment (ref. Chapter 2).

5.4.1 Significance to the PCs

The inclusion of creativity within the PC framework recognises its relevance and influence on society and workplace advancements, and aims to focus attention on the need to encourage opportunities within the school subject curriculum. A range of behaviours are promoted within the framework to prompt reflection and to stimulate discussion about the nature of creative work in Science. Features of originality, imagination and risk taking are identified, and where creativity is set within the context of broader skills and characteristics, the opportunity to explore the implications of self-image, self-motivation and more teaching strategies, aims to better enable its development.

5.5 VERBAL COMMUNICATION

<u>PC Definition:</u> Being able to communicate one's opinions and feelings appropriately by means of the spoken word.

> Communication is seen as a process of negotiation in which each person involved in sending or receiving a message seeks for some common ground on which they can agree. Shared experience, a common culture, common usage of linguistic signs and contextual cues all help in the search for an agreed meaning which serves as a vehicle for exchanging ideas and forming relationships. (Ellis & McClintock 1994: 85)

The effective use of communication underpins all personal and interpersonal relationships. This definition illustrates how the ability to communicate and express one's thoughts, opinions and feelings is significant in the development of shared understandings and meanings. Communication is influenced by differing environments, groups, cultures and contexts, thus requiring individuals to assess and modify their communication strategies accordingly.

Specific emphasis on verbal communication relates to three forms of 'talk' - narration, description and explanation (Hayes 1998: 12-15). Narration relates to sharing *what* is known, for example giving directions or relating sequences of events to others. Description tends to relate to telling *how* things occur or take place. During description it is assumed that the individual already knows the sequence of events, and requires further elaboration. Explanation emphasises *why* things occur, and assists people to better understand the processes involved or the meaning for why events have taken place. Using any of these forms of talk, an individual aims to communicate meaning for specific purposes, provoking reaction from the listener. The effectiveness of shared talk depends on various factors, such as the individuals' grasp of vocabulary, the clarity of purpose expressed in its use, the attentiveness of the recipient, and a joint awareness of the impact the communication has had. The receiver of information plays a crucial role in this process and influences the success of the communication process.

An established model of communication was proposed by Shannon & Weaver (1949), who related the processes of communication to a linear transmission model. They considered that messages were sent in a unidirectional process, directly and intentionally from the source to the recipient. A channel of communication is used which takes the form of physical gestures, sound or light waves. Although appreciating the multidimensional channels of communication, this model does not reflect the two-way interactions between the transmitter and the recipient. Thus, subsequent work has related effective communication to a series of interactions which illustrate an interactive loop of communication and feedback, dependent on talking, listening and responding. Elgin's (1996: 10) description of communication describes the processes involved.

> The people who hear us talk base what they say on what they heard us say to them, and so on around and around the loop. Even the very first line we say in a conversation is usually based at least in part on something another person said at an earlier time.

This model better illustrates the interaction between the transmitter and the receiver in maintaining effective communication. By continuing the loop, the extent to which the message has been received and interpreted correctly can be elicited, thus providing grounds for further communication. Schein (1993) also emphasises the significance of shared dialogue, focusing on the importance of eliciting and ensuring that those undertaking communication have shared interpretations of terms which are being used. He suggests that the clarification of discrepancies at this level leads to more effective communication.

Misinterpretation of meaning and purpose can also stem from the non-verbal communication processes. It is well recognised that communication between people involves far more than just the words they use, and any communication is influenced by a range of other factors, such as 'paralinguistic vocal features', such as pitch, emphasis and intonation, as well as facial expressions, gestures, dress and accent. These factors are considered to influence the way individuals communicate information and indicates the mix between deliberate and non-deliberate messages (Ellis & McClintock 1994). The tone and expression used in particular discussions, the gestures and posture adopted during the talk, can lead the recipient to gain different interpretations of the meaning and validity of dialogue. Stressing particular aspects more than others, and the influence of body positioning, can dramatically influence the way in which dialogue is received.

5.5.1 Significance to the PCs

Due to the importance of such interactions, it is essential that the skills of effective verbal communication are understood and developed from a young age. Schools, teachers and parents have a responsibility to demonstrate and model effective communication skills, especially as these have been found to be influential determinants of young people's development (Elgin 1996, National Skills Task Force 2000). Verbal communication has been identified as an area of specific focus within the PC framework, in a bid to develop students understanding of the processes and influences of effective communication, and endorses the sharing, justification and questioning of ideas and opinions.

5.6 CRITICAL THINKING

PC Definition: Being able to critically review and evaluate practice in order to improve.

Critical thinking is considered to be a higher-order thinking skill which mainly involves the processes of reasoning and reflection. The inherent processes of analysing, classifying, inferring, observing, evaluating, synthesising and hypothesising, are generic operations that can be used across a wide variety of contexts (Bailin *et al.* 1999). Such processes have recently received increased interest in government research reports (McGuiness 1999), examination standards (Oxford and Cambridge and RSA Examinations 2000) and curriculum development initiatives (Adey 1993).

One of the main aims of critical thinking and evaluation is to assist in the determination of truth or action (Thayer-Bacon 1998), and critical thinking is mainly considered a form of thinking which is undertaken purposefully, for specific reasons and directed towards achieving a particular goal. Individuals' dispositions and sensitivities, such as open-mindedness, fair-mindedness, a desire for truth, respect for high quality products and an inquiring attitude (Halpern 1997), are also considered to assist critical thinking.

Ricoeur (1970, Robinson 1995, Smith 1995), distinguished between two modes of critical thinking, which further considers its nature, identifying an 'enriching' mode, where critical thinking is used to unpack and improve understanding and practice; and a mode related to critical thinking of 'suspicion', which sets out to discover underlying assumptions, often implicit in current thinking or practice, and to question and critique them accordingly. The former relates to criticism being informative and enriching, with a view to improving practice, whilst the latter aims mainly to challenge the surface account, by critically analysing all aspects of an environment or activity.

Critical thinking is best viewed as by a sequential process of enquiry, drawing on the use of reflective and reasoning skills. It enables individuals to evaluate outcomes, monitor progress, and consider the relevance or applicability of a decision or occurrence. McPeck (1981: 171) considers critical thinking to be 'the appropriate use of reflective scepticism', and, as such, the learner becomes involved in understanding the essential elements of arguments, seeking out evidence that bears upon them, evaluating the evidence and reasoning offered, and questioning or elaborating their own viewpoints. Powell (1987) suggest that individuals may be required to test possible generalisations, and extract and apply principles to other areas before accepting or refuting possible suggestions. These processes require the individual to pose questions and hypotheses, adopting a healthy attitude towards argument, judgement and informed reasoning.

The characteristics of good critical thinking depend largely on the quality of reasoning that takes place. Schauble and Glaser (1990: 9) state that 'knowing is only part of being educated; thinking and reasoning with what we know complete it.' Ennis (1995) identifies six basic elements in critical thinking, recommending focus, reasons, inference, situation, clarity and overview. Similar models have suggested four areas of critical thinking, namely clarity, basis, inference and interaction (Baron & Sternberg 1987). The notion of gaining clarity of purpose along with a reasonable basis for judgement are key aspects of these models, which when undertaken collaboratively improves the chance of valuable outcomes.

The role of the subconscious or intuitive mind has also noted been associated in the literature with critical thinking (Fisher 1990, Thayer & Bacon 1988, Kreber 1998). Intuition or insight is considered to be the ability to reach sound conclusions based on minimal evidence (Fisher 1990), and, although mainly a perceptive function, is considered to complement logical thinking during the critical thinking and decision-making process. Whereas reasoning assists the process of ordering and sorting ideas, intuition influences the way in which the ideas are shaped and drawn together. In practice, individuals' inner beliefs are more likely to influence their final decision, despite their sound reasoning. The influence of personal dispositions and attributes, such as motivation, persistence and self-confidence are increasingly noted to influence an individual's ability to think critically. Bailin *et al* (1999: 294) considers these in detail.

NC documentation emphasises and promotes thinking skills, however Fisher (1990: xi) noted that:

> ... traditional schools have tended to discourage thinking. They have been places where children receive rather than give information and thoughts. Generally teachers have expected children to learn and reproduce the accepted wisdom, a 'learn because I tell you' approach.

Opportunities to reason, discuss and question problems and issues are encouraged more readily within active teaching and learning strategies (Centre for Science Education 1992), and specifically designed initiatives such as the Cognitive Acceleration in Science Education Programme, and the Cognitive Acceleration in Maths Education Programme (Adey 1993). Recent introduction of the DfEE's National Literacy (DfEE 1998b) and Numeracy (DfEE 1999c) strategies, along with QCA schemes of work for Key Stages 2 and 3, have prompted the use of more discursive and interactive approaches, which focus on the development of thinking skills.

5.6.1 Significance to the PCs

The reason for the increased interest in this area arises from the need for people of all ages to analyse and manipulate knowledge. The need to think clearly and reflectively on situations or experiences is a requirement of many jobs, and relevant within the school curriculum. The development of critical thinking abilities within the PC framework focuses on encouraging necessary analytical and reflective skills, to complement overall personal capability and future potential. Its relationship with problem solving within the framework is close, with an emphasis on critical thinking towards improving practice, thus picking up on Ricoeur's (1970) 'enrichment' focus.

5.7 SOCIAL INTELLIGENCE

<u>PC Definition:</u> Being able to respond appropriately to different situations and people.

One of the earliest references to social intelligence is provided by Thorndike (1920: 228) whose work significantly contributed to the intelligence debate. He took the view that intelligence was multi-faceted and described intelligence in relation to three areas:

- 'mechanical intelligence: the ability to learn to understand and manage things and mechanisms such as a knife or gun
- social intelligence: the ability to understand and manage men and women, boys and girls – to act wisely in human relations
- abstract intelligence: the ability to understand and manage ideas and symbols, such as words, numbers, chemical or physical formulae.'

Thorndike considered these intelligences to primarily be acquired genetically, but emphasised that they could be enhanced through education or training. He also recognised that differing contexts or 'life situations' may affect the level of social intelligence individuals exhibit. These views are maintained within the more recent work into multiple intelligences (Gardner 1993).

Thorndike's definition of social intelligence suggested it to be 'the ability to understand and manage men and women, boys and girls – to act wisely in human relations'. From this definition 'acting wisely' relates to the ability to both understand and manage others. Being aware of others and reacting well to their feelings, beliefs and ideas are key features of this form of intelligence, and unfold a wide range of possibilities given the many cultural influences in different environments. In this respect, social intelligence in one culture may be highly disfunctional in another, such that Marlowe (1985) defines social intelligence with an appreciation of these differences.

> [Social Intelligence is] the ability to engage in effective, mutually beneficial, social problem solving. The socially intelligent person can recognise, understand and appropriately respond to social demands or messages in ways that, for the most part, are beneficial and productive to all parties involved. (Marlowe 1985: 4)

Much of the work in this area is related to interpersonal intelligence and often the terms are used interchangeably. Bye & Jussim (1993) highlight the influence of social intelligence on individuals' standard of life, considering that 'deficits in social knowledge carry costs in terms of survival and quality of life... Individuals who do not know how to get along with other people often suffer maladjustment and emotional problems' (ibid: 143). Attaining social knowledge involves being aware of oneself and understanding how to realise personal strengths and limitations. Coupling this with the procedural knowledge associated with different situations, enhances the possibility to perform well in an environment. The development of these forms of social intelligence assist in understanding roles, behaviours and systems that characterise competence or capability.

Bye & Jussim (1993: 144) consider that social knowledge is 'a necessary, but not sufficient, condition for appropriate social behaviour', and simply possessing knowledge of oneself and a situation, will not necessarily result in appropriate behaviour. To efficiently use social knowledge individuals should seek to reason and critically judge situations, to know when, where and how to alter their behaviour. Adapting effectively to different environments illustrates individuals' social intelligence, and influences the proficient management and understanding of other people and oneself (Sternberg 1996, Goleman 1996).

5.7.1 Significance to the PCs

Raising awareness of social intelligence and developing strategies to enhance its use, draw on a range of PCs. The skills of verbal communication, critical thinking and teamwork skills, as well as positive self-image are influential in the recognition and use of social intelligence. Incorporating this capability provides an appreciation of the significance of social awareness, desirability and adeptness. The PC behaviours promote a sense of responsibility towards others, such that views and opinions are respected, and adaptation readily promoted in different contexts.

5.8 TEAMWORK

PC Definition: Being able to work well in teams.

'Teamwork' and 'group work' are terms often used loosely or synonymously to describe a form of collaboration between individuals focused towards a similar goal. The main difference between these terms reflects the nature of the participation that occurs between the individuals.

'Groups' suggests that participants are related in some definite way, however involvement may be relatively independent, with each striving towards individualistic, yet related goals. 'Teams' reflects a co-operative and collaborative effort by participants focused towards a specific goal. In teams each contribution assists in the achievement of the final outcome.

Although these descriptions reflect similar processes, it is accepted that effective group work also relies on co-operation between its participants. The difference, however, also lies in the completion of tasks, which in groups is not dependent as greatly on the performance of others. Teams characteristically rely on the completion of a series of tasks which are interdependent on each other's outcomes. Adair (1986) suggests that the team members are also brought together on the basis of individual areas of expertise, and strive to capitalise on each other's strengths, as opposed to group members who may fulfil a functional purpose. Argyle (1972) also describes teams in relation to people who co-operate to carry out joint tasks underpinned by the social, emotional and cognitive support of others.

The influence of team working on learning can be characterised by Vygotsky's concept of the 'zone of proximal development' (ZPD) (Vygotsky 1962). Vygotsky defined the ZPD as the distance between individuals' actual development and their potential development. He considered that under guidance, or in collaboration with more capable peers, higher levels of attainment could be achieved. The interactions undertaken in teams provide a basis for enhanced development owing to the improved social interactions that stimulate a range of questioning and reasoning strategies. Interactions within such co-operative learning environments also encourage the development of personal and affective capabilities, such as self-confidence, empathy for others and prosocial behaviours (Joyce & Weil 1996).

Belbin (1993) identified nine roles for individuals within teams in business. His research has made a significant contribution to understanding team interaction and suggests that all members of a team have specific roles and can be recognised by characteristic behaviours. He suggests that the most significant influence on teams is not necessarily whether its members are qualified to do particular jobs, but how they react, behave and compensate for each other. Table 5.8 summarises the roles which prove valuable in recognising particular strengths and suggesting areas of improvement.

Belbin suggests that there will be an increased demand for effective teamwork teams as flatter management structures become more commonplace. The importance of effective, well-composed teams will become more evident as individuals increasingly need to capitalise on their individual strengths. This is endorsed by the National Skills Task Force (2000), which identifies team working as a skills 'hotspot'.

Role & description	Weaknesses
Plant: Is creative, imaginative, unorthodox. Solves difficult problems.	Ignore details. Too preoccupied to communicate effectively.
Resource Investigator: extrovert, enthusiastic, communicative. Explores opportunities. Develops contacts.	Overoptimistic. Loses interest once initial enthusiasm has passed.
Co-ordinator: mature, confidence, a good chairperson. Clarifies goals, promotes decision-making, delegates well.	Can be seen as manipulative. Delegates personal work.
Shaper: Challenging, dynamic, thrives on pressure. Has the drive and courage to overcome obstacles.	Can provoke others. Hurts other people's feelings.
Monitor evaluator: Sober, strategic and discerning. Sees all options. Judges accurately.	Lacks drive and ability to inspire others. Overly critical.
Teamworker: Co-operative, mild, perceptive and diplomatic. Listens, builds, averts friction, calms the waters.	Indecisive in crunch situations. Can be easily influenced.
Implementer: Disciplined, reliable, conservative and efficient. Turns ideas into practical actions.	Somewhat inflexible. Slow to respond to new possibilities.
Completer: Painstaking, conscientious, anxious. Searches out errors and omissions. Delivers on time.	Inclined to worry unduly. Reluctant to delegate. Can be a nit-picker.
Specialist: Single-minded, self-starting, dedicated. Provides knowledge and skills in rare supply.	Contributes on only a narrow front. Dwells on technicalities. Overlooks the 'big picture'

(Adapted from Belbin 1993: 22)

Table 5.8: ***Belbin's team roles***

Activity at school and classroom level, however, frequently relates to group work, due to the requirement to assess the performance of individuals. Group work, and especially group discussion, is a frequently used teaching approach, however the outcomes remain individualistic, and assessments are identifiable to particular individuals. The limited use of teamwork also relates to the limited time teachers feel they have to impart prescribed information, as highlighted in section 2.1.

5.8.1 Significance to the PCs

Teamwork provides a medium through which students' academic, affective and emotional needs can be better developed during learning, encouraging improved communication and cooperation. The inclusion of teamwork in the PCs framework provides a means by which individuals can begin to develop such skills, and experience improved opportunities to work interdependently with peers.

The PC behaviours encourage cooperation within teams, by encouraging individuals to be personally responsible for actions taken within the team, and to work with others to be effective. Role-taking is prompted, following collaborative decision making.

5.9 SELF-MANAGEMENT

PC Definition: Being able to take charge of one's own learning.

Self-management, often referred to in literature as self-regulation, encompasses the skills of self-control, adaptability, conscientiousness, trustworthiness and innovation (Goleman 1998). The notion of taking responsibility for personal development, be it social, academic or professional, links self-management to the need to be consciously in control of one's strengths and areas for improvement. Self-regulation facilitates self-management through the use of strategies, such as time management, work scheduling and organising work, aimed at improving performance or behaviour (Anderson *et al* 1996).

Self-management is defined as 'the process whereby students activate and sustain cognitions, behaviours, and affects, which are systematically orientated toward attainment of their goals' (Schunk & Zimmerman 1994: 309). Pedler *et al* (1993) stated that such activity is:

> ... bound to be a risky business involving as it does facing up to one's own weaknesses and trying to work on them. It is therefore extremely important to provide a learning climate that helps people to examine their own weaknesses, to discuss them, to practice new behaviours, to take risks, to give and receive feedback, and generally become deeply involved in the exciting, if sometimes painful process of growth.

Exhibiting self-regulatory behaviours relies on individuals reflecting on their status, and assessing their abilities, with the aim of targeting specific areas for improvement. Self-management skills of target setting, self-monitoring and controlling encourage the tracking and channelling of improvement. Research indicates that this involves a complex interactive process involving not only cognitive regulation but also motivational regulatory behaviours (Boekaerts 1997, Schapiro & Livingston 2000).

The link between self-regulation and motivation is increasingly noted in research literature (Iran-Nejad 1990, Schunk & Zimmerman 1994, Schapiro & Livingston 2000). Iran-Nejad and Chisson's (1992) descriptions of 'active' and 'dynamic' self-regulation relate to the influence of intrinsic and extrinsic motivation. They consider active self-regulation to relate to the focused and deliberate control of cognitive processes, directed towards the achievement of specific needs or endpoints, e.g. revision to enhance memory. Dynamic self-regulation, however, stems from more spontaneous internal dispositions and is driven by genuine interest, curiosity and enthusiasm in an area of work. In this way, motivation towards personal improvement stems from intrinsic interests, and self-regulation is considered to account for the variance in academic achievement. Either process requires the learner to manage themselves, their actions and their time, using a range of skills considered to be developmental.

It is to its detriment that most learning in school is prescribed and determined by teachers, who, due to various pressures, do not readily encourage self-regulated learning within the subject curriculum. Students' time management, organisation and presentation of work, is often prescribed by teachers, with limited opportunity to use and develop self-management skills.

Anderson *et al* (1996) highlight the advantages that stem from such development, noting that learning which is self-regulated becomes student-orientated and based on individual needs, previous learning and experiences can be built upon, and responsibility for self-improvement encouraged. Enhancing motivation towards personal development can result in heightened self-awareness, and improved prospects of sustaining change. Anderson *et al* also consider the disadvantages of taking a self-regulated approach to its extreme, suggesting that if learning is channelled specifically towards individual needs, it may negate the wider learning system and thus limit the impact from supportive sources or groups. Veering fully towards self-regulated learning also assumes that individuals are capable and motivated to recognise and capitalise on opportunities for self-advancement when they arise, and is dependent on their aptitude in self-analysis.

For effective self-management to be achieved, a balance should be struck, whereby self-regulated learning takes into consideration broader theories of learning and encourage collaborative development. Boekaerts (1997) suggests that this can be enhanced and achieved through allowing students to design their own learning experiments, which would benefit from reinforcement and training of self-management skills and behaviours (Latham & Edwin 1991).

> Teachers should be trained to create powerful learning environments in which students can learn to self-scaffold the learning process. (Boekaerts 1997: 174)

5.9.1 Significance to the PCs

The PC framework endorses the development of self-management behaviours, such as managing time, setting realistic targets and meeting deadlines, and encourages a keen self-awareness towards self-improvement and self-regulation. Such skills are identified as crucial for progression within a culture of life-long learning, especially required in self-maintained businesses and increasingly dynamic working relationships (National Skills Task Force 2000).

5.10 TENACITY

<u>PC Definition:</u> Being able to persevere at a task in order to meet deadlines.

Literature into the characteristics and impact of tenacity on personal success is limited, and restricted to the work of Sternberg (1996) and Goleman (1996). Sternberg (1996: 256) suggests that perseverance is a common characteristic among successfully intelligent people. He suggests that:

> Some people, even very intelligent ones, give up too easily. If things do not immediately go their way, or if their initial attempts at doing something are unsuccessful, they simply quit. They thereby lose the opportunity to complete, possibly in a highly suitable way, the tasks they undertake. It is as if the least frustration is enough to keep them from persevering.

Maintaining tenacity relates to the motivational disposition of individuals and their ability to withstand and cope with complications, hindrances and challenge. It may be encouraged through the provision of extrinsically motivated rewards, such that individuals strive to achieve success and overcome frustration in the aim of attaining rewards. Irrespective of its status, however, it is possible that individuals will decline to persevere with a task if the level of challenge is too high.

Goleman (1996) reviewed the work of Mischel (1960), reporting on an experiment with four-year old children being set the 'marshmallow challenge'. Mischel illustrates the long-term effects of individuals' tenacious characteristics, which tested children's ability to resist temptation. Children were challenged to await the return of the researcher, at which time they would receive two marshmallows, instead of the one, which they could have at any time. Results from follow up work revealed that children who had resisted temptation at four years of age, were in adolescence, more socially competent. That is more personally effective, self assertive, and better able to cope with life's frustrations.

> They were less likely to go to pieces, freeze, or regress under stress, or become rattled and disorganised when pressured; they embraced challenges and pursued them instead of giving up even in the face of difficulties; they were self-reliant and confident, trustworthy and dependable; and they took initiative and plunged into projects. And more than a decade later, they were still able to delay gratification in pursuit of their goals. (Goleman 1996: 82)

Alternatively, children who were unable to wait for the return of the researcher proved, in later years, to: shy away from social contacts; be stubborn and indecisive; be easily upset by frustrations; think of themselves as 'bad' or unworthy; regress or become immobilised by stress; to be mistrustful and resentful about not 'getting enough'; be prone to jealousy and envy; overreact to irritations with a sharp temper; continued to be unable to differ gratification.

On the basis of this work, Goleman (1996: 82) suggests that 'the ability to delay gratification' and to persevere 'contributes powerfully to intellectual potential'.

5.10.1 Significance to the PCs

This evidence, although limited, provides further basis for including tenacity within the PC framework, which aims to give students an awareness and appreciation of the significance of maintaining commitment to tasks. It aims to support and endorse a sense of personal responsibility, such that individuals are encouraged to exhibit tenacious behaviours for the benefit of themselves and the wider group. It is a capability which is considered to complement other PCs, which without commitment would be negatively influenced.

5.11 Summary

This chapter has provided an insight into literature associate with each of the ten PCs. Within the scope of the thesis, the set of PCs has to be, to some extent, taken for granted, as the research aims at investigating how Science teachers can encourage students' development in these areas. We rely on the authoritative opinions outlined in Chapter 3 for the justification of this set of PCs as important, and this chapter to outline their nature. It would be for other research to test the accuracy of the claims of industrialists, government, or authors of referenced literature.

Where these chapters have provided background to the study, the following outline the methods, outcomes and discussions stemming from the research strategy and activity.

CHAPTER 6

Review of Methodology Literature

This chapter reviews the methodological approach adopted in the study and relates it to a literature base. It provides justification for the approaches used, and considers issues pertinent to the choice of the research methodology.

6.0 OVERVIEW

The research focused on reflection, action and review using an action research approach, presenting and interpreting practicing teachers' experiences and perceptions of the teaching of PCs, mainly through Science. The approach enabled the researcher, in participation with the teachers, to gain a more detailed understanding of the issues, strategies and implications of developing PCs through the subject curriculum. A non-positivist perspective was adopted to allow understandings to be constructed and emerge from the ongoing events, interactions and experiences between teachers, students and the researcher.

Qualitative strategies provided descriptive and explanatory insights into the teachers' experiences, which informed, monitored and marked out the development of the research. The researcher co-ordinated the involvement of various participants, such as students, university staff and employers, and worked collaboratively with the teachers in their school settings. Research interventions were adapted and tailored to suit particular contexts and students' needs. Case study and grounded theory strategies enabled the sorting and analysis of data, leading to theme building and meaning-making.

6.1 ACTION RESEARCH

As a methodology suited to the social sciences, Kemmis (1997: 173) defines action research as,

> ... a form of collective, self-reflective enquiry undertaken by participants in social situations in order to improve the productivity, rationality, and justice of their own social or educational practices, as well as their understanding of these practices and the situations in which the practices are carried out.

Features associated with action research are the generation and refinement of understandings, through on-going processes of reflective and critical monitoring and evaluation, within familiar or specific contexts (Kember 2000, Stringer 1999, Dickens & Watkins 1999, Elliott 1991, McTaggart 1991). Kemmis (1997) sees it as helping practitioners investigate their educational settings, as a direct medium for improving practice. The process of change encompasses a cycle of systematic inquiry, involving observation, reflection, development, monitoring and review. The 'spiral of cycles' (Lewin 1951, ref. Figure 6.1), involves demonstrating the development from general ideas to actions, implementation and evaluation, a cycle replicated in the second or subsequent phases of research.

Action research was considered the most suitable methodology for this study for three reasons:

1. the social nature of the research required a flexible and adaptable process, involving collaboration and intervention
2. the involvement of practising teachers in the research process, involving teachers as co-researchers of their own practice
3. the ongoing and reflective enquiry working towards systematic development of ideas and understandings, towards the construction of mutual understandings
4. the ongoing intervention and re-construction of practice towards improvement.

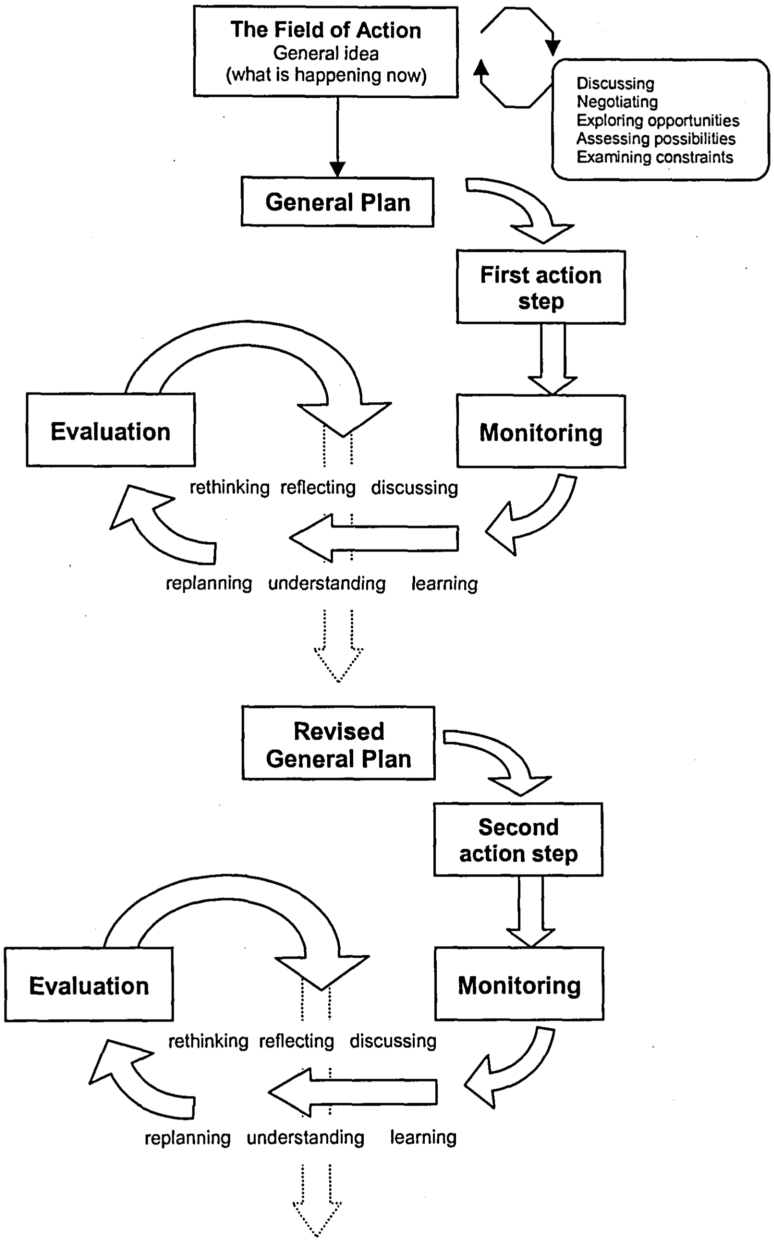


Figure 6.1: ***Kurt Lewin's model of Action Research***

6.1.1 The social context of the research

Educational settings vary widely, influenced by contextual variables interacting with research techniques and designed interventions. For on-going research to be maintained within classroom settings, it was important for the researcher to work collaboratively with practising teachers to mould the research into their systems, and to consider methodologically sound forms of data collection. The school set-up did not allow for structured research regimes to be imposed on classroom structures, especially where ongoing participation and development were required from the teachers. An action research approach allowed for the modification and adaptation of processes and interventions throughout the study, enabling teachers to trial and reflect on experiences within their specific contexts and across the whole study group.

This form of methodology could be criticised for the limited generalisability of its outcomes, due to the variations that result from its social and adaptable approach. Kember (2000: 42) describes that the conclusions drawn from this work do not necessarily result in the development of universal laws, which positivists strive towards, but rather that they should be viewed as 'provisional specifications to be tested, rather than unqualified recommendations'. Further discussion of this issue is outlined in section 6.4, however, although variations in school contexts were appreciated within this study, the action research methodology allowed these to contextualise and inform its outcomes. Varied contexts were beneficial in illustrating the application of research interventions in different settings, enabling teachers to describe experiences from different viewpoints and also to contribute to emergent findings across the group.

Due to the dynamic nature of the events within schools, it was necessary to adopt a methodology which allowed for adaptation and change, in light of the 'real-life' nature of schools, teachers and students. The level of involvement teachers were able to give during the course of the study fluctuated depending on professional and personal commitments, and, as such, it was necessary that the methodology compensated for this. The flexibility of the action research approach proved beneficial to these needs, and allowed the teachers to maintain their interest, commitment and involvement in the research where it may otherwise have petered out.

6.1.2 Involving practising teachers in the research process

Involving practising teachers in the research was imperative to influencing teaching practices to encourage students' PC development, thus enabling detailed and well-grounded descriptions of their experiences and perceptions to be gathered during the study. Collaboration and participation between the teachers and researcher at all stages encouraged them to develop a sense of ownership and understanding of the aims, interventions, issues and methods, and, therefore, being better equipped to manage change and overcome possible difficulties.

> By sharing their diverse knowledge and experience – expert, professional, and lay – stakeholders can create solutions to their problems and, in the process, improve the quality of their community life. (Stringer 1999: 10)

Teacher participation was considered to be 'co-generative' insofar as they were not treated as objects of research, but were encouraged to become collaborative partners, under the co-ordination, but not prescription of the researcher. A co-dependent research group was encouraged, with the researcher and teachers striving to achieve informed and well-grounded descriptions of events and interventions. This approach enabled understandings to be drawn from the data. Kemmis (1997: 174) highlighted the integral nature of teacher participation in this form of methodology.

> In action research, teachers (and others) are encouraged to treat their own educational ideas and theories, their own work practices, and their own work settings as objects for analysis and critique.

6.1.3 Ongoing, systematic and reflective enquiry

Eliciting, tracking and exemplifying the participants' experiences and perceptions suited an ongoing, systematic and reflective form of enquiry. Action research allowed findings to directly influence subsequent developments and the researcher, with the teachers, to reflect on and evaluate classroom practice, personal philosophies and students' behaviour, to develop and refine descriptions and understandings, with the objective of improving future practice (Cohen *et al* 1994).

The notion of metacognition is linked to the self-reflective attitude the research aimed to encourage in the teachers. It refers to the knowledge, awareness and control individuals have of their learning, and is associated with the process of change integral in personal development. Gunstone (1994: 133) described 'an appropriately metacognitive learner' as 'one who undertakes the task of monitoring, integrating and extending their own learning'. Encouraging teachers to self-reflect prompted them to review, consider and evaluate their own performance and that of their students, with regard to its influence on learning, the environment, PC development and other people.

Social contexts, such as group discussions or peer review (teacher-researcher and teacher-teacher) facilitated these activities. Prawatt (1989) considered this to be beneficial in developing heightened self-awareness. He considered discussion to be an ideal prompt to bring subconscious thinking, beliefs and understandings to the fore. Once awareness has been raised, he viewed individuals to be better able to reflect on, analyse and modify their beliefs and behaviours. Mason (1996: 431) suggested that:

> Functioning on a metacognitive level will make [people] reflect on the limitations, contradictions, presumptions, and implications of their own representations. This kind of awareness constitutes a critical condition for experiencing conceptual change in one's own knowledge structures.

Capitalising on the features of action research enhanced the opportunity for the researcher to react to teachers' experiences and perceptions, and the understandings and developing themes. It enabled the research to evolve in response to social contexts and new interests, as well as enabling additional teachers to become involved in the study. Sarantakos (1998: 113) considered an ultimate aim of action research to be 'to empower participants and to develop the skills and knowledge required to effect change in their own environment.' This study endorses this view and found action research to be a most appropriate and very valuable methodology.

6.2 DATA COLLECTION TECHNIQUES

In order to fulfil the aims of the study the data intended to illustrate individuals' opinions, feelings, descriptions and explanations. Although quantitative data was useful to substantiate descriptive statements, qualitative approaches would better represent teachers' experiences and perceptions. Interviews, questionnaires, observations, surveys and diaries were used to triangulate and improve the validity of data. Inherent in the choice of each technique are characteristic strengths and weaknesses, which are outlined more fully in the following sections.

6.2.1 Interviews

> The research interview is a conversation about the human life world, with the oral discourse transformed into texts to be interpreted. (Kvale 1996: 46)

Kvale's definition illustrates how interviews were used to elicit, catalogue and draw meaning from teachers' experiences and perceptions. Interviews formed a main data source throughout the study, with verbal dialogue between the researcher, teachers and students proving advantageous in two ways. Firstly, interviews encouraged the development of positive relationships between the researcher and the participants. On-going one-to-one dialogue enabled a rapport to be built up, significant in enabling both parties to feel confident and relaxed with each other. Interviews allowed for the discussion and clarification of ideas and experiences, and for gaining a firm understanding of the teachers' and researcher's expectations. Secondly, teachers considered interviews to be an accessible form of data collection, when finding difficulty in independently maintaining detailed reflections amidst the pressures of their jobs. Interviews provided a means by which data could be collected at convenient opportunities, and enabled ample insight and reflection to be gathered (Bell 1992, Cohen *et al.* 2000). A process of joint interpretation, critical reflection and meaning-making arose during interviews, contributing to the participatory and developmental nature of the methodology.

Semi-structured interviews were used, allowing discussions to freely develop with a degree of control by the researcher. It was considered important to allow participants to express opinions and feelings in an uninhibited way, resulting in interviews being open to diversification where appropriate. The semi-structured nature of the interviews ensured that the discussions remained focused on the research purposes, and that the researcher was able to direct emphasis to pertinent areas. The researcher probed about particular issues, yet avoided prompting the participants' responses.

Sarantakos (1998: 246-255) highlights a wide range of interviews, distinguished by their mode of delivery or purpose. The following types exemplify some of the features of the interviews in this study.

a) Panel interviews: the interviewer collects information from the same group of respondents two or more times at regular intervals

b) Neutral Interviews: the interviewer is neutral, factual, encouraging, friendly but also distanced and impersonal

c) Personal Interviews: the interviews are conducted in a face-to-face situation

d) Inquiring interviews: an informant participates equally in the process of data collection along with the interviewer

e) Informative interviews: interviews that are employed to gather information of a descriptive nature.

The researcher chose to audiotape the interviews as a means of limiting data loss, and gaining verbatim accounts of the participants' dialogue. Despite the time consuming nature of this method, it was a highly valuable source of data.

The limitations of interviews as a data collection technique relate to the time consumed in preparation, delivery, transcription and analysis. Difficulties may arise from respondents' subjective or from reactive responses which result in unqualified statements. Verbal comments may potentially be distorted during transcription, thereby altering the intended meaning of the dialogue. The recognition and influence of non-verbal communication is also limited by taped interviews, unless particular efforts are made to record gestures, intonation or body language during the interview.

Bell (1992) considers that it is questionable whether subjectivity, bias or misinterpretation can completely be avoided in interviews and suggests that researchers should be aware of its influence, and endeavour to limit its effects.

6.2.1.1 Transcription

Kvale (1996: 165) stressed the difficulty of interpreting data merely from interview transcripts, highlighting the methodical and theoretical problems that may arise. He stressed that although transcripts provide worthy records of dialogue, they cannot be considered copies of reality, but should be used as 'interpretative constructions that are useful tools for given purposes'. In this way, transcripts may best be used as logs of conversation that, through the act of transcription, emerge as decontextualised bodies of data.

Concerns also arise from the degree of 'transcriber reliability' within transcribed texts, emphasising the differences in interpretation or direct recording that may occur during transcription (Cohen *et al* 2000). The reliability of the transcription can be influenced by the quality of the original recording, or the transcriber's interpretation of what is suitable to transcribe. Kvale (1996: 166) argues that transcriptions should be judged on their 'usefulness' for the purposes of the research, as opposed to querying 'Was it the correct transcription?' By relating validity and utility in this way, Kvale accepts that discrepancies may arise in the diagnosis and transcription of features such as, the length of pauses and emotional influences such as giggling or nervous laughter. Focusing on the effectiveness of the transcription in meeting its purpose, allows for a more liberal view to be adopted in transcription and interpretation, however does not suggest the deliberate neglect of significant features.

6.2.2 Questionnaires

Questionnaires are a commonly used data collection technique and were used for various purposes in the study. They require limited input or interference from the researcher and can take the form of highly structured documents providing quantitative and qualitative data. They are a less time-intensive strategy than interviews, and can target more diverse areas of distribution. Questionnaires also enable respondents to maintain anonymity.

Questionnaire design and construction directly influences the quality of response. The manner in which the questions are posed, their content and format can influence the way in which respondents react to the questionnaire and also influences the researchers' analysis. Clarity of questioning can directly facilitate the respondents' openness and ability to answer, and, as such it is important to ensure that questions do not lead the respondent towards particular biased responses.

A range of related literature (Oppenhiem 1992, Cohen *et al* 1994) highlights the relevant criteria for preparing questions, stating they should:

- only address one item
- be related to the research topic
- avoid ambiguity, vagueness or embarrassment by being clear and simple
- be formulated in the language of the respondent
- convey a positive attitude, friendliness and collegiality
- avoid presumption
- avoid suggestive comments.

Despite their more convenient nature, questionnaires suffer from difficulties in gaining high response rates and detailed evidence. The lack of personal contact with respondents often results in high proportions of incomplete or non-returned questionnaires than other data collection techniques. In general, where mailed questionnaires are distributed, average response rates are below 40%. The influence of misinterpretation also impacts on the validity of responses - respondents may interpret generic terms, such as 'a lot', 'some' or 'a little', in different ways and in relation to personal assumptions. Cross-questioning and verifying statements can limit this effect, and verbal completion of questionnaires e.g. telephone questioning can also limit poor response rates.

A variety of questionnaires were designed within this study for a range of audiences and purposes. On occasion, it was necessary to use follow-up telephone and electronic mail to improve response rates.

6.2.2.1 <u>Surveys</u>

Surveys had limited use for establishing confidence in the initial assumptions of the study (ref. section 7.3.1). Cohen *et al* (2000: 171) comprehensively discuss this technique, considering three prerequisites to their design and their association. Characteristic features of the survey used in this study are that surveys can:

- gather data on an on-shot basis
- represent a 'relatively' wide target population
- generate numerical data
- gather standardised data
- capture data from multiple choice and closed questions.

This technique proved to be economical and efficient in resources and time, and was relatively easily administered by the researcher.

6.2.3 Observations

Data collection through direct observation is a well-recognised technique within social research. It can be applied solely or jointly with other techniques, and varies in the level of involvement observers have within a particular setting. Observation enables researchers to study facets of an environment, gaining understanding about context, interactions and relationships. It allows the researcher to recognise events or influences which otherwise might go unnoticed, or which participants may not freely wish to talk about. It enables researchers to move beyond perception-based data to directly observable events and occurrences (Cohen *et al* 2000). Observation also enables the diversity and unpredictability of human nature to be recognised, however in doing so poses challenges for recording and standardisation.

The level to which the researcher is known to the participant group can vary, as can the degree of structure in the observation. Participant observation requires the observer to become a member of the group studied, enabling an acquaintance with the structures, processes, problems and attitudes being experienced. Alternatively, the observer remains external to the group, aiming to remain unnoticed whilst observing interactions.

The structure of observations also determines the specificity of data. Structured observation schedules set out well-defined categories and focus on particular types of interaction or activity. These aim to record specific data and are applicable where multiple observers gather data for a particular purpose, therefore providing a systematic approach to recording. By contrast, unstructured observations may only require reflective note taking during or following the observation, and best suit regular observations aimed at identifying characteristic features of particular contexts.

Semi-structured schedules were used in all observations in this study, which on most occasions were conducted in regular classroom settings to observe teaching, interaction and behaviour. On two occasions 'controlled' or planned observations were undertaken to compare student groups (ref. Appendix A2: 14, 18). On these occasions, the researcher adopted a non-participant role in the observed groups, whilst a more active role was taken in other observations, where the researcher acted as team-teacher.

As with other data collection techniques, observation can be influenced by bias from selective recording of information. Few control measures can be applied to observational activities to limit error from observer bias, other than increasing the structure of recording, however it continues to be prone to the observers' selectivity and subjectivity.

6.2.4 Diaries

The use of diaries or reflective journals receives relatively limited review in literature, however Bell (1992: 102) considers their utility to relate to recording or logging professional activities - they 'can provide valuable information about work patterns and activities, provided subjects are clear about what they are being asked to do, and why'. They encourage the participant to reflect on experiences and to record events, impressions and feelings. As such, they are highly qualitative, although structures can be imposed to suit particular purposes, and enable data to be gathered by relatively simple administration.

The practicality of using and analysing diaries poses issues relating to their time consuming and discursive style. Oppenhiem (1966) highlights that the writer must be sympathetic to the task and willing to fully engage with it regularly. He draws attention to the potential problems with its volitional nature, suggesting that 'the respondent's interest in filling up the diary will cause him to modify the very behaviour we wish him to record' (ibid.: 215), such that evidence may provide unnatural representations of real-life events.

The validity or representativeness of dairies should be considered, and Burgess (1981) suggests they may best be suited as a preliminary activity to interviewing, or as a tool for describing 'critical incident events' over a specified period. Methods of analysis are best outlined prior to the activity, such that the format and structure of entries suits methods of coding which are applied.

6.3 DATA ANALYSIS USING A CASE STUDY AND GROUNDED THEORY APPROACH

Data gathered in each phase of the research was analysed using aspects of grounded theory, and this influenced subsequent stages of the research. Data collected in particular schools was analysed and presented in separate case study accounts, due to their contextualised nature. At all times, data analysis adopted a generative and critical approach, with the involvement of teachers and the supervisory team.

6.3.1 Case Studies

The approach used in the current study is described by Denzin & Lincoln (1998: 89) as a 'collective case study approach', and studied 'a number of cases jointly in order to inquire into the phenomenon, population or general condition'. This enabled particular cases to be compiled and analysed individually, as well as contributing to the generation of understanding across the group. The case studies enabled each teacher or school to receive detailed representation and explanation, within the context of particular ethnographic and pedagogic features.

Collective case studies differ from singular cases, which focus on the in-depth cataloguing of particular cases or issues. This approach is most suited to research which has an interest in a particular case, or focuses on the way particular events and interactions influence situations or contexts (Denzin & Lincoln, 1998).

Tellis (1997: *adapted from pg 1-2*) considered case studies to be of use where they are:

- designed to bring out the details from the viewpoint of the participants, by using multiple sources of data
- selective, focusing on one or more issues that are fundamental to understanding the system
- able to provide a multi-perspective analysis in giving voice to the various members and the interactions between them
- able to provide a triangulated research strategy, thereby improving the descriptions.

The benefits of using collective cases are twofold. Firstly, they allow the validity of emergent themes to be enhanced, as they may be verified in more than one case, and, secondly, they provide the reader with a series of cases which draw on a selection of sources and scenarios.

Case studies describe perceived reality, drawn from the subjective standpoints of those involved, through an iterative interpretative process. This may fuel criticisms in relation to the over dependence on specific contexts or subjectivity of the data querying its generalisability. These issues are discussed more fully in section 6.4.

6.3.2 Grounded theory

Case studies provide contextualised data from which a process of coding, categorising and identify patterns can allow emergent themes or commonalties to be identified. This form of conceptualisation is associated with the ongoing interpretative nature of grounded theory, considered to be an 'intellectual process that extends throughout the entire course of a given research project' (Denzin & Lincoln 1998: 172). A significant feature of this analysis technique relates to the way researchers and participants draw out and react to emergent themes throughout the research. The use of 'constant comparative analysis' (Glaser & Strauss 1967: vii) enables the researcher to compare data and to identify similarities or generalisations, aiding the development of emergent themes and theories. This may lead to further explanation or interpretation of anomalous occurrences.

6.3.2.1 <u>Coding</u>

The process of theory generation relies on coding and categorising data. Coding allows for the naming and grouping of phenomena based on close examination of the data (Seale 1999). The generation of codes, categories and subcategories enables the 'data to be broken down, conceptualised, and put back together in new ways' (Strauss and Corbin 1990: 57). Open coding forms the first-stage of analysis, where the data is split into units representing particular events or meanings. Codes are then grouped into larger categories which represent associated pieces of data.

Open coding stimulates further saturation, refinement and interpretation of meaning, which can be achieved using axial or selective coding. Axial coding explores further connections between codes and categories, integrating data and presenting it in more meaningful ways. In this process, external criteria may be imposed onto the data to exemplify the relations between categories, such as linking categories based on particular conditions, contexts, actions or strategies used in its collection. Axial coding provides a series of categories based on the salient properties, dimensions and interrelationships of events, providing increased depth to meanings.

Subsequently, selective coding finalises the process, aiming to define major categories or strong emergent themes, which prove to illustrate an overarching meaning from the data. This process involves cross-validating, verifying and justifying emergent themes, and engages the researcher in a cyclical process of reflection, refinement, and possible further exploration of specific areas of interest (Strauss & Corbin 1990).

The maturation of grounded theories using these coding processes is underpinned by on-going analytical comparison. Strauss and Corbin (1990: 23) consider that grounded theory enables theories to be:

> ... inductively derived from the study of the phenomenon it represents. That is, discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon. Therefore, data collection, analysis, and theory should stand in reciprocal relationship with each other. One does not begin with a theory, then prove it. Rather, one begins with an area of study and what is relevant to that area is allowed to emerge.

This suggests clear links with collective case study methods, and illustrates the relationship between case study and grounded theory approaches in this study.

6.3.2.2 Validity of the approach

Sarantakos' (1996) stresses the need for the researcher to enter the field with an open mind, without preconceptions, prestructured categories, hypothesis or knowledge of the research area, when using grounded theory. The data should fundamentally drive the construction of theory, with limited external bias influencing the analysis. The researcher outlines the initial assumptions and prior understandings of the study, appreciating their influence on its undertaking and outcomes.

Denzin & Lincoln (1998: 170) stress that emergent themes or theories should be directly traceable to the data, and represent 'systematic statements of plausible relationships'. They encourage researchers to maintain 'fluidity' in their approach, emphasising the temporality of theories, and encourage critical evaluation of their application to new situations. They suggest that theories should be viewed openly in relation to other contexts, and explored to see '*if* they fit, *how* they fit, and how they *might not* fit'. This is of particular relevance to social research which focuses on particular life worlds within limited frames of time.

6.3.2.3 Applications in this study

Aspects of grounded theory applied in the analysis of this study's data, aimed to enable the researcher to:

- study single cases and groups, record findings and make observations about certain aspects of the research objective

- make comparisons between groups and other elements, enabling the testing and validation of collected facts, to: develop categories; identify changes; refine data; integrate data, categories and hypotheses; identify similarities and differences between categories; integrate similar categories; formulate hypotheses
- collect data and analyse it concurrently throughout the study
- subject the findings to comparative analysis and attempt to generalise the statements, resulting in 'theories' and 'meaning units' which have emerged from the data.

The researcher aimed to draw from the data grounded understandings that could form recommendations for educational practice and curriculum development, as opposed to eliciting final theories. The interpretations and understandings drawn from teachers' experiences and perceptions, therefore, aim to be more than reported findings from particular perspectives, but to be emergent, data-driven themes, grounded in real experiences, enhancing understanding in the study area.

6.4 ISSUES CONCERNING THE VALIDITY AND RELIABILITY OF THE DATA

6.4.1 Establishing Credibility

Social research is influenced by a number of issues which affect the credibility of its data. Concerns often relate to the techniques, often qualitative, used in data collection. Its perceived weaknesses stem from the long-standing dominance of positivistic research methods, which limit the interpretations placed on data. Qualitative research has fought to justify its claims and has provided explanations for its validity. Kvale (1996: 69) summarises these difficulties stating that:

> … qualitative and quantitative methods are tools, and their utility depends on their power to bear upon the research questions asked. As tools they require different competencies, with differences among researchers in their abilities to, and interests in, carrying out quantitative computations or conducting linguistic or empathic analysis of qualitative data. Despite the conceptual and practical interweaving of the qualitative and quantitative aspects of social research, a dichotomised conception… may still prevail.

Patton (1990) suggests that in order for any study, including qualitative studies, to be viewed as credible, three questions must be addressed.

1) What techniques and methods were used to ensure the integrity, validity, and accuracy of the findings?
2) What does the researcher bring to the study in terms of experience and qualifications?
3) What assumptions underpin the study?

The current study has addressed these issues, and has recognised the representativeness, validity and reliability of the data, as well as the degree of objectivity afforded to it.

6.4.2 Representativeness

Social research and qualitative studies are often argued to have relatively small sample sizes, such that, their representation is questioned as not sufficiently embodying a culturally diverse group. Findings are, therefore, criticised for the lack of sufficiently generalisable claims that they offer, suggesting that emergent outcomes lack transferability to other settings.

Typically, however, social or educational research is limited to populations, institutions or individuals willing to participate. The research group in this study were selected individuals who showed willingness to invest time, effort and interest in it. The factors which influence involvement are diverse and researchers can only endeavour to improve representation by making explicit the nuances of each specific context.

Kember (2000: 40) highlights this diversity, and suggests that:

> Genuine educational settings are particularly difficult for control/ experiment designs because of the complex array of contextual variables that can interact with the variable under study.

He considers that findings are generalisable if intellectually applied to alternative circumstances, and where particular innovations or methods prove beneficial in one or more contexts, it can be assumed that their use in wider fields will also prove useful, given adequate consideration.

Kvale (1996) labels Kember's approach as 'analytical', one of three forms of generalisation he identifies along with 'naturalistic' and 'statistical' methods. As such, 'analytical' generalisation encourages the reader to make reasoned judgements about the extent to which the findings can be used to guide to what might occur in other situations. The validity of the generalisations, therefore, relies on the extent to which attributes of one situation are relevant to another. The collection of 'rich, dense or thick descriptions', thus aiding the degree to which comparisons can be made. Naturalistic and statistical methods alternatively rely upon interpretations drawn from individual settings or statistical methods, and did not readily apply to this study.

6.4.3 Validity

Validity is a well-recognised, key requirement of all types of research. Traditional views on validity referred to the degree to which techniques were accurate in their measurements, however the increased use of qualitative methodologies has required the concept to be reviewed. More recent definitions suggest that validity is a judgement of the way in which opinions, views and experiences have been verified within the data (LeCompte & Preissle 1993, Cohen *et al* 1994). The use of triangulation and a heightened awareness of the need for objectivity during data collection and analysis have become intrinsic elements of validating the depth, honesty or richness of qualitative data (Cohen *et al* 1994). Broadening the concept in this way has given rise to several forms of validity being identified as significant, such as content validity, criterion-related validity, construct validity etc. For in depth discussion of these read Cohen *et al* (1994: 105).

Discrimination against the validity of participants' conceptions, views and experiences, however, continues to plague the qualitative and social research field. Cohen *et al.* (1994) suggested that, at best, researchers could strive to minimize invalidity and maximize validity within the data by encouraging the cross-checking and support of findings. In doing so, they argue that 'validity, then, should be seen as a matter of degree rather than as an absolute state' (ibid. 1994: 105).

Validity of data can be regarded in two ways - internal and external. Internal validity relates to whether the outcomes of the research are adequately substantiated within the data. In relation to qualitative studies, this is concerned with the level of confidence, authenticity, cogency, soundness, credibility, confirmability, dependability and auditability of the data (LeCompte & Preissle 1993: 323-4). External validity focuses mainly on the way in which findings are generalisable to wider populations or situations. Outcomes are viewed as externally valid when they can readily be transferred to other contexts.

The areas which pose a threat to the external validity of data are described by Lincoln & Guba (1985) as being:

- selection effects: where selected constructs or themes are only relevant to particular groups
- setting effects: where the results are largely a function of their context
- history effects: where the situations have been arrived at through unique circumstances and, therefore, are not comparable to other contexts
- construct effects: where the constructs being used are particular to a certain group.

Such threats can be limited, however not fully eliminated, as data gathered in particular contexts will inevitably be influenced by external factors, some of which may not be easily identifiable. A means of assisting the verification of data and enhancing the authenticity of outcomes is the use of triangulated methods (Cohen *et al* 1994, Sarantakos 1998, Miles & Huberman 1994). Triangulation aims to illustrate the extent to which two or more independent measures confirm or disconfirm each other's findings. By gathering information on different viewpoints triangulation can enhance clarity by choosing data sources which illustrate different biases and strengths. Where outcomes from various sources illustrate similarity, it can be suggested that the findings have increased validity.

Triangulation is one of a range of 'tactics' suggested by Miles & Huberman (1994) to improve data's validity. Other tactics have permeated the process of data generation and interpretation in this study, such as:

1) checking for representation: being aware of the sample and the implications of it
2) checking for researcher effects: eliciting truthful responses based on evidence irrespective of the vested interest of the researcher
3) triangulation: using multiple data-collection methods
4) weighting the evidence: being aware of the strength of the data, with respect to second hand comments or particularly subjective statements
5) checking the meaning of anomalous findings: exploring the reasons for deviant or outlying cases or events
6) looking for negative evidence: exploring whether any data opposes the general findings
7) ruling out spurious relations: examining whether third parties are significantly influencing a particular outcome
8) checking out rival explanations: exploring whether other explanations can explain research effects
9) getting feedback from informants: asking participants to review interview transcripts, summaries and emerging findings.

Norris (1997) suggests that qualitative researchers must acquire a sense of reflexivity and must maintain scepticism, commitment and detachment to improve validity. He views it in terms of the degree of error or bias within the data, highlighting the need for researchers to be both self-critical and pro-active in evaluating and eliminating threats to validity. Norris (1997: 172) summarises the purpose of these efforts, suggesting that:

> Validity refers to the reasons we have for believing truth claims... irrespective of their form. What is important is why we believe the things that we do and how we justify the claims we make.

6.4.4 Reliability

The notion of reliability in qualitative research differs fundamentally from that in quantitative studies, where it generally relates to the extent to which the research findings can be replicated in similar contexts. Quantitative studies lend themselves more favourably to controlling the research approach, strategies and nature of response. However, the diversity of social environments in qualitative studies proves more challenging. In these circumstances, efforts can be made to achieve reliability by maintaining certain features of the research, such as the status of the researcher, the choice of respondents, the social situations, the analytic constructs used, and the methods of data collection (LeCompte & Preissle 1993). However, the nature of human experiences and interpretation will inevitably influence the replicability of the findings.

The concept of reliability is not particularly helpful in this study, due to the diversity that can ensue from a qualitative research approach. The current study, therefore, endeavoured to catalogue and detail the experiences and perceptions of participants, making clear the techniques and methods used to elicit and analyse their responses. Such clarity of approach aims to enable future replication of the study, such that its reliability, if not in outcome, will be achievable in process.

6.4.5 Objectivity

Objectivity within social research is of particular relevance, given the emphasis on gathering and interpreting data drawn from people. This study aimed to gain data which was representative of participants' experiences and perceptions, in a manner which stressed the researcher's objectivity. It was evident that limiting the subjectivity of the teachers or participants may potentially influence the validity and richness of the data, however supportive statements for claims aimed to limit bias or less-objective data. Kvale (1996: 64) identifies three conceptions of objectivity:

- freedom from bias
- intersubjective knowledge
- letting the object speak.

Firstly, viewing objectivity in terms of the degree to which data is free from bias implies that systematic cross-checking and verification of data should occur throughout its collection and analysis, reducing subjectivity where possible. Secondly, Kvale suggests that objectivity is based on intersubjective knowledge (the knowledge and understanding shared by a number of individuals), considering that when a number of researchers or observers gather data on the same phenomenon, objectivity can be enhanced. Thirdly, Kvale describes how focusing specifically on the object or participant under research, and 'letting them speak', diverts emphasis away from the researcher, such that objectivity relies solely on what is drawn from the subject.

Although efforts can be made to limit its effects, threats to objectivity may arise from the influence of stakeholders, the researcher, the observers or the participants, who have vested interests in the research outcomes. The methodology may also influence the balance between objectivity and subjectivity, for instance, positivistic studies generally strive to eliminate subjective influences at all stages, whilst interpretativist research aims to capture the subjective experiences of its respondents.

Glesne and Peshkin (1988) consider subjectivity to be inevitable, and suggests that it is not sufficient for researchers to simply acknowledge its influence. They consider that researchers should capitalise on the subjective nature of research and not attempt to disjoint themselves from its process in the quest for achieving objectivity. They also suggests that they should be aware of, disclose and illustrate its influence to their readers. Subjectivity may 'filter, skew, shape, block, transform, construe and misconstrue what transpires from the outset of a research project to its culmination in a written statement' (ibid. 1988: 17), and that its integral effects cannot be removed from the process. They advocate self-monitoring, through which researchers may better manage their subjective influences and 'preclude it from being unwittingly burdensome' (ibid. 1988: 20).

6.4.6 Researcher effects

The researcher was aware of the error and bias that could result from observer distortion or participant deviation during the collection and interpretation of data. These issues reflect the influence the researcher had on the environments and participants under observation. If highly influential, the observer's presence is prone to distorting normal activity, influencing the participants' behaviour to the extent that it no longer reflects the norm (Sarantakos 1998). On these occasions, participants may feel obliged to display 'ideal' behaviours due to the presence of the researcher. These issues may also arise during interviews, where respondents feel they are unable to provide truthful answers due to the status of the researcher or the possible implications which may result from their exposure. These effects are described in relation to the Pygmalion Effect (Rosenthal & Jacobson 1968), which suggests that respondents are influenced by the obligation to provide the researcher with what they wish to hear or observe.

The development of positive researcher-participant relationships engendered trust which aimed to encourage participants to feel comfortable with the research process, and able to reflect critically and objectively on its progress. The use of an action research methodology capitalised on and endorsed the researcher's integral involvement, and considerable time was spent familiarising the participants with the study, discussing widely the areas of observational interest. However, even though positive relationships were maintained and efforts were made to limit negative effects, the research may still have impacted on participant behaviour (Kimmel 1988).

6.4.7 Appropriateness to this study

It was important to consider the issues of data representation, validity, reliability and objectivity. The current study has aimed to address these issues by reflectively cross-checking data and appreciating Lincoln and Guba's (1985) suggestion of alternative concepts for those above. They focus attention on the level of detail, comprehensiveness, situation-specificity, honesty, depth of response and meaningfulness the data holds, and consider these to better suit qualitative and interpretative studies. They propose that validity, reliability, generalisability and objectivity be better viewed in relation to credibility, transferability, dependability and confirmability, considering these to be more appropriate for qualitative research.

In linking validity to credibility, they aim to demonstrate 'methodological excellence' by encouraging a professional, accurate and systematic manner to research. They suggest that transferability be used to better describe the generalisability of data, thus allowing the reader to be responsible for deciding how and whether the research can relate to other contexts. The fast changing nature of certain contexts results in increasing difficulty to ensure the reliability of social research, therefore they suggest that establishing dependability is a more appropriate consideration. Lastly, they consider the confirmability of data to be a better indicator of quality than the objectivity of researchers' interpretations, placing increased concern on whether findings can be confirmed within the data. They consider that improved confirmability results from well-grounded data drawn from adequate sources of data.

Lincoln and Guba's suggestions enable the varying nuances associated with qualitative data to be recognised, and are most appropriately viewed alongside the influential aspects of credibility, validity and reliability. Improving the status of such concepts has been imperative to this study, which has aimed to be aware of and reflectively consider their implications during design, undertaking and analysis.

6.4.8 Ethical considerations

Cohen *et al* (2000) identify the variety of areas which prompt ethical consideration within a study, such as the nature of the project, the methods of data collection, the nature of the participants, the type of data collected and the representation of the data. This study accepted these broader debates, and primarily aimed to obtain informed consent and co-operation from all those involved, following which the dignity and confidentiality of all individuals was protected and maintained. In doing so, it was necessary to respect the participants' right to freedom and self-determination, such that they had the right to choose or refuse be involved.

Cohen *et al* (2000) suggest that informed consent involves four elements – competence, full information, voluntarism and comprehension. Competence, in this way, relates to whether participants are able to understand the implications of the research, and they must be given full information in order to make a fair judgement. Voluntarism stresses the importance of ensuring participants' free choice in their involvement, referring to the level of information provided and their ability to fully comprehend its purpose and nature.

CHAPTER 7

Research Strategy

This chapter describes the research strategy used in the study. Details are given of the researcher's and teacher's roles, the nature of the research sample and the five-phase model of research. Issues relating to the manner in which credibility of research findings was achieved are also outlined.

7.0 ROLES IN THE RESEARCH

The study utilised qualitative and quantitative methods to research, interpret and draw understandings from teachers' perceptions and experiences of a variety of educational settings. The research spanned a 3-year period, with the involvement of a wide study group including the researcher, supervisors, advisors, teachers, students and employers.

7.0.1 The teachers' role

The teachers were engaged in regular discussions with the researcher to negotiate and decide on the most appropriate strategy for the study in particular schools. Encouraging teachers to take part in the action-research process in a way which suited their personal and departmental circumstances, enabled the researcher to engender a sense of teacher ownership, hence stimulating more productive partnerships. It was considered important that teachers viewed themselves as active decision-makers, as opposed to passive decision-takers, and in this way, the process of study was not imposed onto the group, but encouraged them to draw on their experiences and expertise in targeting students' PC development.

The research thereby evolved as an ongoing process of development, trial, reflection, review and evaluation undertaken by teachers as action researchers, co-ordinated by the researcher. They were required to use the interventions, designed in consultation with the researcher, as regularly as possible, and to describe and explain their experiences and perceptions. The researcher requested access to classrooms for observations and to undertake regular review meetings and interviews. Teachers were obliged to attend larger organised meetings involving the wider study group, and some smaller regional meetings were also held.

7.0.2 The researcher's role

The roles of the researcher and the teacher were co-dependent to allow reflective discourses to inform, exemplify, refine and modify approaches, perceptions and general progress. The researcher directed the research programme in a variety of ways, such as: selecting the methodological and analysis strategy and techniques; paying regard to the reliability and validity of data; developing, refining and maintaining generic research interventions; observing and interviewing targeted research groups; co-ordinating regular study group meetings; progressively recording the development of the study; drawing out emergent themes and issues from the data. These roles are briefly described below.

7.0.2.1 Curriculum developer

The researcher assisted the teachers in planning and devising interventions and strategies to facilitate and encourage students' PC development and self-assessment. The role required a considerable investment in curriculum development, providing classroom resources in the form of guidance notes, evaluation frameworks, visual aids, worksheets, schemes of work and research project materials. These resources were generic to the study group and also specifically designed for particular teachers. Considerable time was dedicated to working collaboratively with teachers to refine the three proposed interventions and to monitor and reflect on their impact during the course of the study. Informal and formal review meetings were organised regularly in order to monitor, develop and improve curriculum materials where necessary.

7.0.2.2 Liaison

In order to identify a sample group of teachers, the researcher made contact with Local Education Authority (LEA) Science advisors, who selected a number of teachers, Science departments or schools who they considered would potentially be interested in promoting students' personal development.

Identification of the teacher group also stemmed from recommendations by The Centre for Science Education.

At this stage, the researcher's role was one of liaison, making contact with the schools, and informing head teachers and senior management teams of the proposed research. Where possible, meetings were held with the identified teachers. Liaison was maintained with the teachers, school management teams and LEAs throughout the study.

7.0.2.4 Colleague

Once the teacher group had been identified, the researcher's role moved to promoting and building positive partnerships with the teachers, as a means of developing and maintaining strong relations with the teachers. It proved essential to promote a non-threatening and supportive ethos, and to discuss how the research could complement departmental or personal development targets, as well as fulfilling the study's aims. Informal and formal meetings were used throughout the course of the study to build a rapport between the teacher and researcher, which proved particularly important for limiting observer distortion or participant deviation during data collection.

7.0.2.5 Friend and confidante

The nature of the research required the researcher to be in regular contact and collaboration with the teachers. Over the research period the researcher and teachers grew in understanding of personal and professional motives towards the study, and positive relationships were built in all cases. The role of friend and confidante, although potentially open to bias, enabled the researcher to better understand and undertake the research, where jointly invested interests in academic, professional and personal interests led to ongoing commitment to the study.

7.0.2.6 Reflective Partner

Throughout the study the researcher stimulated opportunities for reflection and reporting on: teachers' experiences and perceptions; personal conceptions and philosophies; current practice; wider educational issues; emergent themes from the research. Regular meetings and observations were organised to establish, clarify and report teachers' perceptions of the impact of the research interventions on students' PC development, and on their own development. Inherent in these reflections were discussions relating to: research interventions, the teaching and learning strategies employed to develop students' PCs, the teachers' views on the relevance of PCs; the ways in which they could be incorporated into regular Science teaching; general areas of concern or significance. An analytical, critical and open-minded perspective, was encouraged, such that opinions and claims were supported with evidence, which aimed to enhance the reliability and confirmability of the data.

7.0.2.7 Information collector, collator and analyst

During the initial stages of the study the researcher acted as information-collector and collator. A range of literature formed information sources, requiring the researcher to read, consider and draw association between a range of texts, position papers and research documents based on areas such as competence, skills and personal development. Commonly, emerging themes and issues were identified representing similar and disparate opinions, evidence and research findings, which prompted and stimulated the researcher to co-ordinate a series of in-depth discussions with the research supervisors and advisors. The purpose of these was to identify the personal skills and characteristics that defined the notion of 'Personal Capabilities'. Emphasis was placed on identifying, questioning and debating the relevance and significance of each of the proposed capabilities, as well as defining their meaning and purpose.

The researcher used the outcomes of these discussions to continue debating, refining and condensing the PC framework with practising teachers and employers during preliminary interviews, through questionnaires and verbal surveys. The researcher analysed the outcomes and proposed a working-framework of PCs, on which subsequent phases of the study were based. Throughout the research period, the framework was the focus of regular discussions which led to its refinement and adaptation. In-depth consultation with experienced advisors enabled the research materials to be modified to suit their purpose and the target audience.

The reviewed literature provided a grounding for the research study, and is represented in Chapters 2, 3 and 4.

7.0.2.8 Reporter

Along with reporting the teachers' perceptions of the research the researcher maintained a research log for each school, expressing personal viewpoints on the ways in which the interventions were employed, and impacted on classroom activity.

Ongoing verbal and written reports were given to the supervisory team, to discuss the progress of the research, as well as providing opportunity for the researcher to receive advice, support and direction. The researcher reflected on these discussions, and made informed decisions about feasible options for progressing the study.

7.0.2.9 Analyst

As various forms of data were collected, the researcher acted as data collector, collator and analyst. Due to the action research approach it was important to analyse and draw understanding from the data on an ongoing basis. This analysis was undertaken concurrently with data collection, with the purpose of reviewing and subsequently influencing the research's progress.

The analysis and critical evaluation of the data was undertaken using a multi-levelled process by: the researcher independently; the researcher and the teachers; each teacher individually; the teacher group as a whole; the wider study group. The collective group dynamic was important in enhancing the validity of the data and the themes emerging from it, contributing to the triangulation of methods. The main aim of the data evaluation with all groups was to draw out themes and understandings from the data and to justify these appropriately, cross-checking and re-exploring issues in more depth where necessary. The use of 'grounded theory' with the assistance of electronic coding and categorising software facilitated the analysis of data which is discussed more fully in section 6.3.

7.0.2.10 Disseminator

Over the study period the research findings were disseminated to a wider audience, at a wide variety of conferences, regional LEA meetings, within Sheffield Hallam University and individual primary and secondary schools.

7.1 THE INFLUENCE OF SCHOOL CONTEXTS

The school contexts differed in various ways and were also significant for the development of the research. The schools' social-economic status, levels of student attainment, management and departmental support, teacher involvement and the status of staff, were factors which were acknowledged and documented within the case studies. It was considered essential to recognise and report the influence of school contexts, so that the generalisability and representativeness of the outcomes was better informed.

7.2 THE RESEARCH SAMPLE

Following their recommendation, the teachers were selected on the basis of a questionnaire response. These initial impressions acted as a filter, to select teachers who had particular interest or motivation concerning students' personal development, and whose departmental and school contexts would enable the research to be undertaken.

A group of 21 teachers from 7 secondary schools, 1 primary school and 1 business-funded education centre became involved in the study. 16 teachers from 6 of the secondary schools and 1 from the primary sustained voluntary involvement on a non-funded basis for a period of at least 18 months. The schools were based within six LEAs and the teachers formed a core study group with supervisors, advisors and university staff contributing to the wider study group.

Of the 16 teachers, 12 were Science specialists with a variety of additional management and pastoral responsibilities. All the teachers, with the exception of one primary school teacher, conducted the research with students from Key Stage 3 (Year 7s, 8 and 9), with occasional support and interest from other members of department and classroom support staff. The four additional teachers were drawn from Mathematics and Design and Technology (DT) departments in one of the participating schools (School C). The way each teacher integrated the research into their teaching is outlined in their case studies (Chapter 9 and 10, and Appendix A1-A8), which varied in approach and commitment.

7.3 THE 5-PHASE RESEARCH STRATEGY

The research programme is represented by a five-phase process which, although presented in linear form, was an ongoing cyclical process of intervention, consideration, adaptation and review. Progress in each phase was subject to regular review and evaluation, and was conducted alongside ongoing literature searches, analysis of data and consultation with the wider study group.

7.3.1 Phase 1: Literature Review & Employer-Teacher Survey

7.3.1.1 Establishing a working framework

The first phase of the study consisted of extensive literature searches and reviews. The literature highlighted a range of texts and papers which listed skills, competences and 'transferable' skills which the authors considered to be influential to personal success. The literature was used in the identification and definition of PCs, and to identify the skills or competences which were most commonly perceived to be of importance. By listing the skills and identifying the similarities between them (ref. Table 4.1.1), a working framework of ten PCs emerged (ref. Appendix A11).

Increased understanding of the nature of each PC enabled their definition (ref. Chapter 5). In order to clarify the definitions, desirable behaviours associated with each PC were identified and phrased as positively focused objectives (ref. Appendix 11). The framework provided an overview of the observable and characteristic behaviours associated with each PC (ref. Figure 7.3.1.1a).

Personal Capability: TEAMWORK

Behavioural objective statements:

a) to help decide what needs to be done in teams
b) to help decide who will do what in teams
c) to take personal responsibility for work when in teams
d) to be willing to critically evaluate ideas and contributions
e) to be willing to change approach if necessary

Figure 7.3.1.1a: *Behavioural Framework Sample*

A consensus of understanding was gained about the generic terms of teamwork, verbal communication, self-motivation etc., through formal and informal discussions with teachers, advisors and supervisors. A formal meeting of nine teachers was organised to review the behavioural indicators in the second study year. The teachers debated whether the behavioural indicators adequately illustrated 'best practice' in each PC. Analysis and critical reflection on the appropriateness of content and terminology took place, contributing to the refinement and clarification of the defining features of PC development. The outcomes of this meeting are outlined in Appendix A13.

Further definition of the PC objectives came through developing a 'discussion document', focused on illustrating progressive development in behaviour using a four-point scale (ref. Appendix A12 and A30). This document primarily aimed to illustrate, to teachers and students, how progression in PCs 'could' occur. The behavioural objectives were differentiated into four progressive statements rated in terms of the frequency of their display. For instance, 'A' indicated students performed the behaviour on 'most occasions', 'B' on 'many occasions', and 'C' on 'some occasions'. 'D' indicated 'difficulties' in this area (ref. Figure 7.3.1.1b).

The document was not presented as a definitive outline of PC progression, or promoted to be used in summative assessment of students' capabilities, but to illustrate the range of behaviours to stimulate student-student, or teacher-student reflection and discussion. It encouraged students to be aware of their behaviour, select statements that best reflected their performance, and justify their reasoning, as a means of improving self-assessment.

Personal Capability: TEAMWORK

A	B
• I decide on what needs to be done in most teams • I help decide who will do what in most teams • I like to be personally responsible for some of the work when working with most teams • I critically evaluate ideas and contributions in most teams • I am willing to change approach if necessary on most occasions when in a team	• I decide on what needs to be done in many teams • I help decide who will do what in many teams • I like to be personally responsible for some of the work in many teams • I critically evaluate my ideas and contributions in many teams • I am willing to change my approach if necessary on many occasions when in a team
C	**D**
• I decide on what needs to be done in some teams • I help decide who will do what in some teams • I like to be personally responsible for some of the work when in some teams • I critically evaluate my ideas and contributions in some teams • I am sometimes willing to change my approach if necessary when in a team	• I find it difficult to decide what needs to be done in teams • I find it difficult to decide who will do what in teams • I find it difficult to take personal responsibility for work when in teams • I find it difficult to critically evaluate my ideas and contributions • I am often unwilling to change my approach if necessary

Figure 7.3.1.1b: *Discussion Document Sample*

Teachers tailored the document to students' needs through discussion, such that levels of proficiency in performance were dependent on the student's age, ability and learning context. Where necessary teachers interpreted, expanded on, or adapted terms to improve students' understanding. For instance, Year 5 students' interpretation of, '*I like to be personally responsible for some of the work in many teams*', differed from that expressed and expected by Year 11 students. Flexibility of interpretation was considered a strength of the document, as its application was broad whilst remaining well grounded and focused.

Consideration and debate was undertaken within the research group to judge the appropriateness of the progressive statements, with key questions influencing the decisions, such as:

- what would typify 'best practice' in the capability?
- what would typify 'poorest practice' in the capability?
- what range statements would best exemplify observable progression in the capability?

It was considered essential to construct behavioural indicators that were observable, adaptable and easily understood by most students and adults. These remained open to suggestion throughout the course of the study.

Significance: Defining the meaning and range of PCs, through the development of the behavioural framework and discussion document, led to the improved understanding of the nature of students' development. The materials provided practical and accessible means to initiate discussion between the researcher, teachers and students, focused on how teaching and learning could address PC development. The documents were non-subject specific and applicable to a range of contexts and situations, from one-to-one tutorial, whole-class discussions, training courses etc. They provided a consistent structure for reflection at many levels: researcher-research team; researcher-teacher; teacher-teacher; teacher-trainer; teacher-student; student-student; student-parent.

These documents prompted teachers to question their understanding and approach of the use of generic terms, such as 'teamwork' and to guide their choice of learning activity to raise students' awareness of particular aspects of PC development. The behavioural statements were made explicit and valued within lessons, often used as individual or class targets, reinforced by visual displays and formative feedback. The PC behaviours also enabled students' reflections and self-assessment to relate to specific behaviours. Without such a framework, the approach to PC development would have been less coherent, as teachers' interpretations and approaches would have varied more widely. Student understanding of generic terms such as teamwork, verbal communication and creativity, could possibly have been less specific, thus influencing their ability to effectively self-assess and evaluate performance.

The identification of behaviours prompted improved understanding and awareness of PCs, and encouraged teaching, target setting and review to be focused on a consistent range of desirable academic and PC outcomes.

Progression, as illustrated in the A-D discussion document, related proficiency to the increasing frequency with which individuals display particular behaviours. The scaling of whether individuals have difficulty displaying behaviours, or display it on 'some', 'many' or 'most' occasions proved useful in this study, however exploration of alternatives, such as the quality of the behaviour, is a matter for future research. It is questionable whether a scale based on frequency effectively illustrates progression, especially where individuals may interpret the behaviours in less socially acceptable ways. For example, the scale of frequency is ineffective where, in its extreme, an individual may be targeting improvement in 'share opinions and ideas with others' and exhibits this on 'most' occasions as shouting, or the imposition of their views on others. This scenario illustrates that individuals may fail to appreciate the suggested intent and purpose of the behavioural objective, which ideally prompts individuals to voice their opinions in a controlled and socially acceptable manner.

Progression defined by quality and frequency would lead to further definition and debate over the nature of students' PC development.

7.3.1.2 <u>Teacher and Employer Opinions</u>

Three forms of data collection were used to gain teachers' and employers' opinions on the framework and concept of PCs. A postal questionnaire survey was conducted targeting a random sample of 100 schools (both primary and secondary age phases) and 50 employers (Appendix A14 and A15). This incorporated Likert-scale responses and longer qualitative statements, and was accompanied by a short verbal random-sample survey, conducted at the Annual Conference of the Association for Science Education (2000). 62 participants were required to choose from four short questions, the results of which are presented in Chapter 8. These were beneficial in supporting and verifying the study's assumptions, as well as in raising other issues associated with PC development.

21 follow-up interviews were undertaken (15 teachers; 6 employers), for which an interview schedule was distributed prior to the event (Appendix A16). These took place face to face or by telephone, and in some cases participants preferred to provide a written summary of their opinions depending on the time and distances involved. Interviews lasted between twenty minutes to one hour, in an informal manner, and tape recorded where possible. Where the interview was conducted by telephone, written summaries were returned to the participant to ensure their opinions and perceptions were not misinterpreted by the researcher. Data was processed and analysed using NUD·IST Vivo (a computerised data analysis package), which enabled the coding and sorting of the qualitative statements in order to draw out emergent themes.

Outcome: On the basis of the critical analysis of the literature, the feedback acquired through the postal questionnaires, verbal survey, interviews and in-depth discussions with teachers, a ten-item list of PCs and their definitions, emerged to represent the working framework of generic life-work skills and characteristics which were considered to be influential in the social, academic and professional lives of individuals. The definition and associated literature relating to 'Personal Capabilities' has been discussed in Chapters 4 and 5.

7.3.2 Phase 2: Designing and adapting teaching and learning

This phase of the study involved the design of three generic research interventions and the adaptation of curriculum materials to encourage students' PC development within regular Science teaching. The researcher proposed and designed the interventions to assist this process, which were based on theoretical understanding of student-centred learning, active teaching and learning strategies and self-assessment.

These generic interventions provided a common approach in all the research schools, and were based on:

- actively involving all students in the learning process
- encouraging co-operative learning environments
- actively involving teachers and students in review and reflection of the learning process
- developing meaningful, formative, developmental and motivational forms of assessment for PCs.

Teachers were provided with guidance on the use of these interventions and their adaptation for their contexts. The three interventions are described below.

7.3.2.1 Intervention 1: Making PCs explicit

Teachers were encouraged to teach lessons targeting PC development, with increased verbal, practical and visual emphasis on particular PC behaviours. They were encouraged to highlight how lessons related to PCs and academic development by explicitly referring to PC behavioural objectives (ref. Appendix A11). It was assumed that where students were made aware of the desired behaviours, they would be increasingly likely to value them, and invest effort in their development (Perkins 1992). The PC behaviours were integrated into Science schemes of work, students' worksheets and classroom displays, and both teachers and students were encouraged to be increasingly conscious of opportunities to actively promote, discuss, reflect on and review PC development during Science.

7.3.2.2 Intervention 2: The GRASP® framework

The GRASP (Getting Results and Solving Problems) framework (ref. Figure 7.3.2.2) was offered as a thinking skills strategy to accompany and promote PC development. The framework outlines a series of key questions which clarify purpose and success criteria within learning, involving individuals in planning, reviewing and reflecting on activities. This process promotes metacognitive activities by making reflection an overtly integral part of the learning process, through which students target particular areas of personal improvement. Teachers were encouraged to use the framework in their teaching and students' learning, i.e. in lesson structures, team planning activities, science investigation report writing or verbal presentations.

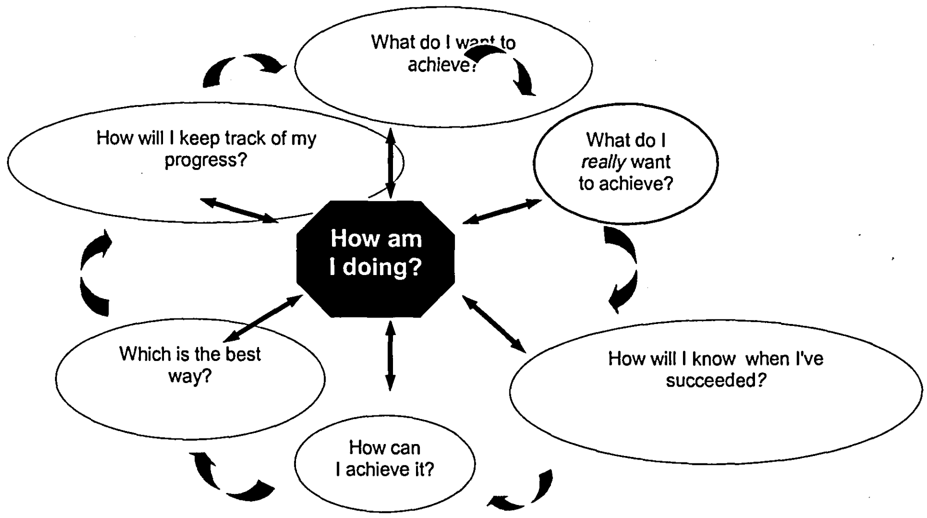


Figure 7.3.2.2: *The GRASP framework*

Where GRASP prompts the question 'What do we want to achieve?', teachers, in the study, were encouraged to identify and make explicit academic and PC targets for a lesson. Following this, the use of the framework aimed to encourage pupils to be aware of and take ownership for their learning and PC development.

The relationship between GRASP and PC development is considered to relate to the development of capability resulting from the series of action-prompts, where pupils are encouraged to:

- think critically about what they intend to achieve - critical thinking
- consider and envision a variety of alternative methods - creativity
- debate and identify the 'best' line of action - problem solving, critical thinking, verbal communication
- plan how to go about the task and how to monitor its success - self management, problem solving
- review and reflect as a means of promoting on-going change - tenacity, critical thinking.

These processes encompass a range of PCs that when shared with others encourage verbal communication and social intelligence. Further discussion of its use is given in section 10.2.8.

7.3.2.3 Intervention 3: Student self-assessment

A cyclical process of target setting, review and evaluation was promoted as a method of self-assessment for PCs, and as a means of tracking student improvement. Students were encouraged to highlight and discuss their PC strengths and areas of development using the A-D scaled discussion document (ref. Appendix A12) and associated self-assessment materials. Students were invited by their teachers to regularly target particular areas for improvement, commit themselves to improvement and self-assess through verbal and written evaluative statements. Students were encouraged to set achievable and realistic targets and to refer to recent and relevant experiences, preferably from classroom experiences. The construction of PC portfolios was encouraged on most occasions, in which students collected evidence of improvement through evidence statements. The frequency of these activities was determined mainly by the teacher in collaboration with the researcher, but were suggested as a weekly activity. Various formats for self-assessment were devised, refined or modified throughout the research period to improve their design. As students were unfamiliar with this type of evaluation, it was necessary to allocate time to model and assist the process of evidence collection in the early stages of the study.

The perception staff and students had of the PCs was influential on the way in which the evaluations were promoted, allowed time for, and valued. It was proposed that teachers, and supporting staff, promote a positive view of this type of personal development and discuss the relevance of the capabilities for self-improvement with students, and where possible teachers were encouraged to give equal weighting to the relevance and value of (a) knowledge and (b) PC development.

The researcher was aware that the curriculum demands could influence the degree to which the interventions could be emphasised, and a realistic attitude was taken to the frequency of recognition and assessment of PCs with Science.

7.3.3 Phase 3: The Pilot Study

A pilot study (18.5.00 – 26.5.00) trialed and evaluated frameworks for students' PC self-assessment. It reviewed the manageability of the frameworks from teacher and student perspectives and reported on their effectiveness in aiding target setting and recording PC development.

The pilot was conducted in School C (ref. Appendix A2: 5), where it was possible to involve approximately 600 students and 12 teachers. The school conducted the pilot study over a week-long project involving students from Years 7, 8 and 9. During this time, staff worked in teams, providing cross-curricular activities focused on the development of students' PCs. No monitoring or assessment of personal skill development had previously been undertaken on similar occasions.

Teachers and students were provided with a summary of the purpose of the pilot study. Students were instructed to use a 'radar-graph' self-assessment framework at the beginning and end of the project (ref. Appendix A17), and teachers were asked to note the strengths and difficulties with the materials. Students' self-assessments were supported with the use of the discussion document (ref. Appendix A30) (at which time the scale was numerical, labelled 4-1). They were encouraged to invest effort in improving their PCs during the project week, which culminated in a final review of progress.

Teachers' opinions were gathered using a semi-structured questionnaire (ref. Appendix A18) asking about the relevance of the PCs, the manageability of the self-assessment framework and its utility in encouraging students' PC development and evaluation. The data informed the adaptation of the self-assessment strategies in preparation for the main study. The outcomes of the pilot study are recorded in Case Study School C (ref. Appendix A2: 5).

7.3.4 Phase 4: Data Collection

During the second year of study, data collection took place in all the schools using a variety of qualitative techniques. Interviews, questionnaires, observations and reflective diaries provided the main sources of data, eliciting and exploring teachers' experiences and perceptions of the integration of PC interventions into the teaching of Science.

7.3.4.1 Interviews

Semi-structured interviews emerged as the most accessible and productive form of data collection. Informal and formal discussions with teachers and students on a one-to-one or group level, allowed for detailed and descriptive evidence to be collected. This method suited the busy nature of the teachers, who considered it more accessible and productive to discuss experiences and perceptions with the researcher, as opposed to compiling diary reports. Generally, the interviews were administered at the participants' place of work, lasting approximately half to one hour. The interviews were transcribed by the researcher soon after the event and, where appropriate, notes were made in the researcher's log. On all occasions the researcher prepared interview schedules to prompt and guide the discussions, however considerable effort was placed on allowing the teachers to express their views, concerns and experiences as openly as possible.

The majority of interviews were audio taped enabling the researcher to be fully engaged in discussions, without the preoccupation of note-taking. There was a possibility that participants might be influenced by recording, however this did not prove to be notably influential at any stage. The rapport between researcher and teachers, established during the period of planning and organisation, engendered a comfortable atmosphere.

The purpose of the interviews was to elicit experiences and perceptions about the research interventions. Participants were encouraged to be objective and give reasons and evidence for their opinions. Both positive and negative issues were discussed, and all interviews were viewed as opportunities to propose further development. Considerable time was dedicated to reflection, targeting improvement and development of interventions and strategies. During data analysis, interviews explicated, consolidated and verified emergent themes.

Student interviews verified the views of the teachers and explored students' opinions on the perceived relevance of PCs. These were undertaken less frequently, however a selection of students from most schools were invited to comment at some stage. The method of analysis for interview transcripts has been described more fully in sections 6.2.1 and 7.3.5.

Transcription: Transcripts provided accounts of interviews which illustrated the dialogue between the researcher and participant. It was decided that raw transcripts which included statements such as 'Um's', 'er's', be filtered, with repetitive or unrelated statements omitted to aid clarity of reading. All transcripts are presented in a 'filtered' form (ref. Figure 7.3.4.1).

Sample of raw transcript

1.	A:	Right this was a question which (laugh) I'd don't, I can't....Why did you become involved in the first place? I know I'd asked you (laugh) Do you know what I mean?
2.	B:	(laugh) I don't think I'm asked __ so good.
3.	A	Cos look I've just put here, so what motivated you to doing it? I mean you had loads to cope with didn't you?
4.	B:	Well yes
5.	A:	You had a difficult class,
6.	B:	Yes
7.	A:	You were, well you had enough to do.... And I wasn't paying you or anything?
8.	B:	No you didn't did you (laugh) No, it wasn't the money at all, I mean, if you want a personal answer, I needed something for personal satisfaction.
9.	A:	Right
10.	B:	It was for me, because they weren't giving me anything at school
11.	A:	Mmm
12.	B:	Personal development wise
13.	A:	Professional development
14.	B:	Career development-wise anything at all.
15.	A:	Right
16.	B:	And I was bored, yes I had enough to do, but I was bored with what I was doing. And direction. I'd got no direction, from my head of department or the head or the people supposed to be in charge of staff development. You know there was nothing there.

Comparative sample of filtered transcript

1.	A:	Why did you become involved in the research in the first place? I know I'd asked you but what motivated you to be involved? You had enough to cope with did you? .... And I wasn't paying you or anything?
2.	B:	No it wasn't the money at all, if you want a personal answer, I needed something for personal satisfaction. It was for me, because they weren't giving me anything at school, personal development wise
3.	A:	Professional development
4.	B:	Career development-wise anything at all. And I was bored, yes I had enough to do, but I was bored with what I was doing. I wanted direction. I'd got no direction, from the head of department or the head or people supposed to be in charge of staff development.

Figure 7.3.4.1: ***Comparison between raw and filtered transcripts***

7.3.4.2 Questionnaires

A wide range of questionnaires were designed and used to elicit opinions from employers, teachers, students, parents and support-staff (ref. Appendix A25). On a number of occasions questionnaires were presented as periodic evaluation documents which enhanced their completion. It is possible that the respondents considered the task to be more purposeful when focused on informative 'evaluation', as opposed to solely a research-based activity aiming to 'question' their progress.

Semi-structured questionnaires formed the main form of design in which respondents were encouraged to provide some structured responses using Likert-scaled statements, such as 'a great deal', 'a little bit', 'not at all'. These responses were grouped and categorised for analysis. Open-ended statements, although more difficult to categorise and compare, allowed respondents to explain and describe their opinions, enabling views to be compared across schools, and provided explanations or descriptive statements for their choice.

Where larger samples of respondents were targeted, e.g. employers and teachers, mailed questionnaires were used, whilst smaller groups were distributed by hand by teachers or the researcher.

7.3.4.3 Observation

Classroom observations were conducted, where possible, to gain information on the ways in which PC development was integrated into subject delivery. Observation focused on the: teaching and learning styles used to facilitate PC development; use and process of target setting and evaluation; students' response to PC development; factors which facilitate or limit the focus of PCs in Science. They were undertaken by the researcher in the role of external or participant observer, depending on the school and context. A semi-structured observation schedule was used consistently across schools (ref. Appendix A19). The observations were predominantly of regular classroom activity, however two controlled observations were also undertaken (ref. Appendix A2: 14, 18). On these occasions the researcher and an independent observer used a specifically designed structured observation schedule for these activities (ref. Appendix 20).

The issue of observer distortion was a concern, however efforts were made to limit its effect by using less intrusive methods of observation, i.e. lack of video equipment, familiarity of the observer to the students etc. If students directly asked the observer about the purpose of their presence an explanation was provided, however this rarely occurred.

7.3.4.4 <u>Researcher's Logbook</u>

The researcher's logbook recorded activity for each school following visits, interviews, observations or contact. Additional reflective notes were gathered following meetings with the supervisory team and advisors. This data provided a chronological account of activity during the three years of study and clearly illustrated the action research process. The case study reports (ref. section 9.2, Appendix A1-3, A5-7) present this data, which are interpreted and explained more fully in subsequent discussions (ref. sections 9.3, and Chapter 10).

7.3.4.5 <u>Training day reflective discussions</u>

Two main training day meetings were held during the period of in-class activity. Teachers from all schools received information about the purpose and intentions of the study and the nature of the PCs, and were invited to contribute to collaborative discussions. University supervisors, advisors, and the researcher coordinated reflective activities which focused on pertinent aspects of the research, encouraging critical consideration of the teachers' perceptions and experiences. A discussion focused on the purpose and nature of assessment of PCs, and the justification of the approach within the classroom. The outcomes of the meetings were followed up in one-to-one interviews with teachers, and aided the progression of the action research process, and are represented in Appendix A21.

7.3.5 Phase 5: Data Analysis - Grounded Theory and Case Study

7.3.5.1 Aspects of Grounded theory

The data was analysed by processes typical of grounded theory methods - sorting, coding and categorising, identifying, clarifying and substantiating findings. Emergent themes and commonalities were sought within the data using constant comparative analysis, such that key strategies for the teaching and learning of PCs emerged.

All data was classified into individual data sets, which represented data collected using a particular method on a particular occasion, i.e. one interview transcript, one completed observation schedule, filed until analysis, and accompanied by the researcher's reflective logbook entries. During the course of the data collection process, and following its completion, data was read, reviewed and analysed to highlight emergent issues. Open, axial and selective coding were used to group and classify similar issues (explanation is given in section 6.3.2), showing that particular themes were supported within the data. NUD·IST Vivo, enabled longer transcripts, and ones with a common focus, to be analysed electronically, facilitating the coding and categorising process. For data sets which were relatively concise or specifically focused, coding was undertaken by hand involving colour-coding, which grouped common issues into particular groups (codes) with corresponding colours (for example, ref. Appendix A22). Both processes aided the sorting of data, however the electronic package more thoroughly assisted the process of text searching for the retrieval, linking, display and integration of data, which was necessary for the development and verification of emergent themes.

Electronic Coding: involved inputting transcribed data into the software programme, and working through each section to identify its meaning, to group and categorise it. Once all data had been inputted and categorised it was possible to retrieve and display the results in three ways:

- by searching for a code across different transcripts, which would display any section of a transcript allocated to a particular code

SEARCH RESULTS FOR CODE 'EXPLICITNESS'

Document 'Mary', 3 passages, 1331 characters.
Section 1, Paragraphs 32-33, 550 characters.
I: So what is making the difference do you think? Is it the PCs or is it the teaching strategy?
M: It's hard that, because the teaching strategy is to make it explicit so you're twisting your emphasis anyway. The teaching strategy is secondary I think, it's about making them more aware of these factors. Now we used to do it a little bit before but not as much as is happening now. And the fact that you're then asking them to review more constantly on what they're improving on, their target, it keeps them more on track with their development.

Document 'Ruth', 3 passages, 2747 characters.
Section 1, Paragraph 44, 260 characters.
D: Making the PCs explicit at the beginning and evaluating them at the end of the lesson. Using these target setting sheets, and I'm actually doing that will other classes I teach too not with the sheets but just doing it in their books. And that's helpful.

Document 'Chris', 2 passages, 1456 characters.
Section 1, Paragraph 3, 990 characters.
I have found that it has obstructed the pace of the lesson, for the science, so consequently I've had to start to push it back and it's much more low key. So the references, instead of having overtly emphasised lessons, and I know this is the recommendation that you keep bringing them back and saying well, reflect on this, reflect on that, then if I'm too overt with it, it tends to stifle the lesson and they get bored. So consequently what I am tending to do now is I am having them work in groups, they seem to have responded well to that. And then I'm picking them up at the beginning of the lesson, during the lesson by saying 'Think about your skills', 'Think about listening to each other' 'Remember the things you wrote down at the beginning'. So I literally only spend 30 seconds to a minute reminding them on that. But we are still going through the initial targeting and the evaluation. I haven't done an evaluation on this unit yet because we haven't finished the unit.

- by searching for a theme within one transcript, which would display only the sections of that transcript which the researcher had associated with a particular code

NVivo revision 1.1.127

Project: School B 2nd Observation User: Administrator
DOCUMENT CODING REPORT

Document: 51~ Observation 2 feedback teacher &
Created: 02/11/2001 - 16:45:41
Modified:02/11/2001 - 17:05:44
Description: Observation feedback with teacher & observer 22.5.01

Nodes in Set: All Tree Nodes
Node 1 of 8 (1) /Teamwork

Passage 1 of 3 Section 1.1, Paras 8 to 9, 748 chars.

8: A: Mmm I'm not sure about the role thing whether we always want leaders to remain as leader. It may be worth thinking about how we could encourage others.
9: B: Yeah that might be a good option because I've had that done before where we were analysed and put into groups, and it worked really well. I also wonder how they would get on if we gave them a completely different task, where it wasn't orientated this way, for instance bracelet making or silk painting or something. Something which may be more orientated towards different members of the group, and then to see how people such as Scott [leader of boy, boy, girl group] got on. Something that wasn't sciencey. May be their roles would change then, when the task isn't in their domain.

Passage 2 of 3 Section 1.1.1, Para 16, 469 chars.

16: B: You know the weaknesses were so strong in the non-project group, they recognised that they weren't working as a team. And it was so blatant that it was much easier to pick them up in that respect. Because they weren't working well, the girls were arguing all the time, that was very very evident. But the boys initially weren't, one of the boys was just beavering on by himself, they weren't talking to each other, there was very little talk with the other boys.

- by conducting a text-search for a particular word or phrase, which would search for any relevant section from the transcripts, irrespective of coding

TEXT SEARCH: 'Teamwork'
Document '48~ Observation 2 nonproj', 1 passages, 80 characters.
Section 3, Paragraph 15, 80 characters.
A: We argued a bit, but we think the teamwork went well.... working as a team.
Document '50~ Observation 2 Project', 1 passages, 219 characters.
Section 1, Paragraph 38, 219 characters.
B: So if we were to look at the teams' strengths and areas of development you've already mentioned that the communication, teamwork and meeting deadlines were what you were good at. How do you think you could improve

Most frequently the first two forms of retrieval were used to collate and compare data. Electronic coding was used mainly for transcripts of a number of interviews where the same interview schedule was used, i.e. initial employer and teacher interviews (Phase 1).

Hand Coding: was used mainly where individual cases were analysed separately. On these occasions, individual data sets were read and coded to draw understanding and supportive statements from particular transcripts, questionnaires, researcher's logs, observation reviews etc.. On these occasions the researcher annotated the data and compiled diagrams or charts to illustrate the key issues and their relationship within the data set (ref. Figure 7.3.5.1)

1st Interim Staff Evaluation Questionnaires Emergent themes:	**Nov 00**
Facilitating aspects	Group work Presentations Research Discussions Investigations Team teaching – enabling more communication between subject areas DT slant – making/designing = creativity, motivation etc.
Inhibiting aspects	Didactic teaching Task heavy projects
Negative aspects/concerns	TIME restrictions to do target-setting and evaluation Takes time for staff and students to get used to PC terminology & general systems Concern to cover NC requirements Paperwork for assessment – from students and overviews of progress from staff
Positive aspects	Target setting more readily achieved Benefits from the reflective process Effective use of self assessment Better transfer of skills Students seem more focused on work and meeting objectives Students more able to work in a group Students aware of their own and other's strengths Students readily identifying PCs assisting t-setting

Figure 7.3.5.1: ***Hand Coding analysis***

7.3.5.2 Case Study

Data from each school was processed and collated into separate explanatory case studies, providing a descriptive illustration of the context, experiences and perceptions. These case study reports outline the action research process, based on all the data collected on the teachers' and researcher's experiences and perceptions. The case studies detail and illustrate the way in which the research was undertaken, the viewpoints and opinions of the participants (including teachers, students, support staff and management) and of the researcher. They were based on the evidence collected using the range of data sources (ref. Phase 4, section 7.3.4).

The researcher logged the research to communicate the emerging experiences and perceptions, without manipulating the process to meet pre-determined goals or specified paths of action. By facilitating this process, the realities, perceptions and experiences of the study group emerged through their interactions within their natural settings. Each case was considered individually (ref. Appendix A1-A9) and collaboratively (ref. Chapters 11, 12, 13), where the varied length and level of detail within the cases reflects the extent to which the schools participated in the research, and the amount of time and effort invested in it.

The majority of the data analysis was undertaken by the researcher, however the supervisory team and teachers were provided with regular reviews of progress. It was deemed imperative that both groups became familiar with and discussed the emerging themes on an ongoing basis, thereby informing the progress of research in particular contexts as well as drawing out meaning from emergent themes. Individual, small group and large group meetings were organised where key issues and areas of concern were considered. These were co-ordinated at periodic intervals to provide opportunity for the study group to meet, share experiences, comment and exemplify particular findings, as well as to allow alternative viewpoints or suggestions to be considered.

The final analysis of cases was undertaken mainly by the researcher with the support of the supervisory team in the final year of study. Processes of description, explanation, verification and validation were underpinned by reflection, in order to clarify and justify outcomes. Referral to, and reflection on, the study's aims and objectives assisted the clarification of key outcomes and areas of further interest.

7.4 ESTABLISHING CREDIBILITY

The study presented detailed descriptions of the teachers' contexts, experiences and perceptions in order to illustrate their opinions on students' PC development. Readers are encouraged to intelligently use the findings whilst engaging in a process of personal reflection in order to consider the applications of the findings in particular contexts. Owing to the relatively small number of cases, the study does not aim to generalise the outcomes to diverse educational settings. However, it considers the findings and emergent strategies to be well-grounded in evidence and worthy of critical appraisal. The emergent themes are substantiated in the data arising from the experiences and perceptions of teachers working mainly in mainstream education over a period of up to three years. They show what kinds of things can happen, and that PC development is possible through the Science curriculum.

In order to address the issue of validity, data collection methods were triangulated, allowing for the cross-checking and exemplification of data across the study group. These methods were used in different contexts over a period of time in order to profile the process of development and change occurring as a result of the research interventions.

The potential for bias in the research may have increased due to the teachers' and researcher's vested interests in its outcomes. It was considered important to improve objectivity in order to consolidate and justify perceptions and experiences. Maintaining an ethos of confirmability, and focusing efforts on grounding findings in the data, improved the potential of avoiding bias. Cross-checking and exploration of rival explanations contributed to the critical and analytical emphasis placed on data collection and analysis. Where additional researchers or observers were involved, clearly structured interview and observation schedules were provided and discussed so that they were familiar with the requirements of data collection. At all times teachers were given the choice to consent or refuse to the researcher's access to classrooms, as well as being able to withdraw from organised meetings or the study as a whole. Informed consent was sought from all participants, inclusive of students, and data was verified through self-evaluation processes.

The methods outlined above were means of encouraging an ethically correct, valid and reliable approach to the research, thus minimising the negative researcher effects on the study.

CHAPTER 8

Employer and Teacher Perceptions

This chapter presents employer and teacher perceptions of the relevance and nature of PC development in employment and in schools. It illustrates the demand for PCs in employment and the current emphasis on encouraging youngsters' PC improvement. These findings represent the way in which the research addressed the second aim of the study, to research the extent to which practice at school and classroom levels enables the teaching of PCs through the Science curriculum.

8.0 OVERVIEW

During Phase 1 the perceptions of employers and teachers were explored to elicit the perceived importance of developing youngsters' PCs. The findings suggest a discrepancy between the demand for PCs as perceived by teachers and employers, and the level of provision for the development of youngsters' PCs at school and on entering the workplace. The data suggests that as the demand for PCs increases, due to their increased desirability by employers, so too will the need for youngsters to improve their PC development to maximise job opportunities and overall personal success. Presently, employers consider that PC development in new employees falls below that required. Responses from employer and teacher groups indicate that they see the responsibility for youngsters' PC development as lying predominantly with schools and with parents. On entry to the workplace employers seek technical skills, academic qualifications and also proficiency in PCs.

This chapter will indicate that teachers and employers considered that PCs are becoming increasingly relevant in the 21st century workplace. They consider that rapid advancements in technology, and demands for superior services, are resulting in employees needing varied and adaptable generic skills. This data supports that presented in related works (DTI 1998, Leadbeater 1999, Seltzer and Bentley 1999, ref. Chapter 3).

8.1 RESPONDENT SAMPLE

The data in this chapter is derived from the first phase of collection: 21 in depth one-to-one interviews (15 teachers, 6 employers); 120 responses to questionnaires (35 employers, 85 teachers); a verbal survey targeting 62 individuals (21 employers, 41 teachers). The methodology is outlined in section 7.3.1.

Several employment groups were involved in this phase of data collection, including barristers, engineers, doctors, nurses, retail managers, bankers, police personnel, policy makers, customer services representatives and members of the construction and food industries. The status of the respondents within the employment group varied, ranging from employees with no added responsibility, to those in management, director or consultant positions. The respondents' experience within their current posts ranged between ten months and thirty years.

Similarly, a broad selection of teachers from a wide range of roles, subject specialisms and years of experience defined the sample. Of the 85 teachers providing questionnaire data, 40 responses (47%) were from trainee or newly qualified teachers.

8.2 PRESENTATION OF DATA

Data derived from interviews, oral surveys and questionnaires, is presented in this chapter within the analysis of results. Where questions are related, the responses from employer and teacher groups have been brought together to illustrate the degree of agreement within the findings. Four assumptions were made in regard to the data collected, which are considered justified within the study due to the nature of the data collection techniques.

It was assumed that:

a) *the respondents were aware of the skills and characteristics being represented by the PCs*

Although respondents were commenting on the PCs, they were only provided with a brief overview of the terms in this phase of data collection. The majority did not have opportunity to fully question or ponder the concepts with the researcher. Due to the nature of the oral survey, answers were limited to those on a four-point scale, and were gathered in a relatively short space of time per respondent. Similarly, where interview schedules or questionnaires were mailed to respondents, only a brief overview of the study's aims and philosophy, along with an outline of the PCs being referred to was provided.

b) *the respondents answered honestly*

Although encouraged to answer honestly, respondents may have provided answers which they perceived to be 'correct', in line with societal norms. In short answer surveys, on questionnaires or during interviews, respondents may have not wanted to be controversial, agreeing with what could be viewed as the 'right' answer (Oppenheim 1992: 138). On the whole the researcher was aware that respondents may have felt the need to agree with what was being proposed, especially regarding the nature of the study. Efforts were made to limit this effect using lengthier follow-up interviews, in which greater exemplification of ideas was explored.

c) *the respondents considered themselves able to make informed responses in relation to the PCs*

Where mailed questionnaire or oral surveys were used, it was assumed that the respondents felt informed enough about the PCs to make a judgement on behalf of themselves, their school, their business or organisation. It was beyond the researcher's control to pinpoint the people who would complete the questionnaire, although where possible relevant job titles were specified. The data therefore emerges from a broad spectrum of employment types and can only be assumed to have been given by respondents who felt able to provide responses which were indicative of their institution or setting. Questionnaires illustrate the nature of the respondents' job and the number of years of experience within the position, thus allowing the reader to understand and present their source.

d) the respondents' interpretation of the question statements and response categories were similar, or the same as those intended

The researcher assumes that the terminology of the question statements or response categories, such as 'strongly agree' to 'strongly disagree' are applicable to all respondents. Identifying the degree of consistency between respondents' and the researcher's perceptions of terms was beyond the remit of this study. The use of Likert-scale statements limited possible misunderstandings, however this could not fully guard against it. Where question statements referred to generic terms such as 'success' or 'regularly', it has been presumed that respondents used good judgement and answered to the best of their understanding (Oppenheim, 1992: 129).

Although not doubting the accuracy of the data, its status should be recognised, in that the depth of feeling behind responses is unclear. Efforts were made to inform the respondents of the purpose and meaning of the terms, being provided with a brief overview of the PCs and their associated definitions. All respondents replied voluntarily with the option of maintaining anonymity.

In the early stages of the study the terms 'Personal Capability Skills' or 'Personal Capabilities' were used interchangeably, however as the study matured the term 'Personal Capabilities' became the norm. Most importantly, both terms consistently described the same skills and characteristics.

All percentages presented in tables or graphs have been rounded up or down to the nearest whole number. The figures presented in the tables (8.3a and 8.3b) are in percentage and raw form due to the sample sizes, and are based on the number of respondents per question.

8.3 EMERGENT THEMES

The data has been categorised into nine themes and discussed separately in this chapter with reference to the following tables.

Item n = 21	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
1. The PCs are desirable to your business.	15 (71%)	6 (29%)	0	0	0
2. The PCs directly influence business success.	17 (81%)	4 (19%)	0	0	0
3. New employees adequately acquired the PCs on entering your business.	0	4 (19%)	6 (29%)	(10) 48%	1 (5%)
4. The PCs should be encouraged in school.	14 (67%)	7 (33%)	0	0	0

Table 8.3a: *Employers' opinions from oral survey*

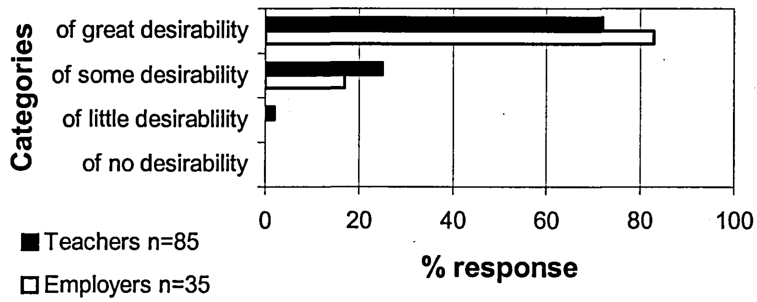
Item n = 41	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
1. The PCs are desirable areas for development for youngsters.	32 (78%)	9 (22%)	0	0	0
2. The PCs should be encouraged in school.	28 (68%)	11 (27%)	0	2 (5%)	0
3. The PCs should be encouraged through subject teaching.	24 (59%)	17 (41%)	0	0	0
4. The PCs are currently developed in your regular subject teaching.	14 (34%)	20 (46%)	4 (10%)	4 (10%)	0

Table 8.3b: ***Teachers' opinions from oral survey***

8.3.1 Desirability

Employers considered PCs to be desirable attributes to their organisations (ref. Table 8.3a: 1), and teachers' opinions reflected this when considering youngsters' development and future success (ref. Table 8.3b: 1). Only 2% of questionnaire respondents indicated that the PCs were 'of little desirability' for youngsters' future success in the workplace (ref. Figure 8.3.1a).

Fig. 8.3.1a Desirability of PCs (Questionnaire data)



Teachers and employers placed similar emphasis on the perceived level of demand on the PCs when recruiting new employees. 61% of teachers considered that employers placed 'a great deal' of demand and 26% 'some demand', with only two teachers identifying 'little demand' for the PCs. This position is reflected in employers' recruitment practices, which was found to select candidates on the basis of PCs as well as academic and technical standards. When recruiting, 45% of employers placed 'great demand', 49% placed 'some demand' and only 6% placed 'little' or 'no' demand on PCs.

Responses during interviews indicate that PCs may have an increasing role in job recruitment, organisational success and sustainability. Employers commented that:

> These skills are essential. More and more employers are taking as read the detailed skills/competences. Recruitment decisions are made on the basis of evidence gained from behaviour/performance in the skill areas (obviously including necessary technical skills/qualifications. (Human Resources Manager)

> We are looking for people who have got a strong academic history, and also having team working capabilities.... we are not looking for your firsts and 2-1's from Cambridge who have sat in a room and never spoken to anybody, we don't want those. We're looking for leaders, natural leaders, or people who have got leadership potential.... All the assessment and recruitment process is based on these competences. (Recruitment Officer)

> There's always two parts to all this, so half of it is technical but the competency bit is key as well... If you look at the job descriptions there are two elements to it, the technical side and the personal side. (Schools Liaison Officer)

During interviews and questionnaires teachers also emphasised the relevance and desirability of PCs, commenting that:

> Many of these skills, if not all, are essential for future professional and social development. Students will need to reflect on their own strengths and weakness in a situation, work as a team, consider other people's feelings and opinions... These I believe are vital within the professional workplace. (Julie, Teacher of Science, 3 years experience)

> Through developing these skills children should succeed better within school and thus be better equipped for the next stage of life. (Chris, Head of Department, 11 years experience)

> All these skills are needed in order for students to be able to achieve their potential in the learning environment in which they are going to find themselves for the rest of their lives. Well-developed PCs allow us to develop a sound understanding of how to learn, progress and apply knowledge as a natural process, rather than just being able to regurgitate facts for exams. (Mary, Teaching and Learning LEA Advisor, 14 years experience)

> I feel that a person's social and professional success is entirely dependent upon these skills. An individual with such skills would have the tools required to face new tasks, suggest possible solutions and communicate these, develop ideas, reflect and think of further improvements. (Alison, Teacher of Science, 5 years experience)

> These skills are vital, they will help to make conflict, when inevitable, productive. They will help improve co-operation and tolerance, reduce racism, sexism and harassment. (Head of Science, 25 years experience)

Employer questionnaires highlighted the importance of PCs and similar skills with respect to personal development.

> It will be important that future employees display many of the skills listed in order for the individual and the employer to succeed. (Banking Services Manager)

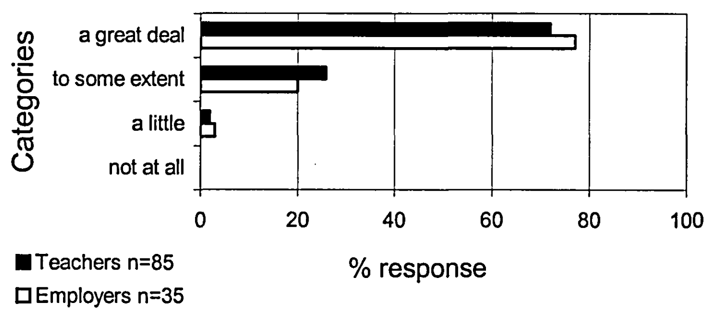
> These skills are very important – we agree with their involvement through the National Curriculum. (Education Liaison Manager)

These skills are very important – the workplace is constantly changing and employees are encouraged to perform to high standards. (Assistant Personnel Manager)

Very important for this age group to have at least an awareness of life skills. (Accounting Senior Manager Human Resources)

Clearly the majority of teachers and employers felt that current orgnaisation success directly related to the contribution made by PCs (ref. Fig 8.3.1b). The verbal survey reflected similar opinions with all employer respondents agreeing that the PCs influenced success (ref. Tables 8.3a: 2, pg 126).

Fig 8.3.1b PC contribution to business success (Questionnaire data)



8.3.2 Current Status of PCs in employment

With such seemingly clear consensus on the perceived desirability of the PCs, from both teachers and employers, it is interesting to establish whether employers considered new employees to have adequate skills and characteristics. Of the twenty-one employer respondents to the oral survey, 11 'strongly disagreed' (5%) or 'disagreed' (48%), and only 4 'agreed' (19%), leaving 6 employers with no opinion (29%) on whether new employees had adequate capabilities (ref. Table 8.3a: 3, pg 126). Of the thirty-five employers responding to the questionnaires, a similar proportion suggested that new employees had only 'poorly' (29%) or 'adequately' (49%) developed the PCs, with only eight (23%) considering their new employees to have 'well' developed PCs when entering their business/company.

However, despite the seeming lack of development the majority of employers (80%) considered their new employees to 'adequately meet' the demands of their workplace in relation to the PCs. Only 6% commented that new employees currently 'well met' the demands of their workplace, and 14% highlighted that they were 'poorly met'.

An obvious tension was found between how employers viewed the status of new employees PC development, and what they consider necessary and relevant to the demands of the workplace. Although the majority of employers considered PC development to be inadequate, most feel that their needs were being 'adequately' met, thus raising the question of whether further attention or development in this area is necessary.

Descriptive statements indicate further discrepancy within the employment sector, some of who expressed concern over the perceived lack of, or limited development in the PCs.

> New employees seem to be worse than those of the past in the way that they are too compliant too quickly and this results in loss of productivity... The majority of new employees fail to meet the company's requirements. (Group Head of Insurance Management Development)
>
> It's evident now how people are struggling because they are lacking in some of these skills. (Human Resources Manager, Chemical Industry)

8.3.3 Most sought after PCs

Employers highlighted 'teamwork' (22%) and 'verbal communication' (19%) as the most important capabilities for development. 'Self-management' (14%) and 'self-motivation' (14%) were also considered important (ref. Table 8.3.3a column 1). Employers considered 'teamwork' (19%) and 'critical thinking' (19%) as capabilities which new employees needed most assistance developing. 'Creativity', 'social intelligence' and 'problem solving' were considered less relevant (3% respectively) (ref. Table 8.3.3a, column 2).

n = no. of times identified from sample group **Personal Capability**	1 **What was considered to be most important for new employees/ youngsters to develop.**		2 **What employers felt were the capabilities that new employees/youngsters needed most assistance in developing.**	
	Employers n = 36	**Teachers** n=112	**Employers** n = 37	**Teachers** n = 79
Positive self image	2 (6%)	31 (28%)	4 (11%)	11 (14%)
Self management	5 (14%)	7 (6%)	5 (14%)	16 (20%)
Creativity	0	5 (4%)	1 (3%)	1 (1%)
Verbal communication	7 (19%)	13 (12%)	3 (8%)	3 (4%)
Critical thinking	2 (6%)	5 (4%)	7 (19%)	12 (15%)
Self motivation	5 (14%)	14 (13%)	5 (14%)	16 (20%)
Problem solving	4 (11%)	2 (2%)	1 (3%)	9 (11%)
Tenacity	0	5 (4%)	3 (8%)	5 (6%)
Teamwork	8 (22%)	15 (13%)	7 (19%)	4 (5%)
Social Intelligence	3 (8%)	15 (13%)	1 (3%)	3 (4%)

Table 8.3.3a: ***Employers' opinions of the importance of development of PCs***

The results from employers differed from those of teachers, who considered 'positive self-image' (28%) to be the PC where youngsters needed most development. 'Problem solving' rated least in this category (2%). Teachers also considered 'self-motivation' (20%) and 'self management' (20%) as areas with which youngsters needed most assistance developing. Interestingly teachers' views differed from those held by employers.

Opinions highlighted that the views about PCs within the workplace is diverse, and varies considerably between employers and the roles undertaken within particular jobs.

These skills are important to differing degrees depending upon the specific role. However, a base level of skill/competence is required in all of the ten areas. Priority will also change for particular individuals as their role develops and they may take on new or different challenges.

> These skills should be prioritised in order that they reflect the requirements of the job involved and as such there is no particular order in which they should be placed. (Banking Services Manager)

The reasons given for the difference in emphasis related mainly to job specification. Table 8.3.3b illustrates the impact of PCs in particular job roles.

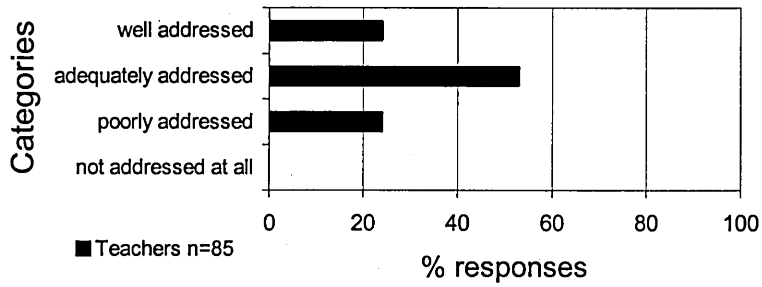
Personal Capability	Employment type	Yrs Experience	Reason given by employer/employee
Teamwork	Specialist Registrar Cardiologist	8	A new doctor has much to learn and much of this is done within the multi-disciplinary team that contributes to patient management.
	Nurse	9	Nurses have to work in a multi-disciplinary team and communicate effectively between team members to deliver a high standard of care.
	Policy Maker, Government Department	5	In the MOD teamwork is vital, it is a joint effort involving many strong personalities and ability to act as a unit is vital.
	Senior Processing Banking Clerk	22	Your own work can impact on other people/departments and therefore contributes or impacts on the remainder of the business.
Verbal Communication	Production Manager Animation	2	Effective articulation is half the battle when negotiating yourself into a new environment.
	Retail Personnel Manager	18	Leads to other skills, if an individual cannot communicate everything else falls down.
	Doctor	5	The ability to convey thoughts, and especially when in difficulty, is important. The ability to ask for help and offer help to others in non-intimidating ways.
	Principal Engineer	9	Without this, ability in all of the other areas cannot be properly utilised or transmitted.
Problem Solving	Barrister	5	That's what people come to lawyers for.
	Construction Engineer	7	Being able to think for themselves helps speed production and puts less strain on others having to keep a close eye on them.
	County Council Planning Assistant	10	This is one of greatest importance because it can be applied, either to tasks directly and practically, related to the past or to the development of capabilities which need further development.
Social intelligence	Consultant Anesthetist	21	For dealing with patients and parents from all walks of life
Critical thinking	Customer Service Manager	6	It is one of the key areas which companies look for in new employees – the ability to 'think outside the box' and bring new ideas from a different environment.
Self motivation	Civil Engineer	22	It is the foundation for a productive environment at any level of employment.
Self management	Plumber Training Manager	23	In order that the business can concentrate on creating new business rather than spending time and money on an individuals' learning needs.

Table 8.3.3b: ***Applications of capability within differing job roles***

8.3.4 Current School Input

The data highlights a difference between what is perceived to be of importance by employers and teachers, and what is regularly encouraged in school and actively developed in organisations. Views from teachers indicate the reasons why new employees are poorly equipped in terms of PCs at present. Approximately a quarter of the teachers responding to the questionnaire considered their schools to 'well address' PC development and over half considered PCs to be 'adequately addressed'. A quarter suggested that PCs were 'poorly addressed' (ref. Fig 8.3.4).

Fig 8.3.4 Current school emphasis (Questionnaire data)



The focus paid to the development of youngsters' PCs therefore seems variable. Although over three quarters of teachers considered that schools were currently addressing their development, the majority of employers did not confirm its impact during recruitment interviews.

The majority of teacher respondents to the oral survey, and those to the questionnaire, considered that schools should encourage the development of PCs, and that they had a responsibility to do so (ref. Table 8.3a: 2, pg 126).

8.3.5 Demand for PCs in the 21st Century

The failure to adequately develop PCs during the school years is of concern when employers consider their development to be increasingly relevant to the demands of the 21st century workplace. Employers highlighted, in interviews and questionnaires, the need for new recruits and managers to perform well technically, personally and interpersonally, and the need for new employees to have an awareness of other peoples' feelings, activities, requirements and concerns.

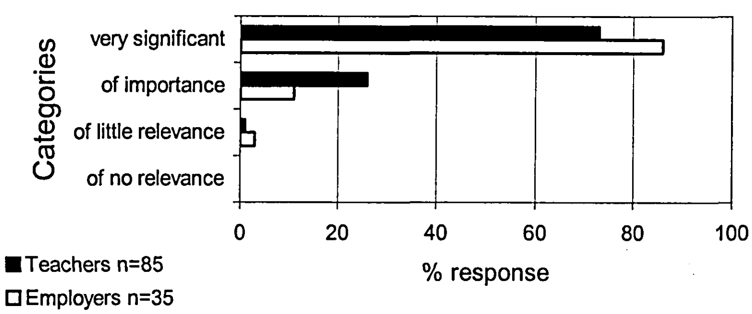
> The company has moved quite quickly to the idea that it's not just all right to do the task anymore, we need good managers too. It's no longer good enough to do your job well but upset people at the same time. You've got to be able to take your team with you, to network, and you need to have the interpersonal skills to do that. (High Profile Recruitment Officer).

Development is constant, and the specific skills of a particular job can be taught, but the personal traits are essential if you are to cope with the demands of the 21st century. A person who can do a specific task relatively well, is not as much an asset as someone who can manage change and different circumstances without trouble. (International Training Policy Manager)

The importance of these skills is increasing because the environment we are operating in is getting ever more competitive and the way we stay ahead of the game is by staying good at this stuff. We need technical competency but contractors say we can turn on a dime and the way we do it is because we have an open culture and you can turn up and say I need help with this and I need it now and they'll get it without aggro or bad behaviour. (Schools Liaison Officer, Chemical Industry)

Questionnaire data revealed similar opinions from a broader range of employers and teachers, who largely felt that it was important for youngsters, between the ages of 8 and 16 years, to develop PCs to meet the demands of the 21st century workplace (ref. Fig 8.3.5). Furthermore, employers highlighted the fact that PC development should be maintained at all levels since they related to all areas of an organisation [Interview 6: 6.2.00: 19-20]. A Human Resources Manager commented that, 'it's critical for everybody and you can't differentiate' [Interview 12: 23.2.00: 29].

Fig 8.3.5 Importance of PCs in the 21st century (Questionnaire data)



Supporting statements from teachers' questionnaires reflect similar opinions.

All youngsters need to develop their personal capabilities to be part of a workforce, to socialise, and fulfil their potential, and to lead a happy and fulfilled life. (KS1 Co-ordinator, 25 years experience)

The workplace is a changing environment with complex demands. Therefore young people need multi-skills to be more flexible to the changing demands of the 21st century. A positive self-image allows them to be confident in meeting these changes. (Key Stage 1 Maths specialist, 24 years experience)

The knock on effect for society as a whole is very significant. People who possess all these capabilities will be able to contribute to society as a whole in a positive way both in home life and at work. They will be more productive and less likely to develop depressive illnesses etc. (Deputy Head teacher, 10 years experience)

Education should not just focus on academic success. Personal Capabilities are just as important as academic success for the workplace. Hopefully the two can be developed together within schools, and not separated from each other. (Science Teacher, 1 year experience)

In contrast, it is interesting to consider the view of one respondent who felt that PCs were 'of little relevance' for the 21st century workplace.

It is all very well if you all want drones in the workplace. The sooner people focus on happiness, the sooner more people will work to real goals and enjoy job satisfaction. (KS3 & 4 Science Teacher, 1 year experience)

Although questioning the relevance of the capabilities this respondent conceded that the PCs were 'of great desirability' for youngsters' future success. She also considered subject teachers to have 'little responsibility' to address these capabilities within their teaching. Despite these views she considered PC development to be the educational responsibility of family/parents and universities.

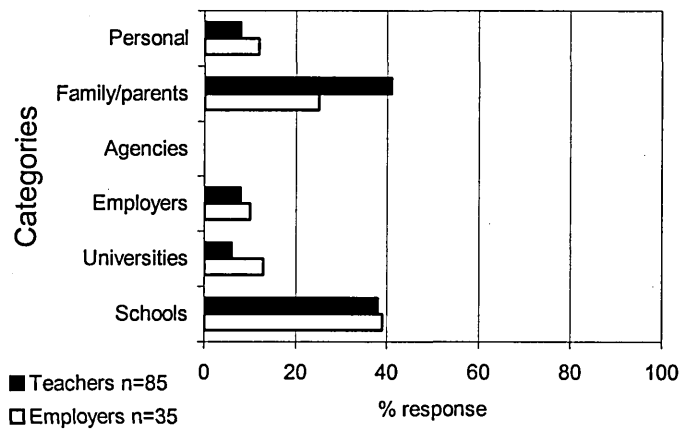
8.3.6 Where or by whom PCs should be encouraged?

Further data was collected with respect to the role of employers and teachers in developing youngsters' PCs.

The large majority of the employers considered themselves to be in a position of responsibility for PC development. 69% of respondents considered all employers to have a 'high responsibility' and 29% 'some responsibility' to contribute to the development of youngsters or new employees' capabilities.

When asked, however, where 'most' responsibility lay, employers rated schools (39%) and family/parents (25%) most highly. Fewer considered universities/training colleges (13%), individuals (12%) or outside agencies to be responsible for PC development. Notably, only 10% of employers considered themselves to carry 'most' responsibility (ref. Fig. 8.3.6).

Fig 8.3.6 Responsibility for development of PCs (Questionnaire data)



Teachers agreed with employers and considered schools and parents to have 'most' responsibility for PC development. 41% of questionnaire respondents felt that family/parents were responsible, with schools as the next most responsible group at 38%. Fewer respondents considered individuals (8%), employers (8%) and colleges (6%) responsible for youngsters' PC development (ref. Fig 8.3.6).

When questioned further on this issue, during interview, employers' comments were steered predominantly towards attributing responsibility towards schools.

> I think it's the teachers' responsibility to be honest because you learn behaviour really young. Because it's all about how you behave with other people isn't it and it should be encouraged from 11 years if not before. If we are already able to recruit people who have an awareness of this type of thing that's brilliant for us because we are not having to start from scratch with introducing totally new concepts. (Schools Liaison Officer, Chemical Industry)

> Focused development of PCs in schools will certainly positively influence employees' success and effectiveness in the workplace… I consider that these initiatives should be undertaken pre-16 and begin in primary schools. I think the focus on measurement and assessment hinders the process of personal development. (Group Head of Insurance Management Development)

Some employers identified existent PC development strategies for new employees entering the workplace. Although some seemingly accepting responsibility, it was clear that the standard of provision across the employment sectors varies from well-structured programmes to limited or no support for personal development. It is interesting to note the variety of provision (ref. Table 8.3.6) and the differences between commercial, private sector and public sector services. The responses relate to the provision for 'new employees' in each of the employment types. It can only be assumed that the level of prior training and qualifications will differ depending on job roles.

Employer	Provision for personal development
National Health Service	Staff mentoring Annual appraisals
Retail	4-day initial training programmes Personal development reviews Teamwork days 'Be Free' Awards
Barristers	Funding for further education One-to-one mentoring
Engineering	Limited and random Internal short courses
Government	Personal Management branches Active line management Training facilities A 'learning' culture
Banking	One-to-one mentoring Self development objectives Learning library
Electronics Manufacturer	Induction programs Psychometric testing Self development tools & workshops
Construction Industry	Limited – no support
University staff	Limited – no support
Museum staff	Limited – no support
Service providers (plumbers, heating engineers)	Limited – no support
Employment Services	Values & Personal Competency structures Peer mentoring

Table 8.3.6: ***Provision for new employees from the employment sector***

During interview, some employers expressed concern over the strategies for PC development in schools, commenting on the need for schools to avoid compromising other subject areas or skills by focusing on PCs during heavily prescribed school years. These opinions address the practical reality and suggest that a cautious approach be taken. The development of PCs, by their very nature, was intended to be supportive and complementary, not a replacement for other subjects or skill development.

> I think you can teach anything from an early age but it's what do you sacrifice to teach that. I appreciate that school children need to get a basic academic basis of subject, which only teachers can teach them so that they can go on and learn other things. So if you're going to sacrifice other subjects to learn how to influence people, I'm not necessarily sure that's worth it. (Recruitment Officer)

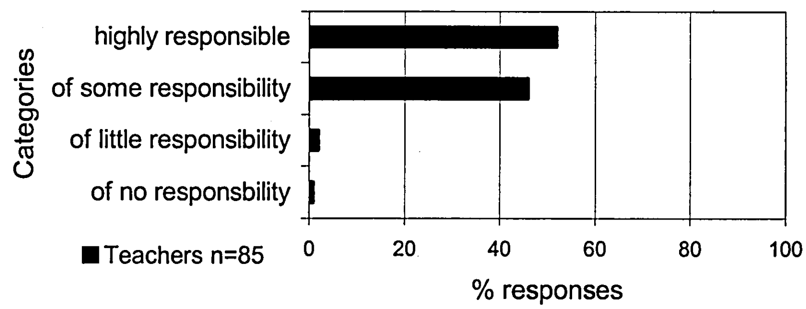
> I'm not sure if I agree with the philosophy of what is being advocated, simply because if we are looking at the skills employers want and we're trying to build that into the educational process, and critical thinking is one of them, that by its very nature might stifle other things. For example, if you're advocating critical thinking and kids do a lot of work on that, then won't that stifle innovation and the more creative aspects, because they'll open their mouths and think 'Oh', and they won't have critically thought about it, and they may feel that they shouldn't. (Police Inspector)

8.3.7 Developing PCs through subject teaching

A fundamental aim of this study is to encourage PC development within the subject curriculum during schooling years. It was important, therefore, to gauge teachers' opinions as to whether they felt that PCs should be addressed in this way, and to address whether they actually incorporated students' PC development in their own subject teaching, an indication of their own personal commitment, or whether they viewed it as a wider school issue.

In the oral survey, all the teacher respondents 'agreed' or 'strongly agreed' that the PCs 'should' be encouraged through subject teaching (ref. Table 8.3a, pg 126). Questionnaires revealed similar opinions from a wider sample of teachers, with only 3% suggesting that all teachers had 'little' or 'no' responsibility for PC development through their subject (ref. Fig. 8.3.7).

Fig 8.3.7 Expected contribution from subject teaching (Questionnaire data)



Thirty-one of the forty-one teachers in the oral survey either 'strongly agreed' (34%) or 'agreed' (46%) that they already addressed the capabilities regularly through their own subject (ref. Table 8.3b: 4, page 126).

The questionnaires indicated that a large proportion of teachers (67%) considered that they personally 'adequately addressed' PCs through their subject teaching. This data was supported in their interview statements, for example,

> Every subject can contribute towards the development of these skills. (Teaching and Learning Advisor, 15 years of experience)

> There's more to teaching than just delivering the subject, I say anyone that's half competent should be able to deliver the subject content, but there's something slightly different when you say you are actually a 'teacher'. I say that one of the things is looking beyond the actual curriculum and at the child, and saying what's going on with the child inside. (Head of Science Department).

It is interesting to note that a larger proportion of teachers considered that PCs were being addressed more by themselves that by their schools. Given the same sample group, it is unclear why any discrepancy exists since it would be expected that school and teacher provision would correlate, such that if teachers delivered PCs then so too would school be viewed by them to be addressing these issues. It can only be assumed that teachers felt the need to defend their individual commitment when asked about their personal level of input.

At interview, teachers explained that PC development was largely unstructured and implicit in their teaching. This contrasted strongly with the intended focus of the question, which attempted to highlight the extent to which 'explicit' attention was paid to the capabilities. Clearly, there is little formal acknowledgement of the PCs within subject areas, other than PSHE, with some recognition of development noted in Records of Achievement and general school reporting systems.

> Some students do develop these skills adequately but it tends to be a consequence of their own personalities rather than that these skills were actively developed in their school career. (Teaching and Learning Advisor, 15 years of experience)

> A lot of these sorts of things happen in an ephemeral way by just normal interaction in a normal classroom situation...I think that a lot of good teachers use these already, but it's not necessarily recognised within themselves that they're doing it. It's necessarily to do with the relationships with the pupils and how you promote learning within the classroom. (Chris, Head of Department, 13 years experience)

The outcome of these efforts, however varied, is mirrored in the views teachers hold about the extent to which they considered school leavers to have developed the PCs. 52% of teachers felt that school leavers had 'adequately developed' the PCs, with 38% considering that they were 'poorly developed'. Only 12% considered students to have 'well developed' capabilities on leaving school. It is interesting to question why such a high proportion of teachers considered students to have only poorly developed the PCs, when most teachers felt that they had adequately addressed them in their subject teaching. These results support the employers' opinions on the level of capabilities of new recruits (ref. Fig. 8.3a, pg 126).

This data suggests that if almost 40% if teachers feel that students' PCs are poorly developed in learning at school, the case addressing this area is further strengthened, indicating that PSHE or the 'hidden curriculum' is not necessarily succeeding.

8.3.8 Strategies for PC development & possible constraints

Teachers raised concerns over the present constraints on the development of PCs in schools. Most considered 'content coverage' and 'syllabus demands' as limiting factors within available time. Teachers commented strongly on the inhibitory nature of the present high content-driven NC. Pressure to deliver large quantities of information within a short amount of time had increasingly led to more didactic teaching, with less opportunity for practical activities and investigations. Teachers felt driven towards 'delivering' the curriculum, and towards focusing on improving or maintaining standards in national tests. They considered the published national league tables to have added pressure to ensuring that students perform well, and standardised national testing at the end of the key stages had a similar effect. It could be deduced, therefore, that central Government's emphasis on improving grade standards has seemingly resulted in teachers delivering subject knowledge in a more formal didactic way, not necessarily in tune with, and is indeed disparate to, the personal philosophies of teachers who hold idealistic beliefs about subject delivery and PC development.

The tension is clearly illustrated in the following representative interview statements.

> Currently I feel that the priority is the subject content, not because I personally think it is more important than the PC skills but because that is what pupils are examined on. However, this does not produce people who are effective in the work environment and so skills should be given equal weighting in the classroom. I do not think this will happen, though, unless there is some formal means of recognising such skills in schools. (Sarah, Teacher of Science, 5 years experience)

> As a department, I'm not sure how much we are actually promoting these things, we have shifted far too much over to the teacher centered model of teaching where we've got the responsibility of getting these kids through their exams, so it's all from us. And that's all from pressures of results. (Chris, Head of Department, 13 years experience)

> These days I think there's maybe too much emphasis on just the pure national curriculum, get the result, and that worries me. (Head of Science Department)

Despite support, it was apparent at interview that some teachers were hesitant to focus attention on the PCs through their subject delivery due to issues such as time and assessment pressures.

> It's how you'd go about putting them into a subject curriculum, that's the thing.... I don't know how you'd put them into a curriculum and I don't know where you'd find the time which is the other thing. (Head of Department)

> You can spot [development in these capabilities] but how do you come up with a kind of grading of it and things like that. Now positive self image and motivation, well I can tell you of twenty-five kids who have got a positive self image, over the top sometimes and that's a problem. So what do you do? Give them ten out of ten or take marks off because it goes over the top, they're so self-centered. Yeah, so they are problematic but they are worth knowing. (Head of Department)

The teacher interviewees suggested that more effort could be made to contribute to PC development of youngsters, through improved monitoring and assessment systems. They suggested that a greater degree of coordination between the assessment and accreditation of academic achievement and PC development would be helpful.

> I do feel it will be extremely useful to have a more detailed form of assessment and think more carefully about the way in which students are taught. (Julie, Teacher of Science, 3 years experience)

> I appreciate that it will be difficult in the beginning to veer people away from knowledge-based tests but as familiarity increases and the government recognise that these skills are as important, it not more important that remembering facts. As this happens, everyone will attach more and more priority to them... These are not explicitly monitored or assessed. They are addressed through PSE, GNVQ Key Skills and investigations but are not monitored as a separate activity. (Sarah, Teacher of Science, 5 years experience)

> There are, at present, no systems for monitoring the development of these skills. (Alison, Teacher of Science, 5 years experience)

> As far as science is concerned we need to do more to monitor and assess these skills. (David, Teacher of Science, 22 years experience)

Teachers voiced strong opinions on the relevance of the PCs within their subject, with some commenting on how the capabilities could positively impact on the acquisition of content knowledge. They suggested that simply adopting this type of development in a piecemeal or 'bolted-on' approach would be less productive, but that there was a need to foster PCs through the subject. The facilitating factors for this type of development were considered to be a variety of teaching strategies which actively engage students in their learning, and which can be supported across a range of curriculum subjects.

> You can't teach someone a positive self-image by getting them to work in silence. So there's a paradox there which they [government educationalists] haven't really got their heads around. (Chris, Head of Department, 13 years experience)
>
> If teachers cross-curricularly aimed to develop these skills then progress would be faster and hopefully pupils would see the benefits much more quickly. (Teacher of Science, 2 years experience)
>
> A department that offers a full range of teaching and learning styles and values the development of a holistic child will be open to further enhancement and enrichment of their pupils' education. (Sue, Advanced Skills Science Teacher, 14 years experience)

This data indicates that PC development is currently poorly addressed in an explicit way. However, questionnaire responses suggest that some currently used teaching strategies can aid the development of students' PCs, albeit implicitly at present.

Suggestions included:

- encouraging a positive school ethos which values students and gives recognition for a wide range of experiences
- undertaking tutorials and one-to-one discussions with students
- giving affirmation and responsibility to students
- providing opportunities for students to work in groups
- emphasising the value of others' views wherever possible
- assemblies
- undertaking circle time where students have an opportunity to openly discuss their feelings with others
- clubs, school councils and drama clubs
- through the PSHE and Religious Education curriculum
- through the use of problem solving and target setting activities.

Some teachers referred to this form of development as the 'hidden curriculum', and a large majority referred to the PSHE curriculum as being the vehicle for PC development. The implicit development of PC is contrary to the focus of this study, which aims to explicitly recognise them through Science teaching.

Current recording and assessment systems for academic progress are considered to be heavily-time dependent, having a negative impact on non-statutory aspects of subject teaching (Jenkins 2000a, b). The teaching and development of PCs can be viewed similarly, however, if PCs are to be assessed it is necessary for teachers to be, *'given a little bit of leeway and allowed to exercise a little bit of professionalism'* (Chris, Head of Department, 13 years experience). One teacher questioned whether there should be formal assessment of the PCs, suggesting that, *'too much monitoring could negate efforts in assimilating these skills in the first place. If you monitor something in too much depth you will end up affecting the outcome you desire in the first place'* (Brain, Head of Department, 12 years experience).

8.4 SUMMARY

This phase of research found that teachers and employers consider the notion of 'Personal Capabilities' important for employees' future success.

> New recruits will increasingly need the skills which enable them to diversify their knowledge, have empathy with their customers in order to realise their needs, be innovative so as to search for various routes to one endpoint, being 'up for a challenge' and pulling together to help gel the organisation. (UK Projects Manager)

Interestingly employers and teachers place prime responsibility for the development of PCs on 'the school' and 'the family'. Current provision, whether formally recognised and provided for, or whether acquired passively, unfortunately seems to lead to a relatively large proportion of new employees having only poorly developed PCs when entering the workplace.

This study highlighted a concern in that neither employers nor teachers, while recognising the importance of PCs for employees' future success, readily accepted responsibility for PC development but were happy to transfer such responsibility to other parties. Employers nominated schools and parents, while teachers failed to reflect the importance of PC development explicitly within their subject teaching.

For PC development to impact significantly on personal success, job recruitment and sustainability, it will be necessary for the education and employment sectors to identify their particular roles and responsibilities for initial and ongoing provision of PC development for youngsters and employees. Current provision is variable, with differing levels of support depending on schools, teachers, employers and job roles.

Teachers considered the NC to limit the time available for PC development, especially through subject teaching. Increasing demand for PC development will require changes to the current emphases in the NC, such that PC development will improve from the current implicit or piecemeal approach to a more formally recognized entity. Teachers' comments highlighted the problems inherent in the current system and the perceived benefits of focused attention on the PCs.

> I think it's the problem of the education system at present. Education now is supposed to prepare kids to enter the adult world confidently, and somewhere along the line the direction has changed to say they'll enter the world confidently only if they've got five passes at GCSE. It's sort of got deviated off. (Head of Department)

> All of these skills are needed in order for students to be able to achieve their potential in the learning environment in which they are going to find themselves for the rest of their lives... Well developed PCs allow us to develop a sound understanding of how to learn, progress and apply knowledge as a natural process, rather than just being able to regurgitate facts for exams. (Teaching and Learning Advisor, 15 years of experience)

The study endeavours to use these insights to assist the development of curriculum interventions which recognise and include PC development explicitly through the Science curriculum. The following chapters present the case studies of teachers who endeavoured to achieve this, as well as reflections on the generic interventions used.

CHAPTER 9

Case Study Findings and Discussion

This chapter provides an exemplar case study report and discussion to illustrate the action research process which was typical of all cases. The chronological report highlights the teacher-researcher interaction, while the discussion draws meaning from and considers the implications of the actions. The discussion presents key themes which are pertinent, not only to the case in hand, but also to other cases in the study.

9.0 OVERVIEW OF THE CASE: SCHOOL A

The case outlines the activity over 20 months (April 2000 – December 2001), with a teacher, Alison, in a Voluntary Aided Church of England Comprehensive School. It reflects on a two-phase research process where the teacher explored the development of PCs with Year 8 and Year 9 students. Whereas the first phase looked at the development of a cross-section of PCs, specific attention was given to creativity during the second.

The case reviews the perceptions and experiences of a relatively unsupported teacher, working in a comprehensive school, where student-teacher relations were good. Focusing on two higher ability groups and one lower ability group, she incorporated the three generic research interventions (ref. section 7.3.2) into her Science teaching. The introduction of student buddy partnerships and an increased use of active teaching and learning strategies encouraged cooperative learning, meeting with a generally positive student response. The interventions seemed most successful with higher ability students, whose self-confidence, increased awareness and self-motivation facilitated further PC development. Lower ability students experienced more success through the use of GRASP, which provided a means of improving self-management capabilities.

9.1 ALISON

Alison, aged 29, is a KS3 Science teacher with a specialism in Physics. Following the completion of a BSc (Hons) Applied Physics degree, she joined the staff at the school in 1998 and has maintained a full-time position for four years, teaching students between 11-18 years. Her additional responsibilities involve the development of teaching and learning approaches in Science, as well as being a form tutor.

She had no previous experience of educational research prior to the study, and had a personal interest in the development of her range of teaching and learning approaches, as well as in endeavouring to raise her awareness of how students learn.

9.2 THE CONTEXT, SAMPLE AND CASE REPORT

The school caters for around 1,200, 11-18 year-old students, selected from a wide geographical area, subject to Church of England membership. Eligibility for free-school meals is well below the national average. Founded on the notions of 'Faith, Vision and Nurture', the school intake in Year 7 meets the national average attainment achievement in KS3 Standard Assessment Tasks (SATs), General Certificate of Secondary Education (GCSE) and 'A' Level is above the national average. Science attainment is reported to be good, with students achieving above national averages at KS3 and KS4.

Three groups, each of approximately 30, 12-14 year old, students were involved in the study. Students were streamed, mixed-gender groups.

<u>Phase 1</u>: September 2000 – August 2001
Year 8 (higher ability set) and Year 9 (lower ability set)
<u>Phase 2</u>: September 2001 – December 2001
Year 9 (higher ability set)

This case has been presented in two sections. Firstly, to illustrate the process of action research which is illustrative of the nature of teacher-researcher interaction in each of the other cases. This is presented in tabular form, to categories the activity into its events, issues and evidence. Other case reports can be found in Appendix A1-A3 and A5-A7. Secondly, the findings of the case are discussed and related to relevant literature, drawing out significant issues which are of interest to the study as a whole. Similar case discussions are presented in Chapter 10.

CASE REPORT: School A	Event	Issue	Evidence
1	**PHASE 1** **22.5.00: Initial Perceptions** Alison became involved in the study following the Head of Department's invitation to present the PCs study during a staff meeting in March 2000. Alison showed interest in the research and volunteered to become involved in the study, and from the outset viewed the notion of PCs positively.	**SCHOOL COMMITMENT** The school endeavoured to develop communication skills by encouraging the use of a wide variety of teaching and learning strategies and specifically targeted 'oracy' as a whole-school issue. **SKILL DEVELOPMENT** Areas of personal development, such as self-management, were considered to be inadequately developed within the curriculum, a result of academic requirements of the NC and the consequent time constraints. Records of Achievement in the school focused mainly on academic success with no assessment of the development of personal skills. School leavers were considered lacking in PCs, however their importance was recognised for students' future success. Alison considered that PCs could effectively be enhanced through the subject of Science.	[Questionnaire 22.05.00: A2] I feel that a persons' social and professional success is entirely dependent on these skills. An individual with such skills would have the tools required to face new tasks, suggest possible solutions and communicate these, develop ideas, reflect and think of further improvements. [Questionnaire 22.05.00: A12] Currently the priority is the subject content, not because I think it is more important than the PCs but because that is what pupils are examined on. However, this does not produce people who are effective in the work environment and so skills should be given equal weighting in the classroom. I do not think this will happen though, unless there is some formal means of recognising such skills in schools.

2	**10.6.00: Planning** A planning meeting was held between Alison and the researcher to establish the research approach. The generic interventions of making the PCs explicit, using the GRASP framework and using the target setting and self-assessment frameworks were adopted.		[Researcher's Log: 10.6.00]
ACTION: The researcher supplied Alison with a PC handbook for each student, including the A-D scale. Permanent classroom display of PCs to be arranged in the laboratory. Research planned to commence from the new academic year (September 2000) with two student groups: Year 8 (higher ability) and Year 9 (lower ability). PC focus to be teamwork and verbal communication.			
3	**5.10.00: Meeting - Reflection on initial Experiences** With a main focus on the verbal communication and teamwork PCs, students used the A-D scale to clarify the meaning of the PCs and progression in them. Students identified their strengths and areas for improvement. The A-D scale enabled students to track progress. Alison reported observable differences between the two student groups after one month of work with the PCs. No self-assessments had taken place at this time.	**ABILITY** More able Year 8 students were considered to react better to the concept of PCs, understanding their relevance and purpose more than the Year 9, lower ability students.	[Researcher's Log: 5.10.00]
4	**23.10.00: Meeting (The use of Buddies & GRASP)** In a second review meeting, Alison discussed the ways in which she had integrated the PCs and the GRASP approach into her Science teaching for Year 8 and 9 groups. 'Buddies' had been introduced in both classes, with students voluntarily partnered with another class member for reflective group discussion work to review progress. GRASP was used mainly with the Year 9 students, as this group seemed to struggle with their self-management and concentration skills. GRASP provided consistency and structure in lesson delivery and aided the improvement of students' management of their	**BUDDY PARTNERSHIPS** This strategy was especially useful with lower ability or less confident pupils, where the buddy acted as a consistent source of support, although all were positive about it. Alison felt that the pupils reacted well to the partnerships and worked well together when in larger teams of four, six or eight. **TEAMWORK** Year 8 students had been engaged in teamwork at the beginning of a new topic of work. These activities highlighted and reviewed individual and team behaviours, using PCs as a stimulus.	[Researcher's Log: 23.10.00]

<table>
<tr><td></td><td>work.</td><td>GRASP
After two months, Alison felt the students had begun to increase their awareness of the GRASP process. She noted an improved aptitude towards organising and undertaking work independently.</td><td></td></tr>
<tr><td colspan="4">ACTION:
Alison considered it useful to focus attention on planning for the integration of PCs within the scheme of work. The PCs had previously been used on a more 'ad hoc' basis, with little reference to specific behavioural objectives.
Alison and the researcher decided to link particular activities from the Science scheme to specific behavioural objectives. This related mainly to the practical or active learning activities, which lent themselves to encouraging the PCs development. 'Post-it' stickers highlighted the relevant objectives within the teacher's text. The researcher provided an exemplar scheme of work, from which Alison made PCs explicit before or during the activities, using them as the basis for individual and group review.</td></tr>
<tr><td>5</td><td>21.11.00: Half termly reflections
In a meeting and interview, four main issues emerged from Alison's experiences over a 6-week period.

Explicitness
Alison made PC objectives explicit, and reinforced them within her teaching. An activity using the jigsaw approach, placed specific emphasis on developing verbal communication.

Target Setting
A team activity formed the basis for initial individual PC target setting. Students had opportunities to review their development of teamwork and verbal communication PCs, and monitored their development against their target.</td><td>ABILITY & GRASP
The Year 9 group found difficulty understanding the PCs, and Alison's attention focused most strongly on subject knowledge because of their slower acquisition of subject knowledge than their more able peers. The students' poorer ability and lack of autonomy resulted in the self-management PC behaviours being encouraged mainly implicitly, with the use GRASP. The framework was considered to enable students to be clearer about the processes in the lesson and to take more responsibility for their learning. However, the implicit approach to PCs resulted in the students being less aware of their PC development.

TARGET SETTING
Alison commented positively on the target setting process, considering students to be more aware and better able to highlight areas for improvement.</td><td>[Interview/Researcher's Log 21.11.00: 8]
Alison "I am really labouring the point of when they communicate – how to communicate and saying it's not just about talking but it's about listening and sharing ideas. So I am really labouring that and I'm watching them as I go round, and you can see them trying to show me that. So that really did work well."

[Interview 21.11.00: 38]</td></tr>
</table>

		BUDDY PARTNERSHIPS Buddies continued to be considered a highly successful strategy. Students were reported to have increased motivation and confidence. Opportunities for buddy work were used approximately half the time, impacting most significantly on quieter students. **ASSESSMENT OF ACADEMIC KNOWLEDGE** Alison had some difficulties assessing collaborative work within buddies, and had resorted to allocating pairs the same mark. She did not feel this inhibited its future use, as other opportunities for individual assessment were available. **GRASP** GRASP remained mainly used with Year 9. Alison felt it enhanced students' understanding of the learning process, and improved their ability to complete activities independently.	[Interview 21.11.00: 15] Alison "... they are developing as people, which is going to benefit them in the long run anyway." [Interview 21.11.00: 20] Alison "When they link up in bigger groups, you can see that the kids, who at the start of the year may have been slightly quiet, although developing naturally anyway, have got their buddy in their group and are much more verbal." [Interview 21.11.00: 33-35]
6	**30.01.01: Observation** Students presented the outcomes of teamwork activities in various forms such as role-plays, posters, leaflets and talks. Students had worked in groups of six (3 buddy pairs) to research and present information on 'Smoking'. Creativity, verbal communication and teamwork PCs had been targeted, and later reviewed using a ten-point scale. Each student evaluated themselves and other team members, and set targets and reviewed progress.	**SELF CONFIDENCE** Such collaborative activities were useful in conveying Science understanding and encouraging the students' self-confidence. **SELF ASSESSMENTS** Alison was concerned about the frequency of students' written self-assessments, which were increasingly difficult to integrate into lesson time. The emphasis on content resulted in few opportunities for students to review in class or homework time. Reviewing individuals'	[Observation Schedule: 30.01.01] [Interview 41. 30.01.01:42] Alison "...It's getting the kids to write something down which is really valid and really useful and that's what I've found

		PC development was mainly verbal. Despite the difficulties of written self-assessments. Alison considered them worthwhile for promoting reflection and review. **AWARENESS & BEHAVIOUR** Alison felt that raising students' PC awareness had impacted on their behaviour, that increased awareness of desirable behaviours resulted in greater investment of effort towards improvement, and that the time spent on the PCs within Science lessons was profitable in terms of the improved ethos and teacher-student and student-student relationships. Alison encouraged students to give feedback and praise in relation to PCs during lessons, to give value to desirable behaviours. Observable differences in students' behaviour was noted through: • increased confidence • openness to talk, present and discuss opinions • improved teamwork due to buddy support • more work being covered due to improved motivation **TEACHING STYLES** The explicitness of the teaching and learning approaches and the purpose, through the use and review of PC behaviours, was a main change to Alison's usual approach. Alison felt that PCs could be encouraged within subject	a struggle and that's the thing, not least because it's such a big group and I can't spend such a lot of time just talking to them." [Interview 41, 30.01.01: 12] [Interview 41. 30.01.01: 19-23] [Interview 41.

		teaching, viewing improvement as a process of awareness-raising, stimulating change in behaviour. **TEACHER OWNERSHIP** Alison felt confident to integrate the PCs into the Science scheme, feeling the process had become integral in her teaching.	30.01.01: 68]
ACTION: Alison was keen to explore how self-assessment could be improved so that students could log their targets more formally. The research was to place most focus on the Year 8 group, as Year 9's GCSE assessment pressures resulted in more attention needed to be paid to curriculum content.			
7	**8.5.01: Interview (Reflecting on progress - differences between Year 8 and Year 9)** Alison was positive about the integration of PCs into teaching over eight months. Regular use of buddy and team-based work and explicit review of the PCs generated increased student enthusiasm and confidence. The process of awareness-raising was ongoing, Alison integrated opportunities for discussing PC behaviours with the class.	**AWARENESS** Raising awareness through various of teaching and learning strategies was fundamental to students' PCs development. Students continued to react positively to the explicit recognition of PC behaviours. Alison viewed this approach as integral to the teaching and learning of PCs. **SELF IMAGE** Students' self-image impacted strongly on their success, and proved fundamentally different between the Year 8 and Year 9 groups. Limited success of the Year 9 group seemed to result both from their lower ability, and their poor self-images. Alison proposed that focused efforts to improve students' self-image from an early stage may prove more appropriate with lower ability students. **ACADEMIC ABILITY** PC success was related increasingly to students' academic ability. Higher ability students were better able to understand the	[Interview 46: 8.5.01: 2, 16, 33] Alison "You're not telling them how to do it, although you are telling them in a way, you're not teaching in a true teaching sense, but you are making them aware of it and then they take it on board. So I do definitely think that PCs can be taught. They see the criteria, they understand it, and then they want to make themselves 'whole' I suppose. They want to meet all that kind thing. So they've taken it as a challenge and taken it quite seriously." [Interview 46. 8.5.01: 14]

		purpose of PCs and to react to them more readily. Lower ability students had difficulty understanding their purpose, PC terminology, and how it related to personal development.	[Interview 46: 8.5.01: 12]
		SCIENCE CONTEXT Science was a useful medium for PCs development due to its practical nature and applicability to a wide variety of teaching and learning approaches.	
		Alison did not doubt her responsibility for nurturing students' PCs alongside their academic ability. PCs seemed a means of encouraging students to recognise on-going achievements.	[Interview 46. 8.5.01: 18-20] Alison "As a teacher, I think you naturally do it anyway, you cannot have kids in your care for a year and not develop them as people. It's just focusing them on what you are doing."
		SELF ASSESSMENT Target setting and evaluation was mainly undertaken discursively in class and between peers. Time and motivational issues in completing written self-assessments had resulted in oral reviews. Alison was concerned about an emphasis on negative self-review, and saw peer reflections as a way for students to recognise the positive aspects of personal development.	[Interview 46. 8.5.01: 51]
		GENERAL IMPRESSION OF IMPROVEMENT Alison felt that the initial impact of PCs was variable due to her own, and the students' lack of familiarity with the interventions. However, her enthusiasm towards the work encouraged further commitment. Students reacted well to the interventions, trying to	[Interview 46: 8.5.01: 30] Alison "I just think that any situation in life where you've got a framework and you know what's expected, and you know what you're doing, can only

		demonstrate improved behaviours. Behaviour might also have been influenced by increasing maturity, although Alison considered improvement to go beyond this.	be positive… I really think the improvements have been largely to do with having discussed stuff with each other, with their buddies, and sets of buddies and the whole class, and they just seem quite free with that."
8	**18.5.01: Interim Evaluation Questionnaire** Alison completed a questionnaire evaluation.	• PCs were addressed 'a great deal' within the subject, through 'careful choice of teaching and learning styles', 'use of buddy teams', resulting in 'increased confidence in the majority of pupils'. • Positively focused criteria helped self-reflection, reducing students' self-criticism. • Understanding the concept of PCs 'proved impossible' for Year 9, but Year 8 'grasped it in a short time'. • Teamwork, peer and self-evaluation and constructive criticism assisted PC integration. • Heavy curriculum content inhibited PC integration. • Year 8 students were 'very aware' of the PCs, Year 9 were 'not aware at all'. • Students' increased awareness affected their behaviour 'a great deal'. 'In terms of set tasks in which they have a greater understanding of how to behave whilst attempting to reach a subject based goal'. • Teaching and learning strategies had a 'massive' effect on PC development. Increased time to plan for opportunities to develop PCs has resulted in 'much more variety'. • Teaching and learning of	[Interim Evaluation Questionnaire 18.5.01]

		PCs is made possible by 'increasing and encouraging active thought' about students' personal development, and 'providing the right environment' in the classroom. • Focused attention on the PCs 'improved' PC development. • Setting personal PC targets 'promoted thought' and was an 'invaluable tool!' • Students' self-evaluation of PCs 'increases focus and gives direction'. • Initially students have difficulties in applying the PC statements to real-life, but 'now they are more used to the format and find referencing targets easier'. • GRASP provides a 'well defined structure which has benefited less able pupils' as it 'relates directly to PCs, especially self management'. • Pupils have benefited 'a great deal' from reflection, as it provided a 'forum for discussion and has enabled pupils to focus on improvements for their next team work.' There have been 'deliberate attempts to overcome weaknesses' during further tasks. • 'It would have been nice to have more time to produce worksheets with clearly defined links to PCs, just to increase the focus further.' • Professionally, the research has increased the opportunity to consider 'not only course content but also teaching and learning approaches.' Positive responses, particularly from Year 8 students related to enjoyment, in part due to the 'conscious effort to increase positive self	

		image.'	
9	**5.6.01: Students' perceptions** The researcher asked a randomly selected group of Year 8 students about their opinions of PCs. They commented on the use of buddies and the differences between PC-linked Science and regular lessons.	**PESONAL CAPABILITIES** Students considered PCs to relate to 'what you can do' and saw it as a method of 'evaluating yourself'. They emphasised the identification of positive behaviours and personal strengths. Some, however, viewed it as a deficit-model and focused on identifying weaknesses. **TEAMWORK** Students related the influence of PCs such as verbal communication to increased confidence in teamwork. **ACADEMIC ACHIEVEMENT** Students thought PCs affected their learning in science mainly via the improved communication, stimulated by buddy and teamwork activities. **BUDDY WORK** Students spoke positively of buddy work. Their enjoyment of it related strongly to the opportunity to work in friendship groups, as opposed to the departments' boy-girl seating policy. **LESSON DIFFERENCES – PC v NON PC FOCUS** Students noted the increased range of teaching and learning strategies, comparing their effects to regular Science lessons. Increased motivation and engagement were associated with these opportunities, which differed from the 'copying out' activities that students otherwise experienced.	[Interview 53. 5.6.01: 25] [Interview 53. 5.6.01: 38-42] Student 1: "When you're working in groups in different subjects the verbal communication has helped because it makes you more confident when giving ideas to the class." [Interview 53. 5.6.01: 54] [Interview 53. 5.6.01: 1-3] [Interview 53. 5.6.01: 4-10, 21-36]
10	**9.7.01: End of Phase 1** This meeting was relatively short. Alison reported that little emphasis		[Researcher's Log: 9.7.01]

	had been placed on PCs due to examinations, school report writing and Science fair events. Brief comments were made about the continued emphasis on varying teaching and learning strategies. She was continuing to make the students aware of PCs by sharing the purpose of the lesson and the choice of activity with the students.		
ACTION: Plans were made to continue the research in the new academic term, with a main focus on the development of 'Creativity' through Science, with a high ability Year 9 group.			
11	**18.9.01: Reflection on Phase 1 and a view towards Phase 2** The researcher met Alison to reflect on the first phase of the research and to establish the key issues arising from it.	**PC DEVELOPMENT** A range of PCs seemed to have been developed, which Alison saw as inter-related. She commented on observable differences in the students' behaviour from the start to the end of the year. She felt the increased levels of confidence and self-image resulted from buddy work, which facilitated verbal communication and teamwork skills. She stressed the influence of a non-threatening learning environment. **ACADEMIC ACHIEVEMENT** The relationship between noted improvements and academic standard were harder to identify, Alison perceived that students worked better together, impacting on their ability to complete work more effectively, and that standard tests did not effectively demonstrate these improvements.	[Interview 60. 18.9.01: 56] [Interview 60. 18.9.01: 59] Alison "I think with the whole scheme of PCs, at the beginning, they were a little bit unsure of it, they were a little bit unsure of each other and themselves. As time went by they were more confident in what I was expecting of them, and I mean, with each other. I think the buddies were the single most important factor in developing positive self-image, and I think that really helped that along. And I think if positive self-image is being pushed along, then the rest will follow."
12	**PHASE 2: CREATIVITY Planning and activity**	**CREATIVITY** She recognised creativity to	[Interview 60. 18.9.01: 15]

For the second phase of the research, Alison was encouraged by the researcher to focus on 'Creativity'.

A period of three months (September - December 2001) was identified for the work.

In the new term Alison had initiated some work with a higher ability Year 9 group. Students produced work on 'Pollution', with a focus on creativity, as a homework activity, following a brief discussion about the meaning of creativity.

Alison was asked about her perceptions of creativity and creative work in an interview.

be a strong feature of her current teaching and valued the opportunity to focus on it.

ACADEMIC ACHIEVEMENT
The standard of all the work was seen as above what would otherwise be expected. This was related to:

- it was the first homework set
- being a top-set Year 9 group
- pending examinations motivating their efforts.

The work was considered to surpass any of these factors, and Alison felt the focus on creativity had a positive influence.

PERCEPTIONS OF CREATIVITY
Alison linked the notions of novel and original outcomes to creative work and personally valued them as a teacher. The independent transfer and application of Science to other curriculum areas was also viewed as significant.

Teaching Creativity
Alison viewed 'teaching' creativity as problematic, but saw her role as facilitating creative development through various teaching and learning approaches, however she also accepted the serendipitous nature of idea formation.

Emphasising creative development in Science
Alison saw her approach as similar to usual teaching approaches, but considered how further emphasis could be placed:

- using more relevant contexts to deliver science

Alison: "... You will always get some pieces of work that are better than the others, and within the group some that are outstanding, but I've never had a piece of work which has obviously had as much effort as that before. I've never had a piece of work like some of these in all the time I've worked in this school."

[Interview 60. 18.9.01: 1]
Alison: "What I really love is when they come up with something that I would never ever have thought of, then I get more a buzz out of it... it would be something that I would think was creative, doing something different with something you know you have to get across, I suppose."

		knowledge e.g. TV ads, newspapers etc. • emphasising creativity as an outcome.	
		TIME & CLASSROOM MANAGEMENT Time was a significant factor in the encouragement of creativity. Alison utilised a combination of class work and homework to allow students to engage in targeted activities, which she saw as 'enhancing learning'. Enabling students to have a more flexible approach to the work, with minimal time constraints, seemed important.	[Interview 60. 18.9.01: 26] Alison "Time is a big issue I think. Certainly actually producing a visual display does take a very long time. We do have time to build that into lessons but not as often as I would perhaps like to do… it's a big part of creativity, ideas don't just come in at a time that suits you…it's something that just bobs in there, and sometimes that's after you've had to hand in a piece of work."
		TARGET SETTING Alison questioned the relevance of this approach for creative development and viewed it as more of a discursive and reflective exercise than planned targeted approach. She also saw peer-assessment as problematic, as creativity is influenced by personal judgements, which may vary considerably within a group.	
		TEACHER COMMITMENT Alison's willingness to continue with the research was evident. She was very interested in the area of study, and considered it to have positive effects on students. She considered the outcomes as potentially being an increased awareness and use of creative work in science.	[Interview 60. 18.9.01: 55] Alison "I want to carry on because I enjoy it and I think the kids get something from it. I mean I would have carried it on anyway regardless of what the new focus was, because I have found it really interesting and I've seen how the kids have responded, and I think that has been really positive."

13	**9.10.01: Creative development** A meeting with Alison indicated that students had been involved in further activities to encourage creativity within their science work. Emphasis was placed on the creative elements of teaching and learning, both with the Year 9 group, and with other year groups.	**TIME** A time gap between setting and reviewing creativity homework activities seemed beneficial in allowing students more time to develop their ideas. **IMPACT** Alison found that although most students responded positively to the freedom of this type of work, others sometimes saw it as an opportunity for silliness. This detracted from the purpose. **AGE** Older sixth form students seemed to find these opportunities much harder to capitalise on. Alison considered that by this time in their education, due to a lack of prior opportunity, students may have had their creative flare 'knocked out of them'.	[Researcher's Log 9.10.01]
14	**5.11.01 Interim Evaluation Questionnaire (Creativity)** Alison completed an evaluative questionnaire two months after initiating work in this area.	• Creativity had been addressed 'a great deal' within lesson delivery 'via a variety of teaching and learning methods'. Alison 'placed far more emphasis on the 'why' of learning , 'not just what was needed to be understood in terms of content'. • Pupils were 'more aware of their own skills' and therefore were 'more focused on the task'. • Initial problems had been experienced in integrating PCs into subject content. • Teaching and learning strategies for PC development through the subject were 'teamwork, practical work, reflection time, buddy work, creative writing, poetry, songs, model making and games.' • No particular teaching and	[Interim Questionnaire 5.11.01]

		learning strategies inhibited PC development, 'provided there was enough variety'. • Focused PC attention resulted in 'increased enthusiasm, thinking more about self improvement, a greater interest in the subject and therefore a better understanding'. • Specific behavioural changes related to increased confidence and enthusiasm. • 'Pupils can learn the behaviours which are associated with the PCs… providing a fun, interesting and non-threatening environment allows a development of positive self image and upon this other PCs can be built'. • Impact on academic progress is 'too difficult to monitor in a relatively short space of time.' • Target setting occurred after group work, where students evaluated their own performance. • Students evaluated PC development 'via self evaluation after specific tasks and buddy/group evaluation both verbal and written'. • The study has increased the level of thought into teaching and learning strategies, the sharing of purpose with the students and increased the time for evaluation. • Alison considered the PC initiative to be 'hard work initially' but has become enjoyable, commenting 'I have myself become more enthusiastic as the pupils appear to be enjoying lessons more'.	

15	**7.11.01: Observing and Interviewing Students** The researcher observed the Year 9 students presenting the outcomes of creativity, teamwork which included poetry, posters and raps based on the elements in the periodic table. Two groups of students produced raps based on the first 20 elements. Other students handed in written work, which varied radically in quality, style and science content. Students entered the class in a lively, yet polite manner, responding positively and respect fully towards Alison. There was a sense of equality between the students and the teacher. Classroom displays illustrated students' work, PCs and GRASP. Effort has been made to maintain a high standard of presentation within classroom display, e.g. mobiles, large illustrations of scientific process and student reward systems.	**IMPACT** Alison felt that creative work enhanced the learning of Science noting students' increased engagement. **CREATIVE WORK** The notion of making work 'different' or novel was clear in students' work. Students had used their imagination collaboratively to produce a creative outcome. They had applied what they knew about the use of the metals to their raps to convey meaning. Enjoyment was obvious in the activity. The work seems to be more beneficial to students undertaking the task and delivering it, as opposed to those observing it.	[Researcher's Log 7.11.01]
	Student Group Interview In a group interview with students, experiences and opinions of creative work were discussed.	Students considered creative work to: a) be more fun and stimulating b) have helped them learn in a more exciting way c) be different from other classes, allowing more choice and group work d) need to be balanced with more factual lessons, where they could gain notes for revision e) be well placed occasionally within a topic f) not really to be associated with what scientists did. g) allow them to work together to gain ideas (mainly boys). In general, girls preferred working alone and producing written or pictorial work. Boys preferred group	[Interview 71: 7.11.01: 6-9, 12-15, 26-31, 33, 56-64] 16. Student (girl): "I don't think you can do this creative stuff all the time though Miss, because you'd have nothing in your book to read for when you're revising." 17. Student (boy): "You have to think about what you're doing don't you, so you remember it as you go

		work and the use of role-play and raps. h) seem harder because it stimulated thinking and the application of knowledge. i) be more motivating - homework activities were more engaging despite taking more time.	along." 18 Interviewer: "So you're saying it's easier to learn." 19. Student (boy): "It's harder to write but easier to learn."
16	**6.12.01: Student Creativity Questionnaires** 28 students in the Year 9 group completed a short questionnaire towards the end of the research period. This elicited their opinions of the creative work undertaken and explored their perceptions of the relevance of creative work within Science.	**General opinions** In general the students valued engaging in creative work, considering it: • to make work more interesting • to be better than doing written work • to be fun but educational • helped them remember work more easily • to be better than just writing or copying things • to have allowed them to work with others more. **Defining Creativity** Creative work was seen as: - learning in a different way - using your imagination - working in groups - thinking of your own ideas - being able to work above - unusual stuff - fun learning - inspirational - taking part more - making things interesting - presenting your ideas - being original. **Positively focused comments** Students thought creative work made science 'less boring' and 'easier to take in', emphasising their increased enjoyment and motivation. **Negatively focused opinions** Students which experienced some concern was apparent with respect to covering	[Questionnaires 6.12.01] [Student B] "I have enjoyed the activities we have taken part in a great deal, because it has been different from the work that we usually do in science. It has let us think for ourselves a little more. The activities have been more fun to participate in than just copying out." [Student C] "I have enjoyed creativity a lot, as I think it is good to have fun in a lesson rather than producing written work all the time. I like being creative as I can show people my hobbies using it. But if you use creativity a lot then you might not learn enough science, as our SATs are this year." [Student F] "It makes us fell better about science work and it shows that not

		assessed knowledge and understanding. Of the 28 students, 4 were less positive about creative work in Science. They thought it had 'nothing to do with science', had made little difference to their learning of Science, found it 'boring' or felt that 'too much time' was spent on it. Some students thought others may see this type of work as an opportunity to 'mess about' during lessons, leading to frustration. **TIME** Time was an issue in a large number of questionnaires. Students generally enjoyed creative work but recognised that it took a lot of time. They saw this as a disadvantage, as less note taking had taken place to aid their examination revision. **PERSONAL DEVELOPMENT** Students saw creative activities as contributing to their personal development, through the increased use of group work. Creative work in Science enabled them to be more inventive, original and imaginative, better able to socialise and develop teamwork skills, express and communicate ideas.	all science work is boring. I think that science work is a highly important subject and if it is creative it is better, as younger children will grow to like science."
17	**11.12. 01: Final Reflections** A final review meeting discussed the overall effect Alison considered the research interventions to have had.	**OWNERSHIP** Students seemed to have gained more ownership of their learning from the increased use of active teaching and learning strategies. More collaborative team activities, and independent research tasks resulted in students taking personal responsibility for aspects of their learning,	

		which might otherwise have been delivered more formally through textbooks or whole-class teaching. **EXPLICITNESS & TEACHING AND LEARNING STRATEGIES** The effects seemed to have resulted from the influence of teaching and learning approaches and the explicitness and review of PCs. Alison saw active teaching and learning strategies as valuable for promoting PC development. **CREATIVE DEVELOPMENT** Alison felt it possible to encourage creativity through Science. Despite students' concerns that not enough pure science was being covered, she was confident that students were learning proficiently. The difference in approach may have resulted in their being less aware of it. **BUDDIES** The students seemed to have increased confidence because of the secure working relationships built with buddies. Following the use of buddies, Alison considered Science work to progress at a much quicker pace, as students were more confident and at ease. Students preferred to work with buddies, with whom they had developed trusting relationships. When linked to creative work, the buddies enabled students to discuss and generate ideas. Independent pieces of creative work were heavily influenced by the buddy discussions, however, limiting the individual	

		originality of the outcomes. **AWARENESS** The students responded well to the discussion and recognition of PC behaviours. Alison felt their increased awareness of generic terms such as 'teamwork', enabled them to practice and demonstrate the skills. Where focused attention was paid to one PC, e.g. creativity, it seemed to limit students' awareness of their overall PC development. Students benefited more from a more holistic approach to their PC development. **SELF ASSESSMENT** Regular self-assessment seemed most useful. Increased practice of reviewing through paper-based exercises, with peers and with the class, improved students' ability to discuss their PC development. Clear and easily understandable formats would aid this process, as the amount of paperwork was off-putting, especially for lower ability students. **PROFESSIONAL DEVELOPMENT** Alison's involvement in the research was personally satisfying. She valued exploring areas of personal interest, considering the insights gained to be of benefit to all her teaching. **ACADEMIC IMPROVEMENT** The science department's selection of gifted and talented students, had revealed that students' test scores from the Year 8	[Researcher's Log. 11.12.01]

		research group (Phase 1) and their non-researched peers were vastly different. The two mixed-ability cohorts exhibited similar scores for general intelligence tests (verbal reasoning, non-verbal reasoning, reading etc.), but in Science tests scores from the two groups, 90% of the top 20 pupils ranked students from both classes emerged from the researched Year 8 group. Only 10% (2 students) of the top 20 were from the non-research group. Despite comparable general intelligence tests scores, a disproportionately higher number of students emerged from the research (Year 8) group. More students had higher Science scores in the research group in their non-researched peers. Although no definitive proof that the differences result from the research, further work to study whether the PCs development assisted academic achievement would be of benefit.	
18	**14.1.02: Final Evaluation** Alison provided a written final evaluation of her experiences over the two phases.	**IMPACT** The PCs make students more aware of skills, their definitions, importance and how to achieve the associated behaviours. This knowledge was considered important for enabling students to deal with new situations. **TEACHING AND LEARNING** PCs have been delivered through various teaching and learning approaches in Science. - Making students aware of the PCs and their associated behaviours.	[Final Evaluation: 14.1.02] I am encouraged by what I have seen, the pupils' response, my own benefits and the possible increase in achievement. I will continue to implement the teaching and learning strategies used, as well as other strategies, regardless of my involvement in the project ending.

		- Self- assessment enabled students to analyse their own PCs, as well as their group's, encouraging them to recognise their strengths and areas for improvement. **AWARENESS** PCs can be taught more effectively by raising students' awareness of a particular skill and the way in which it can be demonstrated, thus stimulating students to behave differently. **INTEGRATION** A difficult aspect is making the self-assessment and delivery of PCs integrated within Science lessons. With time, students began to recognise that PCs were part of what they were doing, but they were being recognised explicitly. **ADVANTAGES** **For the teacher:** - increase awareness of own teaching approaches - understanding that it is useful to share with the class why a particular strategy is being used and what they should gain from that. **For the students:** - very enthusiastic - PCs encouraged greater responsibility for their learning, and a sense of ownership and pride emerged. - Improved academic standards may be achieved (but needs further work to confirm)	
19	**14.2.02: Follow Up** During the analysis of the case study a number of issues arose which the researcher discussed and clarified with Alison. The		[Follow up Questionnaire: 14.2.02]

	outcomes of these discussions are presented here in section **9.3** to avoid duplication.		
20	**Work continues in this school, extending into September 2002-2003, adopting PCs in a Key Stage 3 departmental strategy for student improvement.**		

9.3 CASE DISCUSSION SCHOOL A: Commitment to Improvement

9.3.1 Overview

This discussion draws meaning from the process and a range of positive outcomes in the development of PCs through mainstream Science teaching. The evidence suggests that students' self-image and academic ability significantly influenced their response to the PC interventions. Higher ability students, who generally exhibited positive self-images, were more responsive, viewing PCs as integral to and influential on learning. Lower ability students exhibited low self-confidence and experienced difficulty responding to the interventions.

Alison, the teacher in this case, considered most students' awareness and understanding of the PCs to have improved, specifically in relation to teamwork, verbal communication and creativity. Increased opportunity to engage with and use creative activities encouraged students to work with, and present Science in more original and imaginative ways. A different approach was required to facilitate creative development, using the PC framework mainly as a reflective document, as opposed to one of target setting.

9.3.2 Key Points

1. The teacher's personal motivation and interest in the research facilitated action, and stimulated professional development. The teacher-researcher partnership was influential in the change process.
2. Reflection-in and on-action aided the development and progression of ideas, and was allied to the action-research methodology.
3. Student buddy partnerships facilitated co-operative learning and encouraged self- and peer-review of PCs. A positive influence was noted with respect to classroom ethos, students' self-confidence and motivation towards learning.
4. PC development related to the students' academic ability. Higher ability students were better able to understand the purpose of the capabilities and take the ideas and processes on board. Lower ability students found more difficulty in understanding the purpose of the work, its terminology and how it related to their own development.

5. Findings suggest that where students exhibit poor self-image, possibly stemming from low expectations and low academic achievement, their ability to review and develop their PCs through the subject is inhibited.
6. Research study student groups illustrated improved scores in end-of-year tests, in comparison with their non-researched peers. Increased student confidence, improved classroom ethos and a faster pace of working on tasks were also noted.
7. Encouraging students to present their subject knowledge in a diverse range of forms facilitated more creative and original outcomes.
8. Teaching for creativity was influenced by the degree of trust, freedom, context, challenge and interaction within the learning environment.
9. A different approach was necessary to encourage creative development, and target setting and objective setting were considered unhelpful strategies.
10. Students noted their enjoyment, fun and positive reflections on creative activities, but tempered their enthusiasm with clear requests for more didactic lessons, to receive notes for revision.

9.3.3 Key Point 1: Teacher's personal motivation and the teacher-researcher partnership

9.3.3.1 Teacher motivation

The teachers' positive attitude towards the research underpins the work in this case. Alison approached and sustained work voluntarily, illustrating interest in, and commitment to the study.

Alison viewed the research as having two purposes. Firstly, it was a source of professional development, through which to extend her ideas and techniques in relation to teaching and learning approaches in Science. Secondly, she valued the skills and characteristics promoted in the PC framework [CSC: 1], considering them fundamental to people's social and professional success. She was interested in exploring methods to improve students' PCs through Science, where she considered them to be poorly addressed.

Alison willingly supported the generic research interventions and introduced student buddy partnerships to further contribute to PC development. Her personal motivation was significant in facilitating action and gaining insights into the development of PCs. She emphasised and encouraged students' PC development, within the commercialised Science scheme, and critically reflected on and discussed their impact with the researcher. This partnership enabled objective and evidence-based insights to be catalogued, to exemplify the use and impact of the research interventions. Despite no prior experience of educational research, Alison was aware of the need to provide objective and well-grounded statements about the progress and influences on the research.

Alison was committed to contributing her findings to the broader study, although she primarily viewed the research as a means of improving and unpacking her own understanding. She valued the incentive that participation in the wider study provided [Follow Up Questionnaire: A8]. Alison's interest and belief in the need for PC development motivated her to maintain commitment to the study [CSA: 1, 8], which continued into a second year, when the use of PC interventions had permeated her teaching beyond the study groups.

Alison initially found her involvement 'exciting but a little daunting', especially where emphasis lay in constructing and developing materials, as opposed to simply trialing and review. She came to value this experience, although the additional work and time implications of the study compounded her school responsibilities [Follow Up Questionnaire: A3].

9.3.3.2 <u>The teacher-researcher partnership</u>

Alison considered her partnership with the researcher to be 'very useful', providing a stimulus for ideas, and to spur on progress. Her personal motivation, and support from the researcher, significantly influenced on-going activity. She valued the insights into students' learning stemming from the work, and the sense of importance the students received from having their progress recognised beyond the classroom by the researcher [Follow Up Questionnaire: A1, 5, 6].

Change was dependent on Alison's continued willingness to develop her understanding of the teaching and learning of PCs, and where she modified her teaching approaches, the researcher worked collaboratively to initiate, maintain, review and record change. Where possible the researcher facilitated Alison's progress through the provision of practical resources, e.g. amended scheme of work, and support e.g. observation and discussion.

Elliott (1977: 88) stressed the importance of teacher participation in curriculum development and innovation, and appreciated the role of the facilitator in encouraging reflection.

> The best way to improve practice lies not so much in trying to control people's behaviours as in helping them control their own by becoming more aware of what they are doing.

Hargreaves (1999: 5) emphasised the importance of putting school teachers at the centre of curriculum development and improvement, viewing it as a 'crucial means of inventing and implementing solutions to the emerging problems'. He endorses that teachers are best placed to discover effective professional practice, and should be given time and opportunity to increasingly influence pedagogy.

This case suggests that sustained involvement in curriculum innovation is strongly influenced by the actions and motivations of individual teachers, and can be affected by the level of support from colleagues or researchers. Alison's liaison with the researcher encouraged her to integrate and adapt her teaching approaches, even with little support from her departmental or management groups. Her continued commitment was mainly influenced by the students' positive response and the value she placed on focused and collaborative reflection with the researcher for her professional development [Follow Up Questionnaire: A10, 11]. Where teachers in other cases did not illustrate such strong commitment, progress was slower, if not inhibited.

9.3.4 Key Point 2: Reflection-in and on-action

The processes through which the development, review and modification of interventions took place can be related to Schon's (1983) notions of 'reflection-*in*-action' and 'reflection-*on*-action', which he identifies as the two core practices of reflective practitioners.

According to Schon, 'reflection-in-action' describes the tacit processes of *thinking,* which accompany *doing*. These processes constantly interact with, and modify ongoing practice, such that learning from experience takes place. Much of these processes may remain implicit, non-verbalised and part of unconscious reflective thinking. Alison considered this type of reflection to be a natural feature of her teaching, enabling her to react and respond to students' learning needs. Reflection-in-action was an ongoing aspect of her formative assessment processes [Follow Up Questionnaire: A13].

Schon (1983) described 'reflection-on-action' as a more deliberate form of reflection. Here teachers might engage in conscious retrospective analysis of their performance, to gain knowledge and understanding from experiences. This form of reflection is more typical of the purposefully organised teacher-researcher interviews and evaluative questionnaires in this case and others, where experiences and perceptions were openly discussed, questioned and considered to catalogue and gather evidence of progress.

The critical nature of these reflections was essential to improving objectivity, however this posed some challenge when striving to establish the definitive reasons for change in students' behaviours. Sustained commitment to focused review encouraged the teacher and researcher to 'see with new eyes' and 'look more deeply at processes underlying the surface observations of classroom life', processes which Kershner (1999: 426) considers fundamental to the process of innovation and change.

This case suggests that where teachers show willingness to consider and reflect on their role in the classroom, and review their PC provision, the likelihood of change is enhanced. Processes of reflection-in and on-action aided the development and progression of ideas in this case, allied with the study's action-research methodology. Where these processes were on-going and self-sustained by the teacher, the influence on curriculum and PC provision stretched beyond the study groups and into other year groups.

Hargreaves (1999) encourages teachers to actively reflect-in and -on their actions, viewing these as more powerful indicators of effective classroom practice than directives or evaluations by external civil servants or educational researchers. Day (1993: 87) considered these processes to impart ownership to teachers, and to empower them to change.

> Reflection in, on and about action, despite its complexities, is a necessary part of survival in the classroom for, at least initially, it serves to reduce many variables which exist in any given situation, thus empowering teachers to remake and if necessary re-order the world in which they live.

9.3.5 Key Point 3: Co-operative Learning Environments and Student Buddy Partnerships

The creation of student-supportive or cooperative learning environments emerged from the introduction of student buddy partnerships - 'buddies'. Initially, buddies were a means of encouraging peer support, where students were encouraged to critically reflect on and discuss improvement of their own, and their buddy's, PC development. Students partnered voluntarily, and although initially a means by which to review PC development, the buddies were regularly used as a grouping strategy, with pairs grouped into larger teams of 4, 6 and 8s. Students were often encouraged to discuss topics with their buddy prior to presenting their opinions to larger teams or the whole class. Approximately 50% of the work in Science lessons incorporated buddy work.

Students responded positively to this, valuing the opportunity to work with friends and in cooperative partnerships [CSA: 4, 5, 9]. The influence of buddies on classroom ethos was considered significant, as students exhibited improved self-confidence and motivation when learning collaboratively [CSA: 7]. Students were considered to exhibit more willingness to share ideas and opinions during whole-class discussion activities due to these partnerships. Alison found it increasingly easy to stimulate class discussions and readily utilised it as a teaching strategy for subject and PC development.

Alison considered that allowing students to discuss opinions with their buddy first, encouraged them to adopt an increasingly active role during class discussions. This resulted from the increased confidence that ensued once ideas had been reviewed collaboratively. They benefited from expressing a shared or 'endorsed' view.

> [Interview 80: 22.01.02]
> 16. Alison: I think I do have a positive classroom ethos anyway but I definitely think buddies enhanced it because it happened sooner. They were much more relaxed when thinking that they had at least one person they were really comfortable with, they knew well, who they had chosen themselves. I think my personal style is informal and non-threatening, if other teachers didn't really work on that, if they used buddies maybe the difference would be greater... But it definitely did help ... and it was like every single lesson it'd be 'Can we work with buddies?'

The value of this approach for PC development related to the improvement of verbal communication and teamwork capabilities, but it also enabled a range of other PCs to be explored, such as problem solving, critical thinking, self management and positive self-image. Alison found the greatest impact to stem from the reflective buddy discussions. The secure partnership assisted the constructive review and target setting of PC behaviours.

> [Interview 80: 22.01.02]
> 20. Alison: I think [buddy work affected the students] mostly in the evaluation stage, because I think they were much more aware of how the other was behaving. They were much more aware of how the other was behaving, perhaps because they were friends, it was easier for one of them to give positive criticism because they weren't going to take that the wrong way. I think because it was their friend they were much more positive about it than they might have been if they weren't such good friends.

The use of buddies enhanced cooperative learning styles, and also increased students' motivation towards Science tasks, due to the increased enjoyment stemming from working with others. An improvement in the quality of Science resulting from increased student confidence, improved classroom ethos and a faster pace of working, was noted [CSA: 11]. Whereas Alison initially expressed concern over the nature of the student interaction during buddy work, classroom observation by the teacher and the researcher illustrated focused activity on Science and PC activities.

9.3.6 Key Point 4: Students' academic ability

Increasing awareness of PCs did not necessarily lead to similar levels of success for all students. A significant difference in PC improvement was noted between students of higher and lower academic ability [CSA: 3, 5, 7]. Lower ability students experienced more difficulty understanding the purpose of the PC interventions, and appreciating their relevance within Science learning. Already challenged by the subject, they seemed unable to cope with addressing PC development. For these students Alison referred mainly to the self-management PC, as they experienced difficulty in independently sequencing their learning, often relying heavily on teacher-directed activities.

Students' ability to understand the purpose and terminology of the PC materials, as well as its potential impact on future success, was different between the ability groups [Interview 80: 22.01.02: 13-14].

Alison found the GRASP framework useful in assisting students' independent work, and thought it improved their awareness of useful processes and self-management behaviours. GRASP enabled lower ability students to take greater ownership of their work, hence increasing their success and confidence. Unfortunately, their awareness of PCs in general was, however, less evident in their verbal commentary [CSA: 4, 5].

9.3.8 Key Point 5: The impact of self-image

The relationship between academic ability and students' self-image influenced PC development. Alison considered students' aptitude to learn and to react to change and challenges to be influenced by their self-efficacy and self-image, which influenced their self-confidence [CSA: 6, 7]. She noted higher ability students to be more accepting of personal challenges, adopting a positive 'can do' attitude.

By contrast, lower ability students seemed to be less confident and approached new or additional interventions with more apprehension. They seemed less accepting of challenges, especially where they already experienced difficulty understanding Science. Lower ability students exhibited a poor perception of their potential abilities, which Alison considered to stem from, and be compounded by, the streaming of student groups.

This case, and others, suggests that students' self-image, which related to their academic ability, impacted significantly on the way they responded to the PC interventions. Raising awareness of the positive self-image PC, through celebrating positive achievements in subject learning and out of school experiences, could improve students' self-image.

[Interview 80: 22.01.02]

8. Alison: ...I think that was out of all of the PCs, positive self-image was the key. I think if they didn't have a positive self-image to begin with, you just can't build on that. If they feel they can actually achieve something, then they'll make way to doing that, but in the beginning if they've got no self-confidence, it's very difficult then to get them to take the first steps.

The literature in this area (ref. section 5.1) indicates a positive correlation between self-image, academic achievement, behavioural difficulties, locus of control and general happiness (Lawrence 1999). Mruk (1999: 87-88) associates individuals with high self-image with those who:

- appear to be more independent, self-directed and autonomous
- seem able to accept both positive and negative feedback about themselves
- focus on self-improvement
- know themselves better.

Higher ability students, in this case, typified these behaviours by experiencing success in overall academic achievement, exhibiting confidence in their response to challenges, having fewer behavioural difficulties and being willing to develop personally. Indeed, this was far different from their less able peers who were more teacher-dependent and seemed unable to cope with additional learning challenges.

It is unclear whether different approaches, with differentiated self-assessment materials, would have altered the outcomes with the lower ability students. Cooper & McIntyre (1995: 183) refer to effective learning, and its influence on classroom ethos and environment.

> If we accept that learning is claimed to be dependent on certain types of interpersonal and social interaction, it follows that circumstances which make these forms of interaction desirable or at least congenial become a prerequisite of effective learning. Furthermore, it can be argued that the appropriate forms of interaction that this view of learning considers necessary, are dependent on the quality of the individual's self image: his or her self worth, and the belief in one's ability to take on, and contribute to, the resolution of problems. This requires an ego-supportive environment, in which the learner feels valued and respected by the significant others with whom he or she is expected to interact in the learning process.

9.3.8 Key Point 6: The impact on Science learning

The PC focus had an impact on students' Science learning. Study group students had improved scores in end-of-year tests, in comparison with their non-researched peers. When ranked, 18 of the top 20 students in the year group were in the researched student group, despite their general intelligence scores being comparable at the beginning of the year.

This result indicates the potential of PCs in learning, although there may be some alternative explanations, i.e.:

a) students' Science learning improved because of the increased use of active and co-operative learning styles in the PC interventions, which increased engagement with the subject
b) the PC interventions improved students' Science learning improved because of increased reflection and self-assessment on learning
c) the research teacher was more effective than her colleague who taught the non-researched group
d) the 'Pygmalion Effect' (Rosenthal & Jacobson 1968) – any intervention by this teacher and class would have positively influenced results due to the increased interest and attention.

Determining the true cause would require further research, however the school and teacher were enthused by the result. They considered the PC interventions to have played a key role in the improved test scores, and to this end, research continues in this school, and is promoted as a departmental initiative.

9.3.9 Key Point 7: Facilitating creative or original outcomes

Students discussed creativity and considered how scientific knowledge could be presented more creatively. Alison emphasised group or whole-class presentation of work to demonstrate, celebrate and motivate creativity. She stimulated students' response to creative work by requesting specific types of presentation, such as newspaper articles, poetry, stories, talks or raps, although they had the final choice. Whether working independently, in groups, or with buddies, students were encouraged to use a range of approaches, oral or written, to present Science knowledge in more imaginative ways.

Mitchell (1998: 29) suggests that creative development can be encouraged, given appropriately designed learning experiences, stating that:

> The notion of creativity is having freedom to explore and discover and dissemble and reassemble in whatever form we choose. Creativity cannot be taught in a lecture, but it's jubilations and frustrations can be, and need to be, experienced first hand... this means providing an environment where experimenting with ideas and conceptions is not just supported, but is encouraged and expected.

Alison valued all students' work through classroom displays, irrespective of the quality or perceived creative outcomes, although she encouraged a high standard of presentation. Valuing the desired features of creative work through the PC framework and the use of group work, increased the students' awareness of and motivation towards being creative. Minkin (1997: 39) considered the explicit valuing of creativity to be important in its encouragement.

> Enhancement is more likely to be encouraged if we value, understand and talk more about the creative process. The encouragement to "be creative" does encourage the occurrence of creative acts. It is important to raise the level of awareness of the creative process, both in its most universal characteristics and in its particular embodiment in the work.

This was of particular relevance in teaching for creativity, and was helpful in raising awareness of associated behaviours. Alison recognised the serendipitous nature of creativity, and queried whether all students could be encouraged to work creatively. Fryer (1996: 71) reviewed the opinions on whether creativity can be taught, suggesting that:

> Teachers have a key role to play in the development of their pupils' creativity (Torrance and Myers 1970) ... Osche 1999 [suggests] that if you want pupils to be creative, you have to persuade them they can be. He does not believe you can direct students to be creative. It is more of a case of creating the right kind of environment for creativity to happen.

9.3.10 Key Point 8: Teaching for creativity

It became apparent that a different approach was required for teaching creativity from teaching other PCs.

Increasingly varied approaches to learning, enhanced by curiosity, inventiveness, exploration and enthusiasm, accompanied by a good knowledge base, and an awareness of creative behaviours, were evident features of Alison's experiences. Seltzer & Bentley (1999: 31-34) outlined five factors affecting creative development. These can be linked to the findings of this case, and form the basis of the following discussion.

> Creativity is not a gene that is passed on, or an attribute that one possesses indefinitely. And nobody is a creative learner all the time. Creativity is an interaction between a learner and their environment.

They suggest that a creative environment is one in which there is trust, freedom, context, challenge and interaction.

a) **Trust**: 'an ethos of trust inspires commitment to one's surroundings and allows creativity to take root' (Seltzer & Bentley 1999: 32)

Alison engendered strong student-teacher relationships and a sense of equality that Alison promoted between the students and herself. She stimulated a secure, non-threatening learning environment which was supportive of students' efforts, and celebrated all contributions through positive feedback, reward and display. Alison felt that a positive classroom ethos enabled students to be creative [Interview 80: 22.1.02: 24].

b) **Freedom**: 'Students and workers need more opportunities to discover and solve problems for themselves, without undue restrictions on the way they organise their time, their priorities and their personal responsibilities' (Seltzer & Bentley 1999: 32)

The freedom to explore ideas and to be imaginative was considered influential to creativity. Encouraging students to approach work in an open-minded and flexible manner, with few time and resource constraints, allowed ideas and imagination to be stimulated. Lengthier creative activities were undertaken as homework, where students were able to work for extended periods. The limitations of lesson time was considered inhibitory to the creative process, as idea-formation and refinement were haphazard and necessary features of this work [Interview 60: 18.9.01: 29]. Alison viewed a flexible approach as crucial to creativity, valuing open or extended opportunities with fewer curriculum constraints.

Opportunities to extend the time available for students to experience more freedom was important, but it had implications for the delivery and coverage of Science curriculum, an issue which may influence its wider application in schools.

[Interview 80. 22.01.02]

24. Alison: ... I mean I find the creativity bit probably the hardest... because I went straight in with a new group and with only a short space of time. They did really enjoy it, they did value what we were doing and why we were doing it, and the atmosphere was right and they came up with some good pieces of work. I think the only thing was that it was taking up more time, where they could have been going over more hard facts... I think that's because they were aware that this was SATs year and they came in quite driven to do well in science. Most of them said, it does help, it does help you grasp concepts by visualising them in a different way, but they were worried about the amount of time this stuff took.

.....

78. Alison: I would just try and reassure them that although they've not got extensive notes, but they do have notes, they're just more brief, ... the process of... using that science knowledge in a different way will be much more logged in their mind, much more valuable. You don't remember everything you write down, but they will remember what they've done and why they've done it - an image of a character or a wrap will remain with them.

c) **Context:** 'when individuals have opportunities to transfer skills and knowledge across contexts, the creative process is set in motion' (Seltzer & Bentley 1999: 33)

The application and transfer of knowledge across subject domains was a key aspect of Alison's perception of creativity. The PC behaviours also suggest that students should be encouraged 'to use many experiences to help stimulate new ideas'. The majority of creative activities used in this case encouraged students to utilise their Science knowledge in increasingly diverse ways. Alison encouraged students to capitalise on their literacy, and their artistic and dramatic skills to represent Science in more original ways. Maintaining an open mind about how students presented work was typical of Alison's approach. She considered that teachers who using traditional forms of Science work may need to adopt a more flexible approach [Interview 80: 22.01.02: 31-38].

[Interview 80. 22.01.02]
42. Alison: I mean...one part of being creative is taking a little bit of something and taking it in a new direction. I mean that's the thing isn't it, creativity isn't just about art, and coming up with pictures. But it's not, you can be creative thinking, putting into a completely different context, having that open-mindedness to be able to approach it and take it in a new direction.

d) **Challenge versus skill:** creativity 'depends on a proper balance between a person's skill level and the degree to which they are challenged by a task.' (Seltzer & Bentley 1999: 33)

Alison felt that for students to engage fully with the creative tasks a good grasp of content knowledge was required. Where students were expected to transfer or apply knowledge across subject domains, a secure understanding of concepts was of benefit. Alison did not consider students' ability or the conceptual difficulty to be as significant, as long as they had a good understanding [Interview 80. 22.01.02: 47-49].

e) **Interactive learning**: 'The best way to ensure that people push skills creatively is to put them in places where they believe these ideas will actually contribute to change. This is a profound motivating factor, expectation that one's skill, if put to use in new ways, will make a difference to others.' (Seltzer & Bentley 1999: 34)

Alison encouraged creative development through the continued use of active teaching and learning strategies. Students independently or collaboratively, to produce work which was stimulating to others in a range of presentation styles.

> [Interview 80. 22.01.02]
> 46. Alison: ...I think that the more senses the more things you can bring in, then the more creative they're going to be. A lot of kids may be able to take something and be creative, but in one plane, but if you said to them 'Have you thought about making sound, or have you thought of even smells?' they could do things that they haven't thought of, and I think definitely with the use of movement.

9.3.11 Key Point 9: A different approach

Initially, Alison emphasised the purpose of creative activities by highlighting the lesson targets at the beginning of a session, but she thought target setting unnecessary and unhelpful for creative development [CSA: 12], as it inhibited and constrained students' freedom and open-mindedness.

> [Interview 80. 22.01.02]
> 55. Alison: I think target setting is a lot less set than it would be with other PCs, creativity is difficult to set targets for. Obviously you have an end idea, something original etc. associated with this concept. I think if they can see where they're heading, sometimes that almost hinders creativity. So I think target setting and creativity don't necessarily gel. I think a big part of creativity is starting off with an idea, and moving forward but not really kind of knowing where you're going to end up with it, and arriving there and thinking 'Oh wow'. So I suppose you can set targets initially but then the creative bit just needs to go.

It seemed more appropriate to use the PC creativity objectives to stimulate reflective whole-class discussion during or following the completion of activities. Students' attention was focussed on the nature of creativity, the creative features of each other's work and the processes used to produce it. Alison considered this promoted creativity, and encouraged students to talk about the processes and thinking behind their work [Interview 80: 22.01.02: 61].

A reflective approach to the teaching of creativity raised students' awareness of desirable behaviours, albeit in a less objective-driven manner.

9.3.12 Key Point 10: Students' response to creative development

Students noted that creative work took longer to prepare and required 'more thinking', but also considered it more stimulating, engaging and fun [CSA: 16]. Take responsibility for learning led to them spend more time considering and preparing work, and resulted in increased engagement with enthusiasm for the subject. A minority of students, however, found this more challenging, and this influenced the quality of Science work, which was evidently of poorer quality. These students took advantage of the increased flexibility in learning approaches.

Students seemed fully aware of the need to learn content and requested comprehensive notes from Alison [CSA: 16]. They were critical of creative tasks which drew away from such activities, and their concerns were unanimous in valuing note-taking as a means of achieving success in statutory tests. Despite their enjoyment, fun and positive response to creative activities, they tempered their enthusiasm with clear requests to receive more didactically focused lessons. However, they considered creative activities did assist in the recall of facts and were keen to have a balance between working creatively and more formal lessons. Despite students' concerns, Alison maintained her commitment to encourage creative opportunities, suggesting that students were simply less aware of the learning they had developed, as they were mainly cultured to associate it with formalised note-taking activities.

9.3.13 Summary

The interventions focused on raising students' awareness and understanding of desirable behaviours and on student buddy partnerships. A range of cooperative and active teaching and learning strategies encouraged students' awareness of learning processes. The teacher explicitly valued PC development alongside subject learning, and the valuing of both 'how' and 'what' learning occurred. Students' self-image was a strong influence on the manner in which they approached tasks, also influencing their ability to cope with the additional challenge and the targeting of PC development.

The development of creativity differed from other PCs due to its serendipitous and diverse nature. Students had choice in the style of working and in presenting Science. Target setting was not considered appropriate, as it limited the flexibility within the work. Time and flexibility of approach were of significance in the formulation and development of ideas, as was a good knowledge base.

Alison's personal drive to forward her own professional development and increase her understanding of teaching and learning strategies, and her belief in the need for PC development, enabled the teacher-researcher partnership to be successful. Teacher motivation seems to be of significance in learning about, and capitalising on PC development through the Science curriculum.

Issues for further exploration:

- Identifying the factors which influenced the noted improvement in Science tests scores, in order to better understand the extent to which the research interventions affected student performance in this case.
- Revising the methods of assessing creativity.

CHAPTER 10

Cases Studies in outline

This chapter presents an overview of activity and impact in all the schools, with discussions of the key findings from Schools B, C and D.

10.0 MATRICES OF ACTIVITY AND THEIR EFFECTS

The following matrices provide an overview of the extent of activity and their effects within all schools in the study. They present an indication of the interventions and approaches used and the impact they were considered to have. The matrices were compiled by the researcher, based on the experiences and perceptions described by the teachers.

10.0.1 Matrix of Interventions & Approaches

Table 10.0.1 represents the interventions and approaches used across all the research schools. The extent of use is illustrated by the degree of shading as shown in the key.

10.0.2 Matrix of Impact & Influences

Table 10.0.2 represents the impact of the interventions and approaches on the students and the teachers. A range of effects were noted and a number of factors influenced the progress of the research to varying extents. The extent of impact is represented by the degree of shading as shown in the key.

Key:

■ Used a great deal ▒ Used to some extent ☐ Used a little ☐ Not used at all

School		A	B	C	D	E	F	G
PC Emphasis		Core	Teamwrk. V. Com. Tenacity (a range)	Teamwrk. V. Com. Creativity (a range)	Teamwrk. V. Com. Core	Positive S-Image S-motiv.	Teamwok. V. Com.	Teamwrk. V. Com. S-manag. Core
Interventions	Making PCs explicit							
	GRASP							
	Target Setting							
	Self Assessment							
Approaches	Visual Display of PCs							
	Role Play							
	Buddy Partners							
	Team/group work							
	Independent/ Group Research							
	Increased choice							
	Increased differentiation of work							
	Increased discussion							

Table 10.0.1: ***Matrix of Interventions and Approaches***

Key:

A great deal of impact | Some impact | A little impact | No impact

School		A	B	C	D	E	F	G
Impact on Students	General improvement in PCs	A great deal of impact	A great deal of impact	A great deal of impact	Some impact	Some impact	A little impact	A little impact
	Increased lesson expectations	A great deal of impact	A little impact	Some impact	A great deal of impact	No impact	A little impact	Some impact
	Increased self awareness	A great deal of impact	A great deal of impact	A great deal of impact	Some impact	Some impact	A little impact	A little impact
	Increased understanding of PCs	Some impact	A great deal of impact	Some impact	No impact	Some impact	Some impact	No impact
	Increased confidence	Some impact	Some impact	A great deal of impact	No impact	Some impact	Some impact	No impact
	Increased motivation	Some impact	A great deal of impact	Some impact	No impact	Some impact	No impact	No impact
	Improved academic ability	No impact	A little impact	Some impact	No impact	No impact	No impact	No impact
	Improved teamwork skills	Some impact	A great deal of impact	A great deal of impact	No impact	Some impact	Some impact	Some impact
	Increased autonomy/ responsibility	A great deal of impact	A great deal of impact	Some impact	Some impact	A great deal of impact	No impact	No impact
	Improved behaviour	No impact	No impact	Some impact	A great deal of impact	No impact	Some impact	No impact
	Improved self-image	Some impact	No impact	A great deal of impact	Some impact	A great deal of impact	No impact	A little impact
	Increased reflection on learning	A great deal of impact	A great deal of impact	A great deal of impact	Some impact	Some impact	Some impact	Some impact
	Improved teacher-student relationship	No impact	A great deal of impact	A great deal of impact	A great deal of impact	A great deal of impact	A great deal of impact	No impact
	Increased clarity of purpose in lessons	A great deal of impact	No impact	A great deal of impact	A great deal of impact	No impact	Some impact	Some impact
Impact on teachers	Increased motivation towards teaching	A little impact	A great deal of impact	Some impact	Some impact	A little impact	A little impact	A little impact
	Increased reflection on teaching and learning	A great deal of impact	A great deal of impact	A great deal of impact	Some impact	A great deal of impact	A great deal of impact	A great deal of impact
	Professional development	A great deal of impact	A great deal of impact	A great deal of impact	A great deal of impact	A great deal of impact	A great deal of impact	No impact
Influences	Students' academic ability	Some impact	Some impact	Some impact	A great deal of impact	A great deal of impact	Some impact	Some impact
	Good management support	No impact	A great deal of impact	No impact	Some impact	No impact	No impact	No impact
	Students' self image	No impact	No impact	No impact	A great deal of impact	Some impact	No impact	Some impact
	Students' behaviour	No impact	No impact	No impact	A great deal of impact	No impact	No impact	No impact
	Teachers' self image	No impact	No impact	No impact	Some impact	No impact	No impact	No impact
	Curriculum/ time pressures	Some impact	No impact	Some impact	Some impact	A great deal of impact	A great deal of impact	A great deal of impact
	Researcher's support	A great deal of impact	A great deal of impact	A great deal of impact	A great deal of impact	A great deal of impact	A great deal of impact	Some impact
	Assessment structures	A great deal of impact	A great deal of impact	A great deal of impact	A great deal of impact	A great deal of impact	A great deal of impact	A great deal of impact

Table 10.0.2: ***Matrix of impact and influences on students' and teachers' development***

Three cases (School B, C and D) are discussed to identify further key findings which are of interest to the study. The chronological case reports are provided in Appendix A1-A3 and A5-A7. School D is presented in summarised form to acknowledge the nature of the action research process with a teacher who was a less confident practitioner. A full discussion is provided in Appendix A4.

10.1 SCHOOL B: TYPIFYING THE USE OF THE PC INTERVENTIONS IN PRACTICE

10.1.1 Overview

This case study (ref. report Appendix A1) discusses the use of the generic research interventions. It reviews how, Emma, a Key Stage 2 (KS2) specialist made PCs explicit, used the GRASP framework, and encouraged target setting and self-assessment, with two groups of Year 5 (9-10 year olds). Her use of the interventions exemplifies the nature of the work in other cases, although the flexibility of the primary curriculum enabled increased focus to be paid to the PCs across various subject areas.

The work focused on the development of nine core PCs (ref. Appendix A11), representing teamwork, verbal communication and self-management capabilities. Emma, used the generic interventions and designed activities to teach pupils relevant skills and to promote understanding of the PCs. The interventions stimulated teacher reflection and the review of lesson delivery and teaching and learning strategies. Emma adopted a proactive and committed approach to personal and pupil development, which facilitated progress.

The processes were considered to improve pupils' self-awareness, self-reflection, teamwork and self-management skills, and related to improved understanding and metacognitive skills. External observers noted pupils' increased self-confidence and responsibility for learning.

10.1.2 Background: The primary school structure

Within primary education, teachers typically teach at least ten curriculum subjects, although specialists in particular subject areas. Being in charge of one class of pupils for the majority of the school day, teachers' planning allocates time to deliver all subjects. The core curriculum subjects of English, Mathematics and Science form the main body of work at primary level, and are delivered consistently throughout the academic year, alongside RE in Church schools. Foundation subjects share the remaining curriculum time and may be delivered sporadically during the year.

Significant changes in the delivery of English and Mathematics has occurred since the introduction of the statutory National Literacy Strategy (DfEE 1998b) and National Numeracy Strategies (DfEE 1999c). This has substantially influenced the structure of the primary school day, where teachers increasingly adopt a single-subject approach to English and Maths.

Generally, pupils in classes of around 30, work in mixed ability groupings, being streamed for particular subjects. Statutory assessment at national level is undertaken in Year 2 (aged 6-7) and Year 6 (aged 10-11), prior to entering KS2 and 3 respectively.

10.1.3 Key Points

1. Target setting, individually and through lesson objectives, provided a means by which teachers and pupils focused attention on aspects of academic and PC development.
2. Pupils showed willingness and motivation to demonstrate improvement when their PC targets challenged them.
3. The use of co-operative and active teaching and learning strategies increased due to the PC focus, relying increasingly on student-centred, and less on teacher-directed activities.
4. The impact of targeting, action planning and maintaining commitment to PCs, resulted in pupils' increased self-awareness and improved behaviour.

5. GRASP was considered useful for promoting personal autonomy in learning and for enabling pupils to be more focused in their understanding and presentation of work.
6. Pupils' ability to provide informative self-assessments developed with practice, becoming better adept at reflecting on targets and gathering evidence. Generally, pupils found written self-assessments difficult and less motivating than verbal class discussions.
7. Encouraging pupils' metacognitive development and encouraging them to think reflectively about PCs, stimulated an informed and self-directed approach to recognising, evaluating and deciding whether to change behaviours.
8. Reflection on practice strongly influenced teacher professional development through consideration of pedagogic styles, and their impact on pupils' learning and PC development.

10.1.4 The action research process

Emma relied on the researcher to coordinate her involvement in the study, requesting clearly defined strategies for developing students' PCs. The teacher-researcher relationship was grounded on friendship and collegiality, and a strong rapport was built up. Emma was cautious in her approach to develop materials independently, however was proactive and committed to trialing strategies and resources provided for her, i.e. classroom displays, self-assessment pupil portfolios, in-class support through delivering introductory lessons. Later in the study Emma independently developed PC activities.

Although Emma reported her perceptions in interviews, questionnaires, and larger study group meetings, analysis and interpretation of findings were viewed as the responsibility of the researcher. Emma preferred to take a more directed approach to altering practice in relation to PC development. Change in practice, resulting from reflection-on-practice, was stimulated mainly through teacher-researcher meetings where constructive and critical debates ensued with regard to the challenges faced in transferring theory into practical classroom settings.

10.1.5 Key Point 1: Target setting

Individual and class target setting was a key approach used to highlight and develop pupils' PCs in the cross-section of cases in the study. This case exemplifies the way in which it influenced teacher and pupil behaviours, and impacted on PC development.

Target setting emerged as an intervention following the pilot study, which showed that although students actively engaged in opportunities for personal and social development, their awareness of it was minimal. Despite teachers' aims to encourage verbal communication, teamwork and problem solving capabilities, students were unaware of these intentions due to an implicit approach (ref. Appendix A2: 5). PC target setting, therefore, aimed to enable specific attention to be placed on aspects of academic and PC development.

Target setting provided a means for Emma and her pupils to explicitly recognise, teach and learn about PCs, encouraging pupils' self-awareness. PC targets enabled pupils to learn about desirable performance and encouraged effort-investment and commitment towards achievement (Latham & Edwin 1991: 234). The explicit recognition of PCs through classroom display and monitoring, increased their value and importance alongside academic objectives, stimulating motivation towards improvement.

The process of setting individual pupil targets was not new for Emma, as school policy required literacy and numeracy targets to be identified for each pupil. Emma viewed the inclusion of PC targets as a natural progression, and used the core PCs to provide a standardised set of targets from which pupils could choose. Pupils were encouraged to choose a target, from the behavioural framework, appropriate to their needs from the core PC targets which were displayed in the classroom. Emma complemented this by identifying whole-class targets during activities, encouraging pupils to practice and develop the PCs. She found it increasingly useful to discuss the purpose of the task, from PC and academic perspectives, such that pupils better understood how to succeed, raising her own, and students', expectations for learning.

10.1.5.1 The effects of target setting on lesson delivery

Emma noted that targeting PCs led to lesson delivery and teaching strategies becoming more focused on academic and PC objectives [Emma. Final Evaluation: A6]. She became increasingly aware that the purpose of lessons had previously mainly focused on academic requirements, with less frequent reference to PCs [Emma. Final Evaluation: A4]. She consequently endeavoured to improve the explicitness of purpose within lessons during the study. She openly shared the purpose and success criteria of lessons in terms of PC and academic targets and encouraged pupils to use targets as criteria for self and peer-assessment. Formative feedback, during lessons and in plenary discussions, specifically focused on how, and whether, pupils had achieved their targets, the methods they used, and the difficulties or further areas of development that arose. In this way, within the context of subject learning, the PC targets became both the criteria for achievement, and also criteria for focused reflection and review, alongside academic objectives.

During the second phase of study, Emma designed activities to develop pupils' understanding of PCs. Pupils were helped to discuss, demonstrate, target and model appropriate behaviours, being encouraged to describe the influence of PCs on their learning and performance. Emma considered these activities to be important for developing pupils' understanding of the PC terminology and their meaning in practice.

> [Emma. Final Evaluation: A7]
> Initially the language of the PCs was difficult for the pupils to understand, which resulted in us breaking the PCs down into bite-sized chunks - defining the wording and carrying out activities to highlight what the PC required the children to focus on and develop. It gave them a starting point to develop from. It also put the PC into a real life context.

10.1.6 Key Point 2: Student motivation

Pupils showed willingness to demonstrate improvement, accepting the PC emphasis as a complementary aspect of their learning [Pupil Questionnaires: 10.12.01].

[Emma. Final Evaluation: A9]
The majority of pupils were very positive. It was something different. Some higher ability pupils could see how it wasn't just the academic target that was important, and it also helped to boost the self-confidence of lower ability children because the lesson wasn't just about academic objectives. There were targets they could achieve and be better at. They used it as a model of good practice.

Latham & Edwin's research (1991) suggests that setting specific and challenging goals stimulates higher levels of performance, and greater effort and motivation is invested in achieving them, resulting in increased success. In contrast, goals of a vague or unchallenging nature have less impact.

The maximum effort is not aroused under a 'do best' goal. This is because the ambiguity inherent in doing one's best allows people to give themselves the benefit of the doubt in evaluating their performance. From the standpoint of self-regulation, a specific hard goal clarifies for the person what constitutes effective performance. (ibid.: 215)

These findings are relevant to the target setting used in this case, and across the research schools, where pupils were encouraged to use pre-defined PC targets for self-improvement. Although targets varied in specificity, depending on the pupils' age group, all were positively focused, and level of difficulty depended on how teachers and pupils jointly interpreted the target. For older or higher-ability students, the requirements of 'sharing one's opinions' may have related to justifting their views, whereas for lower-ability students emphasis may have focused on improving the use of appropriate vocabulary. Emma considered that the specificity of targets, accompanied by the discussion of their meaning and expected outcomes, effectively encouraged pupils' PC development and motivation towards improvement.

[Emma. Final Evaluation: A10, 13]
Setting specific targets gave the pupils a clear goal. I was not only telling them what to do but how I expected them to do it. Which behaviours would be useful in enabling learning... Breaking down the core PCs was imperative, as the pupils wouldn't have been able to use them as they didn't understand what some of the words meant – they didn't understand what was expected by words like 'co-operating.' They needed first to develop their understanding.

Pupils invested effort and commitment to personal development when they were challenged by PC targets and were familiar with the desirable behaviours. Emma explained that effort-investment and motivation varied within the class for a number of reasons, i.e. special educational needs, parental support, students' perception of the teacher's role.

Emma considered self-motivation to significantly influence pupils' level of success in developing PCs [CSB: 16]. Pupils lacking self-motivation were less committed to improvement, and their achievements fell correspondingly. The influence of motivation is recognised in Latham & Edwin's work (1991: 213) which strongly endorsed the volitional nature of purposeful action.

Emma encouraged pupils' motivation and concentration towards specific areas of work, using a 'you can do it' approach, and acknowledged all positive contributions to development and discussion, promoting a classroom ethos which emphasised improvement, commitment and success. She shared personal reflections on her own performance, illustrating that PC development was a collaborative and on-going endeavour [CSB: 9].

10.1.7 Key Point 3: Facilitating pupils' PC development – cooperative and active teaching and learning strategies

The influence of PCs on Science teaching in this case typified the approach used by most teachers in the study. Initially emphasis was placed on highlighting the relevance of PCs within lessons, with later use of more opportunities for 'active' teaching and learning strategies. Greater opportunities for cooperative and student-centred learning were used, i.e. individual and group investigations, mini-research activities, oral presentations, debates, model-making and role-playing [Emma. Final Evaluation: A1]. These activities enabled PC behaviours to be emphasised, encouraged and practiced, with the aim of allowing pupils more responsibility for, and awareness of, their own development. They enabled the development of teamwork, verbal communication and self-management capabilities, as well as those of problem-solving, creativity, critical thinking and tenacity. The use of project work in Phase 2 of this case significantly increased the use of these strategies, however more standardised lessons also helped to focus on PCs, by encouraging pupils to communicate and discuss their work with others [Interview 79: 12.12.01: 31-34].

Increasing the emphasis on PCs within lessons enabled Emma, and other teachers in the study, to encourage PCs without compromising the standard of academic provision. Science teaching was used as a context for PC development, often steering or being steered by the emphasis on PCs.

10.1.8 Key Point 4: Impact of the approach

Pupils' positive response to targeting, action planning and maintaining commitment to PCs, resulted in increased self-awareness and improved behaviour. Emma valued the increased sense of personal responsibility that she felt had stemmed from the increasingly student-centred approach [Emma. Final Evaluation: A17, CSB:12].

Improvement was noted by a variety of external observers (Office for Standards in Education, OFSTED, and outside agencies) who 'could see that the children were more focused and could discuss what was meant by good listening skills, being part of a team etc.' [Emma. Final Evaluation: A19].

The positive impact of active teaching and learning strategies is discussed more fully in section 10.2.6. However, Emma noted the benefits in terms of the improved responsibility for pupils' personal development [CSB: 3]. She recognised a definite shift towards paired and group work, and an increased emphasis on discussion, moving away from didactic teaching strategies. She also noted an increased use of games and quizzes, which she found motivated, enthused and engaged pupils' more fully in their Science learning [Emma. Final Evaluation: A1].

10.1.9 Key Point 5: The GRASP Framework

GRASP (ref. Figure 7.3.2.2) was encouraged in all research schools to stimulate PC target setting, action planning and review, and to provide:

- a framework to support personal achievement
- a mental scaffolding for achieving results, and
- a shared language for moving forward through an activity or task.

Emma found the combination of PCs and GRASP to be influential in encouraging confidence and building self-esteem. It encouraged the identification of a clear purpose, creative ideas gathering, self-monitoring, controlling and reflection during a process of change. She encouraged pupils to be clear about their expected outcomes, and, through a success-orientated approach, aimed to improve self-belief and self-image [CSB: 2].

> [Emma. Final Evaluation: A22-23]
> I can't say it was the structure of GRASP that helped as much as its emphasis on skills such as co-operation, seeking advice, the explicit nature of setting objectives, and giving the pupils the criteria they need to achieve in order to succeed. GRASP helped pupils to see what was being asked of them. Work was not so open-ended, but more focused. It gave them methods, ways of going about a task, and they had to choose which was best.

GRASP was used flexibly within the case, as a whole-class, small group or independent activity. Emma noted its usefulness in the planning and organisation of Science investigations, group research activities and oral presentations. Emma also used GRASP to structure her lesson planning and delivery, however considered the framework to be 'cumbersome' if used in its entirety on all occasions [Emma. Final Evaluation: A21]. Pupils became demotivated by the necessary completion of the cycle on every occasion, and target setting and review were most regularly undertaken, with action planning used in specific activities.

Whereas originally GRASP was considered a generic research intervention, the processes of making PCs explicit, target setting and self-assessment overshadowed its use. Other cases show little evidence of its impact, however this is not surprising given its sporadic use [CSB: 4, 5]. Emma considered GRASP useful for promoting personal autonomy in learning and for enabling pupils to be more focused in their understanding and presentation of work. GRASP accompanied the development of PCs, but was not seen as a means of independently improving capability.

10.1.10 Key Point 6: Improving pupils' ability to self-assess

Active engagement in review and self-assessment were considered essential features of pupils' PC development, in this and other cases. Verbal reviews were frequently co-ordinated following activities, and supported with written self-assessment activities. The researcher provided teachers with a selection of self-assessment formats for trialing. All pupils were encouraged to compile reflective portfolios of their PC development, to collect evidence on PC improvement. The frequency of pupils' self-assessment heavily depended on the teacher and the time available.

Emma's pupils reviewed one PC target in detail per week. Notes assisted the recall of particular activities. Self-assessments encouraged them to think purposefully about the processes and products of their learning, and to consider the influence of their PCs on task completion. Parental and peer reviews also provided external assessment, encouraging pupils to appreciate how others perceived them. For some pupils these perceptions were better than their own. Emma placed greater value on pupils' responses which were realistic and reflected actual events, rather than those giving what they perceived to be the 'correct' response. She highlighted areas of improvement and development, providing constructive feedback.

The use of pupil self-assessment has become increasingly seen as beneficial to the learning process. Research by Black & William (1998a and b) highlighted the need for pupils to be aware of the purpose of tasks if they are to be successful in self-assessment. More recently, an upsurge of interest in formative assessment has seen greater focus on self-assessment. Black & William (1998a, 1998b: 10, 2001) suggest that in order for 'formative assessment to be productive, pupils should be trained in self-assessment so that they can understand the main purposes of their learning and thereby grasp what they need to do to achieve'. They note that the explicit setting of objectives is less commonly used in teaching, hindering the self-assessment process and endorse more frequent opportunities for pupils to know, understand and react positively to the learning objectives.

> The main problem is… that pupils can only assess themselves when they have a sufficiently clear picture of the targets that their learning is meant to attain. Surprisingly, and sadly, many pupils do not have such a picture, and appear to have become accustomed to receiving classroom teaching as an arbitrary sequence of exercises with no overarching rationale… When pupils do acquire such an overview, they then become more committed and more effective as learners; their own assessments become an object of discussion with their teachers and with one another, and this promotes even further that reflection on one's own ideas that is essential to good learning. (Black & William, 1998b: 9)

At first, Emma noted that considerable time was needed to familiarise pupils with the notion and processes of self-assessment. Initial attempts proved difficult, because pupils lacked familiarity, practice and poor reflective skills. Sutherland (1992: 95) doubted whether children were sufficiently adept to reflect on their thinking and actions, however suggested that children trained in the use of self-checking were better able to influence their learning. Brown & DeLoache (1983) also argue that 'it is inexperience rather than youth that handicaps a person', and that training can affect performance in these areas.

Humphreys *et al* (2001: 60) also suggests that,

> Self- and peer- assessment gives learners a greater ownership of the learning they are undertaking. Assessment is not a process done to them, but a participative process in which they are involved. This in turn tends to motivate students, who feel they have a greater investment in what they are doing.

Pupils' ability to provide informative self-assessments developed with practice with them becoming more adept at reflecting on targets and learning opportunities. Initially, their evidence for improvement was unclear and unspecific, with some pupils rating their ability too highly, or finding difficulty in identifying the occasions or activities where they had improved. Literacy skills strongly influenced the written self-assessments. Strategies such as peer or teacher-scribes, word banks, sentence starters, role-play, and the use of a range of prepared evidence statements, encouraged lower ability pupils to self-assess more productively.

> [Emma. Final Evaluation: A24]
> Lower ability children do not come out well in written reviews because I felt they haven't the vocabulary to express what they mean. They can role-play what PCs are about but not write it down well.

Generally, the students found written self-assessment difficult, and less motivating than class discussions. They found difficulty independently reflecting, wanting to provide 'correct' answers. Emma also expressed concern over the objectivity of the self-assessments and evidence. Emma considered it challenging to encourage self-improvement, and to promote an ethos of positive criticism where pupils viewed the activity as having a definitive or final outcome [Emma. Final Evaluation: A26].

Although the increased self-awareness was valued, Emma found the time needed to undertake the activities was problematic [CSB: 9]. She, and other teachers in the study, especially at secondary level, felt heavily constrained by curriculum and administrative requirements, and additional lesson time needed for target setting and self-review was often difficult to organise.

10.1.11 Key Point 7: Metacognitive development

Metacognition has been associated with a range of processes focused on thinking and reflecting on different aspects of experience, such as metacognitive knowledge - thinking about what one knows; metacognitive skill - thinking about what one is currently doing; and metacognitive experience - thinking about one's current cognitive or affective state (Hacker *et al*, 1998: 3). To varying extents, target setting, review and self-assessment required a combination of all three aspects.

Emma guided reflective discussions, important for pupils of this young age, to assist them in linking their performance with PCs, and with strategies for improvement. Pupils, independently and collaboratively, reflected on how behaviour affected their learning, their achievements, their activity and that of those around them. Pupils were encouraged to think about the effect their actions had on particular events, openly interrogating and discussing their performance, their interaction with others, and their understanding of particular ways of behaving. Emma helped pupils to relate these processes to their subjects, focusing on how their behaviours influenced their learning and that of others.

In this case, the PC interventions encouraged and trained pupils to undertake review and self-checking processes, so that they were able to independently review work towards the end of the academic year. As in other cases, encouraging pupils to think reflectively on their PCs resulted in them taking an informed and self-directed approach to recognising, evaluating and deciding whether to reconstruct their behaviours, processes which Gunstone (1989: 133) associates with metacognitive development.

McGuiness' (1999: 2) report into developing thinking and reflective skills also suggests strategies similar to those used in this case. She stresses the importance of giving learners time and opportunity to talk about thinking processes, to make their own thought processes explicit, and to reflect on learning strategies. She considered this to be an effective means of encouraging more self-control and developing metacognitive awareness, as was also noted in School D (see section 10.3).

10.1.12 Key Point 8: Professional development

Retrospectively, Emma valued the opportunity to review her teaching and learning methods in relation to PC targets with the reseracher, considering it to positively influence her professional development. She considered teachers' reflection on practice to have been compromised with the increased demands on teacher time from prescriptive schemes of work, assessment requirements and administrative activities [Emma. Final Evaluation: A4]. She found that reflecting on practice, and explicitly sharing lesson targets, had led to a change in her practice, enabling pupils to be more aware of and involved in their personal and academic development

10.1.13 Summary

This case typifies the use of the generic PC interventions across the research schools, giving an indication of how they can be applied in order to support the development of students' PCs. The regular commitment to explicitly target setting and logging progress, using Science activities as a stimulus, enabled Emma to provide regular formative feedback on PC development and to involve peers and parents. The strategies increased the perceived value and importance of PCs in learning and encouraged motivation towards their development. The review and adaptation of teaching and learning strategies encouraged opportunities to use and develop PCs, and were valuable sources of reflection for pupils. GRASP provided a framework to encourage the development of personal responsibility and PCs.

> [Emma. Final Evaluation: A32]
> All the methods and interventions gave the children choice, ideas, and ways in which they could do a task. Surely that can only be a good thing. The government get us to teach children three ways of doing an addition sum, so that the children can choose the best method – the method they find easiest. In a way this is what PCs, GRASP and self-review have done. They've given children the criteria and various ways in which they can achieve… I hope that children learnt better and have developed both academically and personally because of the interventions we have used.

The case illustrates that pupils' behaviour and performance was positively influenced by their increased self-awareness, confidence and motivation. However, some activities proved difficult for academically lower ability pupils, due to their poorer literacy abilities.

PC development benefited from specifically dedicated opportunities and structures, as endorsed by Latham & Edwin (1991: 240) who suggest that 'although people are *natural* self-regulators in that goal-directedness is inherent in the life process, they are not innately *effective* self-regulators. Skill in self-regulation must be acquired through experience, training, and effort.' These strategies form the basis of the teaching and learning of PCs, however, the constraints of the prescribed curricula, time-restrictions, teacher or pupils' ability and self-motivation, are features which need to be considered when introducing PC development through Science.

Emma was highly committed, and endeavoured to trial and maintain focus on PC development, with a large class of mixed ability pupils. Her perseverance in making PCs explicit relate to features which McGuiness (1999: 2) found to be strategies to encourage better learning.

There is need to be explicit about what we mean by better forms of thinking and of educating directly for thinking. If students are to become better thinkers – to learn meaningfully, to think flexibly and to make reasoned judgements – then they must be taught explicitly how to do it.

10.2 SCHOOL C: A MORE INNOVATIVE APPROACH TO PC DEVELOPMENT

10.2.1 Overview

This case (ref. report Appendix A2) reports on an innovative approach to PC development, features of which can be applied to more mainstream settings. It illustrates PCs development through integrated project work, linking Science, Mathematics and DT for a half-year group of Year 7 students (100). Seven teachers, supported by a member of school management, constructed and delivered four integrated projects with PC development as a key focus. The use of the generic research interventions encouraged students to target set and self-assess PCs verbally and in writing. Four project contexts (Energy, Toys, Structures and Gardens) focused on presenting subject knowledge in 'real-life' contexts.

The approach stimulated the increased used of active and co-operative learning strategies. Students reacted positively to subjects being delivered with a cross-curricular approach. Increased motivation and engagement, as well as improved teamwork capabilities were noted in students, and positively influenced the teachers.

The issues of management support, and the implications of project work on subject and PC development were features of this case. Project work proved especially useful in promoting opportunities for PC development, however the implications on curriculum delivery rely on the reorganisation of the school timetable for regular cross-disciplinary teaching.

10.2.1.1 <u>The teachers</u>

Eight teachers were involved in the study, whose perceptions and experiences are outlined in this discussion.

Paul: the school manager, Chemistry specialist.

Peter: Design Technology specialist, 18 years experience.

Richard: aged 43, Technology specialist, 6 years teaching experience.

Julie: aged 28, Biology specialist, 3 years teaching experience.

Tim: aged 41, Science/DT supply teacher, a trainee teacher

Jayne: aged 31, Mathematics specialist, 5 years teaching experience.

Clare: aged 26, Maths & Engineering specialist, 3 years experience.

10.2.2 The action research process

The progress of study and research in School C was strongly led by the changes in curriculum delivery resulting from the use of integrated project work. The researcher initially stimulated the work into students' PC development, and provided training for the teachers at the start of the year, along with curriculum resources, display materials and student self-assessment materials.

The researcher designed the Energy Project scheme of work, which was used to initiate the study, following which the teachers structured three project units. Throughout the period of study, the researcher took the role of curriculum writer, data collector and analyst, conducting evaluation meetings, classroom observations, and teacher and pupil interviews. The researcher collated the range of activity that the teachers undertook in all projects, linking them to NC objectives, and writing them up as schemes of work.

The teachers led the change process with the regular stimulus, direction and feedback from the researcher. The development of strategies and materials for self-assessment materials was collaborative, with teachers reporting their interests or concerns, and the researcher interpreting them and designing practical resources or worksheets. Change in practice was rapid and sustained.

Reflection-on-practice was continuous for teachers, and this was mainly responsive to classroom and curriculum management issues. Liaison with, and feedback to the researcher occurred mainly in structured evaluative meetings, or during observation and scheduled interviews, where consideration of the impact and strategies for PC development was a key focus.

10.2.3 Key Points

1. Management support was significant in emphasising the value of the study, and enabling its progress. Handing ownership to teachers for the development and implementation of the study was encouraged from an early stage, when teachers' philosophy and understanding was of value.
2. Project work enabled teaching and learning to focus on actively engaging students in cooperative and cross-curricular opportunities.
3. Project work promoted autonomy and choice in learning, and allowed improved opportunities for developing teamwork capabilities. The transfer of knowledge was encouraged through setting learning within 'real-life' contexts.
4. Teachers initially found difficulty making PCs targets explicit, however later noted the positive effects of stimulating students' awareness of PCs and promoting a shared sense of responsibility for their development.
5. Teachers recognised the negative influence academic assessment and increasing administrative requirements had on the development of PCs. Where teachers felt that the NC was being compromised because of the research, change was rapid, reverting to more formal individualised methods of student learning.

10.2.4 Key Point 1: Management support

10.2.4.1 <u>Top-Down</u>

The school was committed to the notion of skill and competence development within the curriculum. Their subject course provision illustrated this through the delivery of a range of vocational qualifications, and supported initiatives, such as Project Weeks and an 'Enrichment' curriculum.

The school management openly valued the PCs and aimed to encourage their emphasis to a greater extent than subject knowledge in this study. Paul, the manager, described how the school's philosophy of 'assessing what is valued', differed from more contemporary practice of what he viewed as 'valuing what is assessed'. He considered that PC development and assessment should take high priority in this study, and that it could be done without compromising the high standards obtained in national examinations. Equally, he felt that examinations should not be the only determining influence on teaching and learning approaches [Interview 70: 20.11.01: 40]. Involvement in the study was welcomed [Interview 70: 20.11.01; 14].

10.2.4.2 Transferring ownership - Bottom Up

Although the management were heavily involved in setting up the study in the school, and overseeing issues of timetabling, room allocation, finances and resourcing, teachers were quickly handed ownership of the project. It was hoped that teachers would value the opportunity to directly control the project, with the researcher's support. This management style is typical of the schools' innovative and broad-minded approach, and is particularly influential on this case's outcomes.

> [Interview 70: 20.11.01]
> 54. Paul: [Management support] had a big effect [on the teachers], because they saw it was a high priority in management and the management were willing to put in the time and the effort, particularly from my timetabling and things like that. Hopefully they saw the encouragement being given and the fact that we were willing to work with Sheffield Hallam. Also my whole philosophy is from grass-roots up, so it was important to allow the teachers to have their own ideas, and use their own ideas, and not being told what to do and get on with it and we worked in partnership, it was very much a team effort. They had some excellent ideas and they ran with it.
> ... On several occasions I'd say 'I've done my bit, over to you now', because I didn't want them to see me interfering at that level, and they needed to get on with it by themselves. In other words it was giving them the control, so it was as much their project as it was my project.

Teachers' active involvement in curriculum development was encouraged, although transferring ownership for the project relied on teachers sharing understanding of its purpose and intended outcomes. The school manager considered teachers' philosophy to be critical to its success, selecting those most likely to be committed. Teachers generally valued PCs [CSC: 6] and considered them relevant to students' long-term development and future potential. Although recognising the contribution PCs could make to subject teaching, they initially questioned the methods for their integration and assessment.

Where teachers had ownership of the project, they saw this as a challenge and valued the flexibility and ability to utilise and extend their professionalism.

[Interview 77: 12.12.01]

2. Julie: Well it was quite daunting at the beginning but I think after we brainstormed the ideas and had quite a few meetings, and because there was an extra teacher, we arranged to get the ideas down and then we went from there really... We had something to start with and then we moulded it and decided what we were going to do with it, and that's always the way it went. We're quite used to doing that anyway... It was particularly good because we could do whatever we wanted. A lot of teachers appreciated that.

.... I think what was most important was the bottom-up approach. We're certainly the ones who know what will work, and how to do project so that it'll work, and I think it did. It widened the teaching styles and we were definitely more conscious of trying to get in as many practical activities as we could, and I always really like the practical based things anyway, in normal type lessons.

There was very little management input in that, so it was just the teachers, on the ground, doing it really. I think we did try and discuss between the two groups last year and although we didn't have enough meetings and there could have been a lot more communication.

Interestingly, some teachers felt that maintaining some leadership from management would have been useful for reaching group decisions and overseeing activities [Interview 77: 12.12.01: 14].

10.2.5 Key Point 2: Project Work

The schools' interest in capitalising on their experiences of project work and exploring the notion of a capability-led curriculum was shared by the researcher.

The schools' experience of twice-annual 'Project Week' activities, which encouraged staff and students to engage in cross-curricular and cross-age phase activities based on generic themes, provided a basis for the approaches used in this study. These opportunities were valued and regarded as key opportunities for staff and students' creative and motivational development [Interview 70: 20.11.01: 4]. The flexible timetabling of project work enabled various student groupings, and for work to be differentiated accordingly.

10.2.5.1 Active teaching and learning

Emphasising PCs and the use of project work created opportunities for increasingly flexible and active teaching approaches, where students were able to experience more choice and responsibility in their learning. Teachers adopted the role of facilitators, assisting students on request, or supporting those less able [CSC: 16, 19]. The active, student-centred nature of project work was more demanding for teachers, requiring them to move flexibly between teaching and facilitating roles. However, the major advantage of such opportunities related to the increased motivation, confidence and independence of the students [CSC: 15, 16].

Teaching strategies varied from more formal training sessions, similar to regular lessons, to independent or team based research and investigation activities. These included subject-related games and oral presentations, as well as research and problem-solving activities. These approaches, recognised as 'active teaching and learning strategies', focus heavily on the physical and mental engagement of students during learning.

The 'Active Teaching and Learning Approaches in Science' project (Centre for Science Education 1992) identified characteristics of active teaching and learning strategies as being those where students have greater opportunity to:

- be personally involved in their learning
- make decisions about the outcome of their work
- own their work
- test their own ideas
- plan and design their own experiments
- report their results to the rest of the class
- evaluate their results
- solve problems
- discuss and interact purposefully in groups
- reflect on the work they have done and reformulate their ideas

(Centre for Science Education, 1992: 5)

They aim to engender 'a sense of ownership and personal involvement' in learning, and encourage the teachers to assist, advise, monitor and record learning, acting as facilitators. Sivan *et al* (2000: 388) suggest that active teaching strategies contribute to the development of critical thinking, problem solving and self-management skills. They consider these skills to be increasingly relevant to students' future careers, and to be an effective means of helping them cope with future changes in their personal and professional lives.

In this case, teachers favoured active teaching and learning activities and commented on the increased motivation the project themes generated, which facilitated personal responsibility and commitment to activities. Teachers, however, questioned the length of time required to teach in this way, which incorporated team or problem-based learning and implied extended periods of less-structured learning opportunities.

10.2.5.2 Co-operative learning

> When it comes to individual classrooms, teachers are beginning to recognise that co-operative learning is more than having students cooperate in a group activity or project. Co-operative groups employ a set of strategies to encourage students to cooperate while learning in a variety of settings and disciplines – at different grade levels. The process involves promoting positive independence by dividing the workload, providing joint rewards, holding individuals accountable, and getting students actively involved in helping each other master the topic being studied. (Adams & Hamm 1996:4)

Adams & Hamm's description characterises the learning approaches used in this case, highlighting the student-centred nature of project work. Teachers designed activities specifically to encourage cooperative learning, which they considered useful to highlight, use and develop PCs within the context of subject learning. Students were encouraged to work together to find, learn and present information for various purposes.

The frequency of using cooperative learning strategies differed, both in style and emphasis, between the four project themes. Two of the projects, 'Energy' and 'Gardens' incorporated a significant amount of team work, where students worked cooperatively to research information, present ideas, organise tasks and investigate concepts. On these occasions PCs such as teamwork, verbal communication, creativity and tenacity were stressed. Other projects, such as 'Toys' and 'Structures', required students to work more independently, often within larger groups producing individual artefacts.

Teachers suggested that the co-operative learning styles resulted in students showing more willingness to take their work 'one step further' [CSC: 15, 21], due to increased self-motivation and attention to PCs. Their motivation towards learning seemed intrinsically linked to the satisfaction and fun they experienced in project lessons, and they expressed enjoyment in working with students from different tutor groups [CSC: 8, 9, 10, 18]. Co-operation spanned student-student relationships as well as student-teacher relationships.

> [Richard: Final Evaluation]
> In my opinion the greatest advantage of this research, is the improved relationship between students and their peers. I particularly feel that working in teams helps the students mature more quickly as individuals. This is because different things have impacted on them. They have demonstrated this by wanting to be successful, being the 'best' group is very important to them, and they have realised their strengths and weaknesses through team discussion.

Interpersonal interaction during cooperative tasks encouraged students to use and learn about desirable PC behaviours, whilst longer problem-style tasks encouraged tenacity, critical thinking, problem solving and self-motivation. Although helpful, teachers felt that PC development was not solely dependent on active or co-operative learning strategies and that it could also be developed in more formalised settings [Interview 77: 12.12.01: 48-50].

10.2.5.3 Cross curricular teaching

Science and DT were integrated with Maths to encourage better understanding of the links between subjects. This approach differs from the separate subject emphasis, endorsed in the 1998 Education Reform Act, which established Mathematics and Science as core subjects, and DT as a separate foundation subject. The association between the subjects, by nature, however, evidently remains (Sorsby 1989). Such subject separation may have resulted unintentionally from the NC, yet it is highly characteristic of contemporary secondary school education.

In this case, teachers valued the opportunity to adopt cross-curricular approaches, and felt that although the NC placed unhelpful constraints on this process, this study stimulated opportunities for subjects to be planned and delivered jointly.

[Interview 70: 20.11.01]

76. Paul: What we want is diversity, whereas the NC doesn't necessarily provide you with that diversity, we want diversity not only for the students to try out different things, but for the staff too. The NC is about subjects being taught singly and the whole point about project is breaking down the barriers between those. So immediately project doesn't fit into NC in that same way. But we didn't want to be constrained in any respect by the NC... So the NC limits you and it's quite constricting and we don't want to do it that way, we want to widen it, indulge ourselves.

The researcher worked closely with the teachers to outline activities that linked knowledge and understanding in the three subject areas, whilst providing opportunities for PC development.

The subject integration in projects often led to subject learning being linked to 'real life' contexts (ref. section 10.2.6.3), which emphasised the interaction of knowledge and PC development. Students noted these changes and appreciated the increased opportunities to apply knowledge from one subject to another within a project theme [CSC: 9, 10].

[Interview 77: 12.12.01]

66. Julie: [Delivering subjects cross-curricularly] makes it more real life, it gives them more linked examples, so they can see how it works as a whole. Sometimes the science curriculum can be quite dry, so if you don't try and give it a context it can end up being very dry, and you get kids saying 'What's the point?', so I always try and start off by giving them examples of how it's used in a kid's life or how it's used industry and that can be really hard, but it improves as you do it more. But the fact that project made it all linked, it was easy to bounce it all off.

Teachers welcomed the opportunity to observe their colleagues work [Interview 78: 12.12.01], and emphasised the benefits of this cross-curricular approach on their professional development [CSC: 16].

[Interview 77: 12.12.01]

86. Julie: [The benefits of cross-curricular project work stemmed from science] linking so much better, with Maths, you realise how much maths there is in science and obviously that's mainly with graphs and percentages... I know there's a lot to be said for the kids to see me or other non-DT teachers get stuck in and it was good but sometimes we hadn't got a clue really... because we were learning like them. I'm sure there are benefits in that, but I'm not sure it's very good on making use of teacher's time.
But it was certainly good to work with other teachers and see what's going on in DT and to have an appreciation of that. So that was a real benefit for us, just to have the chance to go into other lessons, and to watch other teachers as well and get new ideas from them. There are all those good things for my development as a teacher. So there are lots of benefits to the teacher.

One teacher viewed the opportunity to involve herself in other lessons as a direct benefit to her subject and her students' understanding. She capitalised on opportunities to extend her teacher-student interaction, and to continue the teaching of her subject within other subject areas. Clearly, however, it was recognised that a cross-curricular approach would create difficulties in relation to formal examinations [Interview 78: 12.12.01: 22].

The allocation of one day per week, with no specified time slots, provided increased flexibility to organise and deliver a wide range of cross-curricular activities, from highly active, practical tasks to more formalised training sessions. This reorganisation of staffing and resources proved essential to the success of this case, and illustrates the strong management support given to this study.

Half of the students' subject allocation remained in mainstream lessons, external to the project, which allowed specific concepts, skills, or aspects of the curriculum to be taught, not necessarily linked to the project themes [Interview 77: 12.12.01: 70]. While project sessions were avenues for the application and transfer of understanding, opportunities to experience Science and Maths separately, in more traditional settings, were also valued for ensuring required NC provision [CSC: 9].

10.2.6 Key Point 3: The impact of project work

10.2.6.1 Autonomy & Choice

Autonomy and choice emerged as significant factors within project work, particularly influential in PC development. Students valued the opportunities to directly influence their learning, make decisions and judgements about what artefacts they made, how they made it or with whom they made it [CSC: 9].

Where students had flexibility to decide how to tackle a piece of work, they were stimulated to seek out information and use relevant skills, thereby improving their teamwork and self-management PCs [CSC: 8]. Such improvements, and their increasing adeptness to work within and across subject boundaries, enabled students to experience greater autonomy in their learning. These outcomes relate to Davies' (1987:11) description of the 'autonomous learner', which defines this as a person who 'is capable of choosing what he or she learns and handling the learning to their own satisfaction'.

Davies (1987) identifies two interpretations of autonomy, suggesting 'autonomy in learning' as being the degree of self-sufficiency a learner has at any one time within their work, whilst 'learning for autonomy' describes how students can be encouraged or taught to take more responsibility for their learning. In this case, project work promoted opportunities for students to experience 'learning for autonomy', where teachers encouraged PCs through activities promoting independent thinking and co-operative learning.

The development of PCs through subjects in this case relates to the notions of self-improvement and personal responsibility. Davies (1987: 13-14) suggests that 'autonomy in learning' depends on:

1) *the extent learners can decide what they want to learn, rather than selecting from pre-specified alternatives, or accepting what is provided* (Davies 1987: 13-14)

The organisation and flexibility of project work allowed teachers and students improved choice over the style of delivery and presentation of subject knowledge and understanding. Whilst satisfying NC objectives, the teaching and learning approaches were flexible, less formal and more co-operative, with increased opportunity for choice and PC development.

2) *the students' ability to handle given learning experiences and/or to develop any required learning skills and strategies* (Davies 1987: 13-14)

The differences between project and non-project students' ability to handle learning experiences was best illustrated during controlled observations [CSC: 14, 18]. Project students were considered to be better problem solvers and team workers than their non-project peers, and illustrated a greater degree of self-reliance.

3) *the suitability of the content to be learned, the learners' ability, the time, and facilities available for the task* (Davies 1987: 13-14)

Project work allowed greater flexibility in learning, as project work enabled students' activities to extend for longer within the school day. Teachers were able to differentiate group learning, giving students necessary support and direction, and opportunities to target set and to review PC development.

4) *the individual's motivation towards activities*

Project work allowed students to pursue some personal interests, within broader topics and subject learning. Typically, teachers outlined planned areas of learning within their subjects, but allowed students to influence its delivery.

PCs such as self-motivation, self-management, tenacity, teamwork and verbal communication were integrally used and link to the notion of autonomous learners. Such developments were also integral features of PC self-assessments, which relied on students' shared responsibility to make informed judgements on personal progress, with teachers, students and their peers (ref. section 7.3.2.3).

10.2.6.2 <u>Teamwork</u>

Controlled observations, reinforced by teachers' more regular observations, illustrated the differences in PC performance between project students and their non-project peers [CSC: 14, 18]. Project students were considered to have developed better cooperative and teamwork skills, and were more able to delegate and assume responsibility within teams, persevering with tasks and avoiding argumentative behaviour. They seemed better able to maintain a cohesive working environment for longer periods of time, whilst non-project students experienced more arguments with the breakdown of team activity, often dissociating into pairs. Project students persevered with the tasks and worked at a relatively steady pace, whereas non-project students seemed less tenacious and unable to complete the tasks, finding difficulty managing their time. In comparison, non-project students experienced greater difficulty co-operating and sharing opinions within a team structure.

Teachers suggested that project students had become increasingly self-reliant, observations similar to Bennett's (1994), who suggests that when relevant skills are practised, such as teamwork, their quality and effectiveness improve. He suggests that when children are aware of the appropriate behaviours for effective group work, they can be assisted to work more effectively.

For some students, improvement only followed after extended practice. Teachers found students with poor or challenging behaviours required more time for observable improvement in PCs [CSC: 19].

10.2.6.3 <u>Transfer and context</u>

Appreciating that the research into 'transfer' of knowledge, skills and understanding is vast, and presents varied points of view, this study considered 'transfer' to describe 'the process of using knowledge acquired in one situation in some new or novel situation' and 'an essential aspect of competent performance in any complex domain' (Alexander & Murphy 1999: 561-2).

During project work, students were encouraged to transfer knowledge, skills and understanding from one subject discipline to another, and to be aware of how their PCs influenced their success. Open-ended tasks specifically encouraged transfer of knowledge and understanding, especially where subject teachers made explicit how knowledge linked to different areas. There was an expectation that students would apply skills and knowledge, gained in projects or more formalised lessons, to carry out investigative or problem-based tasks, where the focus of project activities mainly relied on the use and consolidation of learning.

Features of this approach, such as increasing the length of time and context, were recognised as aiding the opportunity to transfer subject specific knowledge. The 6-8 week projects gave teachers the opportunity to encourage students to transfer knowledge and skills not solely on one-off activities but over extended periods, in different activities and contexts.

The project contexts were chosen to be relevant and applicable to each subject area. They were considered to be particularly influential to the students' perception of and motivation towards the projects, which were chosen on the basis of being: interesting or relevant; relatively broad in nature; not subject related by title. The school manager considered these contexts to be integral to the projects' success.

> [Interview 70: 20.11.01]
> 92. Paul: ... there was a link, which I didn't appreciate at the beginning, which was in relation to the context that you're delivering in. You know, the projects themselves are as important as the PCs, and as important as the assessment that goes with them as well as the teaching and learning styles. They're so interlinked.

Alexander & Murphy (1999: 570) found that often students do not see the connection between the world and the classroom, suggesting that procedures are mainly articulated in relation to the completion of short tasks or examinations. Although students appreciated the relevance of their subject knowledge, and linked it cross-curricularly to the project contexts, the extent of knowledge transfer is not fully known, and requires future work in this area.

10.2.7 Key Point 4: Difficulties making PCs explicit

The explicitness of PC target setting raised students' awareness, and allowed for review and discussion of academic and PC development (ref. section 10.1.5). In this case, teachers found difficulty referencing the PCs on a regular basis, finding the active and fast moving pace of project work resulted in organisational aspects of the tasks taking main priority. More frequently, 'in promptu' reference was made to PCs during activities.

As the study progressed and the students relied more heavily on PCs for interpersonal and academic success within projects, a more focused approach was adopted by the teachers who noted positive effects of explicitly valuing desirable behaviours [CSC: 24]. Teachers emphasised students' behaviour using visual reminders through classroom display to reinforce the PCs.

Jayne explained how PCs were directly taught in this study to help students understand how improvement could be achieved (ref. The testing of underpinning knowledge, section 11.0.6).

> [Interview 78: 12.12.01]
> 72. Jayne: I had to [teach PCs] - you have to. To get there the kids have to know, it's just like the training books for maths, and you have to have that for PCs really. It's no good saying you are a 'D' in teamwork and this is what you've got to do to get to an 'A', you have to tell them how to do it in some respects. Just like when you're telling a kid off you've got to tell them what to do to make it right. You have to some degree… If I'm teaching it right [the kids learn it], but you do have to talk about it, such as if you were problem solving you'd discuss it and talk about how you might solve it.

This case showed that concerted efforts to formalise the teaching of PCs was of benefit. Students who had learnt about PCs were more aware of desirable behaviours, exhibited improved performance and were better able to interact with others.

10.2.8 Key Point 5: The influence of academic testing

Achieving NC requirements was consistently a key focus for teachers in this case, even though the school management prioritised the PCs. In practice, it was difficult to give equal importance to PCs and subjects, since teachers felt obliged to ensure that project students received comparable subject provision to their non-project peers. Although this was not disputed in the aims of the study, the implications seemed of greater significance for Maths and Science teachers who showed on-going concern to fulfil specified schemes of work, drawn from longer-term developmental plans. Time constraints emerged as an early concern [Julie: Initial Perceptions: A6].

In spite of the strong management and personal philosophies, teachers, especially younger members, found difficulty maintaining a strong PCs focus in their teaching, considering this to go against national norms and curriculum assessment requirements. The increasing emphasis placed on factual recall in SAT examinations often led to an increased inclination to use didactic teaching and learning approaches [Interview 70: 20.11.01: 46-52]. Julie, one of the teachers, described her need to ensure that students' knowledge acquisition was not compromised within this initiative, and felt that the emphasis on knowledge acquisition over PC development was somewhat unavoidable.

> [Interview 77: 12.12.01]
>
> 32. Julie: I guess I'd agree with teachers who say knowledge development is more important to a certain extent. At the end of Year 11, it is possible that this school will have forgotten what happened with Year 7 with the PCs, and they might be saying 'Why are the results down?', that's just an example. You've got to test them at the end of the year, so you can understand why their knowledge has got to be good, and their parents would probably agree that they want their kids to have good subject skills.
>
> I honestly don't believe their Science knowledge suffered in any way, and I do find it difficult to understand why say their Maths teachers were worried about their Maths knowledge suffering.

Projects were, therefore, primarily driven by NC coverage, and teachers strongly felt that in order for students to apply their subject knowledge and understanding in open-ended or investigative activities, there was a need to first develop understanding in basic subject concepts and skills. During project time, more formalised training activities were introduced, which continued to emphasise the project theme. Where teachers felt that NC may be compromised, change was rapid, with a shift towards more formal individualised methods of student learning [Interview 78: 12.12.01: 58-60].

This change in emphasis is important, as despite the set up of the project and management support, focusing strongly on PCs, teachers seemed professionally obliged to abide by the national norms, primarily driven to fulfil the requirements of the NC. Teaching approaches tended towards the single subject, whilst clearly recognising the value of more active approaches for PC development [Interview 78: 12.12.01: 62]. Management was fully supportive of teachers' concerns to develop subject knowledge alongside, and within project work [Interview 70: 20.11.01: 80].

10.2.9 Summary

This case has illustrated that the integration of PCs and NC subject development can be achieved through the use of cross-curricular projects. PC development was incorporated into, and balanced with, subject knowledge acquisition, through the use of cooperative and active teaching strategies. Opportunities for students to practice and use PCs were explicitly recognised and reviewed, as a means of raising awareness and developing understanding of PCs. The use of project contexts increased the flexibility of opportunity to develop and stimulate students' motivation towards learning.

It was not surprising that maintaining the balance between PC and subject development, sometimes caused teachers concern [CSC: 11, 13, 16, 19]. It is particularly relevant that where teachers felt pressured to cover prescribed areas of subject content, they did not do this at the detriment of students' PC development. It is suggested that even during more didactically focused lessons, students can be made aware of PCs relevant to their learning experiences.

This case suggests that, despite good intent, sustained change and curriculum development is challenging, and is influenced by teachers' preoccupation with subject knowledge acquisition. Although high priority or value was attributed to these capabilities, there was no guarantee that teachers actively and regularly addressed them through subject teaching, even where the approaches had been specifically devised for this purpose. This is not as much a criticism of the teachers, as recognition of the pressures created from a heavily prescribed and assessed NC.

Issues for further exploration:

The extent to which students would independently transfer knowledge beyond the project is not demonstrated by this research. Further work into the transferability of knowledge, skills and capabilities between projects and regular classroom teaching will be of benefit.

10.3 A summary of SCHOOL D: A STORY OF SUBVERTED EFFORTS

This case (ref. report Appendix A3) is presented to illustrate the effects of the action research process with a less confident practitioner. This case describes the efforts of a KS3 teacher who was unsure of her future in the profession, and was endeavouring to take control of her own professional development and improve her pupils' behaviour towards learning. Her involvement with the research brought attention and external support, assisting her to cope with a group of challenging students. The main focus of the work resulted in tackling the students' social behaviour, with the aim of subsequently influencing their PC development. By differentiating classroom resources, sharing lesson objectives, raising lesson expectations, and instilling review and reflection, the teacher was rewarded by improved social behaviour, and better academic achievement.

This study demonstrates the impact of ownership of the learning experience, both from the teacher and her students. When active teaching and learning strategies were used, students had improved opportunities to take responsibility for learning, and to interact with each other. If sustained, these occasions had the potential to enhance PC development, especially in areas of teamwork, verbal communication and social intelligence.

The case describes how, despite good intent, the teacher compromised the research aims. Although the PCs provided a context through which the teacher could reflect and take action, with the support of the researcher, the actual result may relate mainly to better classroom management and a more conducive learning environment, rather than students' PC development. The

PC research, therefore, provided a platform for identification and resolution of the underlying issues for this group, a necessary precursor to further intervention or development.

Although on-going in-class, personal and practical support was provided by the researcher, through the provision of classroom resources and worksheets, the impact of the interventions were found to rely on the teacher's philosophy, confidence and motivation. This case suggests that where this teacher lacked confidence in her own abilities and had low expectations of her students, the impact of this approach to curriculum and PC development was hindered. The action research process proved useful in engaging the teacher in reflection-in and on-action, however, in effect, this related most strongly to classroom management issues, as opposed to the development of PCs.

This case illustrates that adopting an action research approach may not affect all teachers in the same way as presented in previous cases, however it was beneficial in helping this teacher in realising important issues in her practice. These challenges may continue, despite support, however it was beneficial in bringing to the fore pertinent issues relating to the teacher's beliefs. This case has illustrated that future engagement in this type of study may not always yield intended outcomes, however researchers should value the action research approach as being one which enables constructive reflection on practice, possibly leading to change.

The following quote pertinently illustrates Ruth's attitude towards classroom control even at the end of the research period.

> [Interview 64: 8.10.01]
> 132. Ruth: ...They liked doing activities... I think [their learning is] semi-active [and] very guided. I mean I could never let them go away and investigate blah, blah, blah. They just couldn't have done it. They'd have been messing about, put stuff in bunsen burners or, just sat and talked at the back of the classroom. It had to be either 'I'm showing you what to do' or... sometimes I'd show them what to do and then let them do it, but I still had to either put it on the board or on the sheet – this is what you do next, and next.

10.4 ADDITIONAL CASES

The case study reports and discussions for Schools E, F and G are presented in Appendix A5-A8, due to the consolidatory and less directly relevant nature of their findings. Two other schools initiated the research, however were unable to complete their involvement due to unavoidable events, for which a summary is provided in Appendix A9.

CHAPTER 11

Recommended strategies for PC development

This chapter provides a series of recommended strategies and activities for improving students' PCs through the Science curriculum, drawn from regularly used activities across the cases.

11.0 RECOMMENDED STRATEGIES

The teachers in the study played a crucial role in encouraging students' PC development. Notwithstanding the gradual development resulting from increasing maturity, the research illustrated that teachers can influence students' PC development through the following strategies: making PCs explicit; target setting and evidence gathering through monitored self-assessment; adapting and devising teaching and learning strategies; providing regular feedback; differentiation; pupil PC quizzes. Many resources were devised to suggest these activities, which provides the focus for this chapter.

The recommended strategies are somewhat typical of curriculum development in general, however the nature of making PCs explicit, target setting, and monitored self-assessment, are particular to this study. Six strategies are drawn from the collective outcomes of the cases. Each is discussed separately, although inherently impacts on one another in practice. These strategies are recommended for the teaching and learning of PCs through the Science curriculum, and are predominantly meant to show the pragmatic approaches which could be directly applied in classroom settings.

1. Making PCs explicit
2. Target setting and evidence gathering through monitored self-assessment
3. Adapting and devising teaching and learning strategies
4. Providing regular feedback
5. Differentiation
6. Pupil PC quizzes

11.0.1 Strategy 1: Making PCs explicit

Teachers provided opportunities to discuss PCs and associated behaviours during subject teaching. For the majority of PCs, teachers identified class or individual targets, drawn from the behavioural framework, and encouraged students to discuss their meaning and consider methods for improvement, prompted by visual displays and by activities. Explicit target setting and the regular formative feedback by teachers, peers and parents, increased the status and value of PCs within students' subject learning. Most students reacted positively, investing effort in the attempt to display the desirable behaviours.

Making PCs explicit in lessons was found in all cases to be especially significant during their introduction, when teachers discussed the PC behaviours and how they were associated with task success. Once the idea of PCs was established, teachers adopted a more reflective manner, encouraging students to independently describe the influence of PCs on tasks, and whether and how their behaviour improved. The latter, more reflective approach, proved most useful when encouraging 'Creativity', which did not seem to suit being specifically targeted from the outset (ref. section 9.3.10-9.3.13).

Focusing on PCs alongside subject knowledge encouraged students to appreciate 'how' their behaviour influenced 'what' they learnt. Students increasingly recognised the influence of their PCs on their learning, as their understanding improved, their self-confidence and sense of personal responsibility towards learning and PC development was enhanced. It was recognised that development was an on-going process, and achievement related to the level of effort and motivation students invested, as well as to academic ability and self-image.

Maintaining students' awareness of PCs seems to be essential to influencing sustained PC development, and is related with metacognitive development – a process enhanced by the improved understanding of the expected outcomes of learning (ref. section 10.2.10). Teachers', peers' and parents' on-going support, feedback and reflection facilitated students' continued awareness and understanding.

11.0.2 Strategy 2: Target-setting and evidence gathering using monitored self-assessment

The process of self-assessment was not solely the responsibility of the student, but was monitored, shared and discussed with others to improve the objectivity, clarity and usefulness of evidence. Teachers, peers and parents were encouraged to become involved in the process, providing students with a view of how others perceived their performance. Their involvement ensured that students were supported, and an ethos of self-improvement was encouraged amongst the students' immediate social group.

11.0.2.1 <u>Target Setting</u>

Target setting raised students' awareness and understanding of PCs. Targets were set by teachers as whole-class lesson objectives, and by students as personal goals for improvement, through their incorporation in worksheet design (ref. School D), classroom display (ref. School B, C, G) and lesson introductions (all schools).

Using the PC behaviours as pre-prepared targets avoided a wide variety of vague, open-ended statements being used across a student group. These were readily identifiable and came to be commonly understood and discussed within the research groups. In most cases target setting aided students' understanding of PCs and focused their attention on improving their capabilities.

Two approaches to target setting were regularly used to identify and review PC development:

- *use of the discussion document*

Discussion with peers or teachers enabled students to identify and justify their perceived personal strengths and areas of improvement. The use of the document was sometimes viewed as time-consuming, and best suited to introductory or longer review activities.

* *use of a self-assessment profile*

Most commonly target setting resulted from regular self-assessment tests which proved manageable in lesson time. These relied less heavily on discussion, encouraging students to rate their ability in relation to core PCs, on a four-point scale (ref. Table 11.0.2.1), thus providing a snapshot of perceptions of personal strengths and areas for improvement. These were supported by peer and teacher review. The triangulation of personal assessments from teachers, peers and parents, enhanced the reliability of the outcomes from which targets were set.

This approach allowed a numerical score to be calculated, which, in some cases, was used to illustrate differences between student and assessor perceptions, or to aid comparability between students' improvement over time. Further work on these scales to coordinate fully with the A-D scale would be of benefit in future.

	No good 1	OK 2	Good 3	Very good 4	Peer review	Teacher review
Sharing your opinions and ideas with others	1	2	3	4		
Listening and responding to other people	1	2	3	4		
Seeking advice when necessary	1	2	3	4		
Co-operating with other people	1	2	3	4		
Helping reach agreements with others	1	2	3	4		
Keeping track and monitoring what I am and others are doing	1	2	3	4		
Avoiding giving up easily	1	2	3	4		
Organising and planning how to go about a task	1	2	3	4		

Table 11.0.2.1: ***Self-assessment sample***

11.0.2.2 Evidence gathering

Having targeted key areas for improvement, and undertaken activities to support their development, students provided evidence of their progress. The evidence took the form of short paragraph statements describing activities, often undertaken in Science lessons, during which the students felt they had displayed or had endeavoured to improve their target.

Initial attempts to encourage students to gather evidence of PC improvement were problematic, as students found difficulty in recollecting relevant activities or occasions for comment. Lengthy periods of time between the activity and the assessment hindered their ability to recall events, and so, short, two to three minute review activities were introduced directly following a lesson (ref. Figure 11.0.2.2a), between two and five times per week.

Date	Target	What activity did you do?	How well have you achieved your target?	What helped or hindered you meeting your target?
			☐ very well ☐ well ☐ a little ☐ not at all	
			☐ very well ☐ well ☐ a little ☐ not at all	
			☐ very well ☐ well ☐ a little ☐ not at all	

Figure 11.0.2.2a: ***Sample of 'Weekly Review' self-assessment format***

Less frequently students elaborated on weekly reviews using structured questions, requiring between 15-30 minutes to complete. At this stage, teacher, peer and parent involvement was also encouraged (ref. Figure 11.0.2.2b).

Students' success in these exercises varied, with most finding early attempts challenging. It became clear that the majority of students required training before independently undertaking the task. Most found difficulty understanding the 'type' of evidence which would be 'worthwhile' to record and teachers worked with students to demonstrate how activities could be capitalised upon.

What is the personal target you are reflecting on?	Do you feel you have you achieved this target?
	☐ very well ☐ well ☐ a little ☐ not at all

<u>How have you done it?</u>

Explain how you have achieved this target. Think about what you have done to improve. What evidence have you got?

I think I have achieved the target because ______________________________

____

____

<u>An occasion that I have shown the improvement is when</u> ______________________________

____

____

____

Do you feel you need more work on this target?

☐ <u>Yes</u>, I feel I need more work on ______________________________

I think I can help do this by ______________________________

____

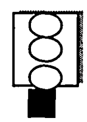
☐ <u>No</u>, I think I would like to focus on a new target such as ______________________________

____

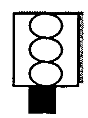
I think I can help do this by ______________________________

____

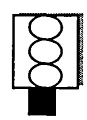
Your thoughts:
How do you feel about how you have worked to meet your target?
Have you made a good effort?



Parents' thoughts:
How do you feel about your child's personal capability development this week?



Peer or Friend's thoughts:
How do you feel about your friend's personal capability development this week?



Teacher's thoughts
How do you feel about this student's personal capability development this week?

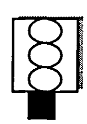


Figure 11.0.2.2b: ***Sample of 'Monthly Review' self-assessment format***

Most teachers found target setting and self-assessment a time-consuming process impinging on subject teaching time. At this time, the researcher worked with the teachers, and supported their efforts in order to ensure their commitment and involvement in the study. As students became more familiar with the tasks, their ability to undertake PC activities improved, and teachers were increasingly confident to allocate the activity as homework tasks. In this way, parents were encouraged, and undertook some work with their children to provide feedback and support. Teachers also reviewed the work giving additional feedback and direction. Teachers limited the frequency of these activities to monthly or half-termly tasks. Alternatively, they gained verbal feedback from students through discursive review sessions.

The use of teacher assessment aided the reliability of the students' self-assessments. The large-scale development and trialing of the 'Student Personal Capability Index' in the latter stage of the study (ref. section 14.2.3) indicated that teacher and students' assessments were highly comparable.

11.0.3 Strategy 3: Adapting teaching and learning strategies

Integrating PCs into subject teaching required teachers to review how their practice influenced students' PC development. Reflection on practice, with analysis of Science schemes of work, resulted in learning opportunities being identified which already encouraged PCs, albeit implicitly. During teacher-researcher discussions, further opportunities were sought to integrate additional and more focused interventions, aimed at explicitly encouraging and developing students' PCs. Activities encouraged students to take increased responsibility for their learning, and they were often required to work cooperatively with their peers to disseminate or share knowledge and understanding.

Increasing students' responsibility resulted in emphasising activities which encouraged autonomy, choice and decision-making. These were often characterised by student-centred or active teaching and learning approaches which depended on students' self-motivation, tenacity and ability to plan and structure their own work.

11.0.3.1 Project Work

The use and nature of project work varied across the cases, from integrated cross-curricular projects to shorter independent research activities, and was identified as teaching styles which effectively encompassed academic and PC development (ref. School A, B, C, School E). Projects placed strong emphasis on encouraging choice, autonomy and personal responsibility, where teachers facilitated learning. Commonly, subject knowledge was presented in relation to 'real-life' contexts, or drew on students' personal interests. Project tasks were flexible and open-ended, requiring time to generate, research, investigate and present ideas and knowledge. Most pertinently, students' active engagement enhanced opportunities for PC development.

Where project work was used as a main teaching strategy, it benefited from the relaxation of curriculum structures, which allowed for longer-periods of activity. Where time and curriculum constraints proved less flexible, projects were undertaken as extra-curricular homework activities, with the presentation of work undertaken in lessons. The extended opportunities to work on projects influenced their intensity and the opportunities for collaborative and curricular work.

11.0.3.2 Co-operative Work

Encouraging student interaction and co-operative work during learning became a strong focus of PC development. Teachers found this to be a means of facilitating the development of teamwork, verbal communication and self-management PCs, using subject knowledge as a context. The use of buddies, pairs, small groups or teams during Science investigation or problem-solving activities furthered opportunities to develop critical thinking and problem solving behaviours (ref. School A, C and D).

Working collaboratively, students noted increased responsibility towards their learning and their peers, and were reluctant to negatively influence the group or team's success. Self-motivation towards achievement seemingly increased where learning was a shared activity. Although learning difficulties and challenging behaviours could have negative influences on success, most students valued the opportunity to work collaboratively in less formal environments.

Flexibility within the curriculum influenced the frequency with which these activities were used, with one-hour lessons inhibiting lengthier group or teamwork activities. Where curriculum pressures required the completion of schemes of work to cover prescribed activities, the use of extended co-operative work was also less frequent. Short, paired or small group activities were more common, with emphasis placed on verbal communication and teamwork PCs.

11.0.3.3 Student Buddy Partnerships

'Buddies' were introduced to aid co-operative activities, and especially benefited the development secure working relationships between two students over extended periods of time (ref. section 9.4.6). Partnerships were voluntarily chosen, unless disruptive students inhibited their working relationship. They were used frequently in discussions in pairs, larger groups or whole class activities, and encouraged students to trust and have confidence in themselves and their partner. Buddies also acted as peer assessors and reflective partners for PC development, providing a continuous view of their peer's development. The impact of buddy partnerships related to positive self-image, verbal communication, teamwork, self-motivation and social intelligence behaviours.

11.0.3.4 Investigative/ Problem-solving activities

Investigation and problem solving activities were already typical of the Science focus in this study. Teachers valued opportunities for students to actively, and often practically, work collaboratively on investigations requiring information to be researched and located, and to undertake short experiments. Problem solving activities varied from short puzzles to lengthier activities requiring the design and construction of artefacts, where analytical and strategic thinking skills were required, as well as PCs of problem solving, critical thinking, creativity and self-management. These more integrated, open-ended activities were time-intensive.

11.0.3.5 Modelling/ PC activities

Encouraging students' understanding of PCs was, in some cases, facilitated by role modelling, which aimed to illustrate actions, strategies and specific behaviours, leading towards improved understanding and proficient performance of PC behaviours (ref. School B). For example, the core PC of 'listening and responding to others' was addressed through an activity in which a student drew a picture on the basis of their partner's description. This activity required the students to actively listen and respond to instructions, emphasising the need for clarity of thought and expression.

Students increasingly benefited from role modelling exercises which involved mock scenarios, and illustrated how particular PCs were transformed into actions in realistic, classroom situations (ref. School B, E, F). Teachers described how these activities prompted discussion, illustrated effective questioning techniques, and allowed students to empathise with others inhibitions or misunderstandings. Role modelling enabled students to see, in direct actions, how improvement could be achieved.

Teachers considered these strategies particularly useful, however they emphasised that PC development could also be illustrated in more routine teaching approaches.

11.0.4 Strategy 4: Providing regular feedback

The monitoring of students' activity and effort towards their PC development allowed them to appreciate and value the contribution of PCs towards self-improvement and learning. Students benefited from being regularly taught, encouraged and praised to display behaviours, reinforcing their self-awareness and personal development. Feedback and reward were necessary to maintain motivation towards tasks and PC targets.

Regular emphasis and feedback on PCs encouraged short-term improvement of students' actions and behaviours. Many students viewed PCs in the 'here and now', as means by which they could improve their subject learning and their ability to work with others. Some also appreciated the potential of these skills for future success.

Feedback took different forms, from teacher's verbal comments, students' self-assessments, reflective discussions with peers or buddies, to parents' comments. Most significantly teachers provided 'on the spot' formative feedback during lessons or through the marking of work which related primarily to whole-class or personal targets.

The PC behavioural statements encouraged a generic language which was more readily understood by those involved, improving and reinforcing awareness and understanding of generic concepts, such as teamwork, self-management, critical thinking etc. Specific feedback emphasised the value of desirable behaviours.

11.0.5 Strategy 5: Differentiation

Differences in students' ability to understand and react to the PC interventions generally correlated with their academic ability. Students with lower academic ability found difficulty in interpreting the meaning and relevance of PCs, often viewing them as unrelated to their subject knowledge development. Many suffered from poor basic literacy skills, which hindered the reading and writing elements of self-assessment tasks. Some students, however, performed equally well as their higher ability peers, in identifying and self-assessing PCs, especially on a verbal basis and assisted by the teacher.

Academic ability was thought to be significantly influenced by students' self-image and self-confidence, which, in turn, seemed to affect their approach to PC development. Higher ability students, who exhibited a positive self-image, seemed better able to target additional features of their development, differing from lower ability students who seemingly lacked confidence or drive.

Such difficulties with reading and writing are areas which were addressed through adaptation of worksheet formats and self-assessment structures. Improved differentiation of vocabulary, the use of diagrams or pictures, along with structured writing frames, better enabled lower ability students to undertake PC self-assessments. Addressing the influence of low self-image was, however, more challenging, and teachers thought it beneficial to initially target students' core PCs, with added focus on positive self-image and self-motivation behaviours. In this way, it was hoped that improved self-awareness and recognition of personal success would lead to increased self-confidence, and to an appreciation of the influence of PC development.

Further research may be of benefit to establish the influence of academic ability on PC development. This study suggests that additional time is beneficial for encouraging PC development with less able students, and teachers appreciated the improved attitudes and classroom relationships that ensued from it. This does not suggest that PC development is better suited to higher ability students, rather that development for those of lower ability require more time, specific emphasis and a differentiated approach.

11.0.6 Strategy 6: PC quizzes (ref. Appendix A23, A24)

Although verbal and written self-assessment proved useful in tracking students' progress, the researcher was also interested to explore whether students' knowledge of PCs could be formally assessed, and if so, how this may contribute to monitoring PC development. The researcher designed a 'PC quiz' to test students' knowledge of PCs. Students demonstrated their knowledge of PCs by describing the types of behaviours they commonly associated with them. The two-part quiz was trialed in School A and B, and aimed to:

- engage students in the self-assessment and target setting of their own development (Part 1)
- test their ability to advise other people about PC development (Part 2).

The quizzes focused on five areas of PC-related knowledge:

1. **Self Assessing**: students' ability to assess their own development
2. **Advising**: students' ability to advise other people about PC development
3. **Understanding**: students' understanding of PC terminology
4. **Analysing & Interpreting:** students' ability to interpret a short scenario in relation to the PCs
5. **Target Setting**: students' ability to set self-improvement targets.

A primary (ref. Appendix A23) and secondary quiz (ref. Appendix A24) aimed to test knowledge and understanding of what had been taught, discussed, highlighted and reviewed using other PC interventions. They formed a diagnostic tool for eliciting the extent to which students:

1. understood the PCs
2. could apply their understanding to other situations
3. might display particular behaviours themselves.

It was assumed that students with a good understanding of the actions constituting PC improvement, would be 'more likely' to display the behaviours. The quizzes aimed to elicit understanding as an indicator of 'possible' or 'likely' performance. It was appreciated that this form of assessment could not be used as an indicator of 'actual' performance, as written or verbal knowledge would not necessarily be transferred into behaviours.

Georghiades (1999) suggests that if pupils regularly reflect on their learning and improve their knowledge, they will be better able to transfer and use it in a range of circumstances. In terms of PCs, it could, therefore, be suggested that if students are encouraged to regularly reflect on their impact, they will be better able to transfer their knowledge to different situations. The suggestion that increased awareness and knowledge of the PCs positively influences behaviour proposes that assessing underpinning knowledge is a 'likely' indicator of PC performance.

Bannister *et al.* (2002) suggested three guiding principles for diagnostic assessment tools, which apply in this case. They suggested that diagnostic assessment tools should be: valid, such that they test what they claim to test; lead to support and should help students to learn. These principles were incorporated in the construction of the quiz, although it requires further refinement.

The pupils' responses to the quizzes illustrated a heightened awareness of the PC behaviours. Students were able to provide advice aimed at assisting personal improvement, and drew on the regularly promoted understanding and behaviours associated with PCs, as well as considering their own methods for self-improvement. Masui & deCorte (1999) suggested that pupils who display a good awareness of desirable behaviours are more likely to demonstrate them. Their research suggests that pupils who are exposed to learning environments involving discussion and reflection on thinking processes are more likely to become knowledgeable in these areas than students who had not. Students in this study who had been exposed to a PC focused learning environment, where PC behaviours were explicitly identified, discussed and reviewed, demonstrated a greater knowledge and awareness.

When compared with control groups, in Schools C & F, it was evident that students involved in the study were better in all areas (ref. Figure 11.0.6).

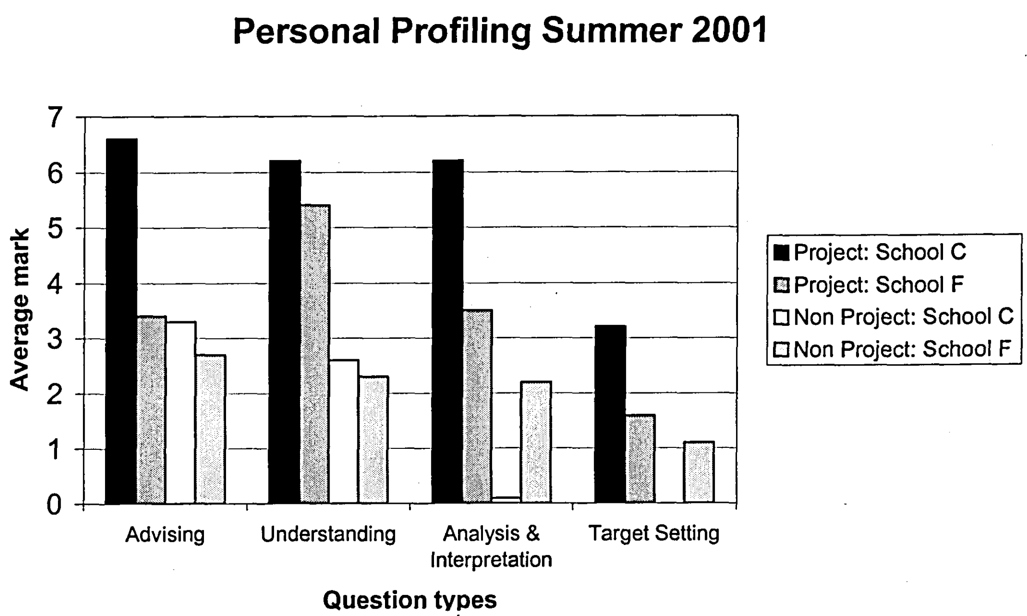


Figure 11.0.6: ***Secondary Pupil Quiz Scores from project and control groups***

Students were better able to provide advice about personal improvement than a control group, using regularly promoted understanding and PC behaviours, generating their own methods for self-improvement.

11.1 CONCLUDING STATEMENT

The recommended strategies for the teaching and learning of students' PC through the Science curriculum may have applications to other subject areas, and provide stimulus for further work on student centred activities for PC learning and assessment. Particular strategies, such as the designs for self-assessment formats, require on-going development and differentiation through a similar action-research process to this study.

CHAPTER 12

Teacher professional development

This chapter reflects on an outcome of the study which was particularly noticeable. It relates to the impact teacher collaboration and participation had on their continued professional development.

12.0 OVERVIEW

It became clear that involving practicing teachers in curriculum development, through an action research process, significantly influenced the course and success of the study. In total, twenty teachers from nine schools were involved in the main phases of the study, and their understanding, commitment, and activity were critical for its success. The study was designed to focus on students' PC development, and its impact and influence on staff professional development was a most beneficial side effect.

12.1 REFLECTIVE PRACTITIONERS

Teachers' reflections and experiences of classroom activities provided insights into the types of approaches useful in stimulating students' PC development, and the researcher's involvement proved integral to encouraging teachers to think about and affect their practice. Reflective activities occurred as pre- and post-intervention activities, and relate to the process of reflection-on-action (Schon 1983), referred to in section 9.3.4.

Pre-intervention, reflection-on-action was directed towards reviewing:

- the Science curriculum and schemes of work, and the opportunities which existed here to encourage PC development
- teaching styles, and their appropriateness for PC development
- students' capabilities and the areas which required development (dependent on age, ability and motivations)
- the manageability of the generic research interventions, and the way in which they could be integrated into regular teaching.

Post-intervention reflection-on-action focused on the impact the activities had on:

- students' activity and response towards the teacher, the interventions and others
- the acquisition of Science knowledge, skills and understanding
- students' awareness and understanding of PCs
- the use and development of PCs
- students' reflection and self-assessment on personal development.

This type of active and regular engagement in reflection was considered by Berliner (1986: 60) to be a determinant of teacher expertise. He suggested that reflecting on practice is of more benefit even than long-standing experience in the profession.

> Although there are fields in which experience and expertise are highly correlated, we would hypothesise that in all fields mere personal experience probably teaches very little. We have no doubt, however, that personal experience that is reflected on and examined, in order to derive ways to improve one's own performance, is a very valuable teacher.

In this study, teachers' reflection-on-practice enabled a shared understanding about facilitatory and inhibitory processes and strategies for PC development. As with Berliner's finding, there was little, if any, indication that more experienced members of staff were better able to use or to note success with the PC interventions, but there are indications that those who were most successful regularly reflected on their teaching. Teachers who maintained on-going reflection-on-practice, and actively used this to influence classroom activity, typify the stronger case studies.

Success, although more limited in some cases, was influenced by the teachers' ability to mould the interventions to their teaching contexts, and the following quotes indicate the benefit of the flexible, but well-monitored approach, that action-research promoted.

School E:
[Sue. 14.2.02]
The research has been mature enough to evolve with respect to comments and evidence from teachers and academic staff. The evolution of the systems and prompts have truly reflected successes and areas for further development over the two years.

[Final Evaluation. David1]
The research has developed a team of teachers who feel they have ownership of the project. There has been an aspect of professional development through the use of different teaching and learning styles, some 'risk taking' and reflection on teaching, and more particularly in students' learning. It has raised issues re. 'Am I preparing/equipping my students adequately for the world of work with personal and social skills etc.?'
Regular meetings of teachers enabled the sharing of information, opinions etc. with the researcher has caused me to reflect on the teaching and learning styles that are used in my own and other peoples' classroom situations. The researchers' work and proactive approach in producing materials for teachers and students has been of benefit. The project has been led by educational imperatives and has changed and developed as it has progressed.

[David. 13.2.02]
There has been an element of professional development for me, in making me reflect on what I do and how I deliver it, and I have enjoyed working with the researcher on the project.

School G
[Final Evaluation 7.9.01: Chris]
My perception about the research is that it has followed its own course and has had to adapt to the different schools and expectations of teachers and students. From my discussions with the researcher and with other colleagues the materials and methodology has had an impact to different extents. In my experience, the research started well but was interrupted by other priorities that arose.

School F
[Interview 73. 10.12.01: 115: Phil]
I think it's made me more reflective over all. I used to worry enough, now I think I worry even more now (laugh).

Reflective practice is seen as a fundamental requirement of the curriculum development and action research process of developing PCs through the Science curriculum.

12.2 RESPONSIVENESS TO CHANGE

The teachers' responsiveness to change was of influence on the success of the research in particular schools. For some teachers, the challenges of departmental and management responsibilities were overpowering, and led to their efforts being compromised and often restricted. For others, focused activity was more readily integrated.

A relationship emerged between the level of teachers' activity in the study, their departmental responsibilities, and the impact of the research. Teachers with between one and ten years experience, and with fewer managerial responsibilities, more readily used regular PC interventions. They engaged in a greater degree of in-class trialing than those holding over ten years experience with senior management responsibilities. More experienced teachers seemingly found it more challenging to integrate PC interventions into their regular teaching, and although further research would illuminate the underpinning reasons for this, the following speculations could be made.

It is possible that teachers with more experience:

- whose time was heavily influenced by management activities, were less able to fully engage in the research due to the additional time that was necessary to design, trial and reflect on particular activities
- were better able to see the implications, both positive and negative, of the various strategies, without necessarily influencing their practice. As such, they were less inclined to trial activities which, from their experience, had previously proved challenging, unsuccessful or required considerable amounts of time
- required more time to consider the implications of the study on their own practice, and although recognising the relevance of PCs, they were less inclined to alter strategies which they were confident 'delivered' the curriculum and achieved high academic standards.

Teachers with less experience may have:

- been more likely to trial different teaching strategies, especially those which they hadn't been exposed to before. As such, they were more receptive to research activities, viewing it as a tool for professional and curriculum development

- been more motivated and familiar with experimenting, reflecting and evaluating the impact of different teaching strategies, having more recently qualified, and being more used to reacting to change, development and self-improvement.

Different factors may have influenced teachers to varying extents. However, it was evident that increased time pressures outside the classroom influenced the extent to which more experienced teachers were able to regularly adopt the research interventions.

12.3 IMPACT

In general, most teachers highlighted the contribution the study had made to their continued professional development. This had stemmed from actively reflecting on practice, students' learning and their being exposed to broader educational issues. They appreciated the training, support and mentoring from the researcher, and the liaison with the wider research group. Many felt that the research had made a permanent impact on their teaching, broadening their understanding of PCs, and focusing their teaching strategies on their development beyond the study classes.

The following quotes illustrate their views on this matter, and provide pertinent examples of the level of impact the experience in action-research had on the teachers.

> [Alison. Final Evaluation]
> For me, the research has made me more aware of my own teaching styles and the need to include a greater variety, but also that it is far more useful to share with the class why you are using a particular strategy and what they should gain from that... I am encouraged by what I have seen, the pupils' response, my own benefits and the possible increase in achievement. I will continue to implement the teaching and learning strategies used, as well as other strategies, regardless of my involvement in the project ending.

> [Brian. Final Evaluation]
> Through taking part in this project I feel that not only have some of my students benefited from personal capabilities, but so have I. This is one of the most tangible examples that I have come across where the feeling of everyone being a learner and learning being a lifelong process can be demonstrated.

[David. Final Evaluation]
There have been highs and lows but the experience has made me develop, think and question the nature of the objectives and the strategies I use to create learning opportunities for the students I teach. Using the PCs has created some different perspectives on the learning situation for me and for some of the students particularly from last year's group... There has been an element of professional development for me, in making me reflect on what I do and how I deliver it, and I have enjoyed working with the researcher on the project.

[Sue. Final Evaluation 1 & 2]
The research has been very much guided by set criteria, however these have been fluid to take into account the individual school's approach, and indeed the emphasis placed on the project by staff, and their relationship with pilot classes. Each time the research group has met we have revisited the progress, application of the criteria and methods of evaluation. The presence of the academic research team encouraged us to view the validity and reliability of the results more than we might have done. This was a necessary constraint and catalysed the restructuring of the evaluation procedure.
...The research has reinforced my belief in 'effective learning occurs in an environment of mutual respect, challenge, praise, celebration and fun'. PCs encourage reflective teachers and learners.

[Phil. Interview 69: 3.11.01: 56/73 - 10.12.01: 115]
The study has made 'me more reflective and has led, over 3 months, to the use of more informal teaching styles', it has encouraged more trust and a better rapport with the students... I think it's made me more reflective over all.

[Chris. Final Evaluation]
In my own teaching I am more aware of how the students are responding to the lesson. I spend more time ensuring that there is a positive atmosphere in the classroom and have tried to incorporate some of the theory from Gardner's ideas of multiple intelligences and accelerated learning.

[Ruth. Final Evaluation A6,7]
The research has given me back some confidence that I was losing, along with the battle to make the pupils behave in the way I wanted them to... The presentation of lessons and resources that I have developed would be extremely useful and transferable to other problem classes with behavioural problems.

12.4 SIGNIFICANCE

This outcome emphasises the relevance of encouraging teacher participation in curriculum development and action-research. These processes not only significantly contributed to understanding the form and nature of PCs, and their associated teaching and learning strategies, but also significantly influenced the participants – teachers, students and the researcher.

The development of reflective practitioners is enhanced through this approach, where facilitation, training, mentoring, and monitoring of activity by the researcher encouraged teachers to think about and influence their practice in the light of the PC interventions. Maintaining a flexible, open-minded and developmental ethos enabled approaches to be tailored to particular environments, responsibilities and students' needs. The effect on teachers' professional development was significant, and benefited from the transferred ownership that the methodology encouraged.

CHAPTER 13

Critical Debate

This chapter critically reviews the key issues of the study. It considers the role the teacher-researcher interaction had in the action research process, the way a unified understanding of PCs was arrived at, a process model of PC development, and the implications for including PCs in the Science curriculum.

13.0 THE CRITICAL ROLE OF THE TEACHER-RESEARCHER INTERACTION

The collaboration between the teachers and researcher enabled both parties to be involved in developing an understanding about PCs and identifying practical strategies for improvement. The researcher co-ordinated and structured the research, stimulating action, observing practice, promoting reflective discourse, preparing materials and analysing findings. Their liaison was fundamental to ensuring that progress was rooted in classroom practice, and that progress had been critically considered through reflection. The researcher prompted the analysis of superficial thoughts to provide greater explanation, exemplification and objectivity of perceptions and experiences. The researcher also encouraged objectivity.

One benefit of this approach was teachers' professional development (ref. Chapter 12). It was apparent that all teachers required the researcher's facilitation and support to undertake, reflect on and analyse practice, even in the cases involving more than one teacher. It is of interest why teachers, who were motivated to participate the study, required such a high degree of support to progress. It might relate to their lack of understanding or incentive, or the essential need for personal collaboration and facilitation.

Also of interest was the fact teachers only superficially reflected on and questioned the researcher's suggestions. The PC framework and interventions were accepted with limited debate. There was a teacher consensus that the capabilities adequately represented personal effectiveness, and the teachers were generally unquestioning of their nature or origin. Interventions were willingly accepted for trial, with some practical adaptation. However, teachers rarely questioned their underlying implications; no teacher independently considered PC assessment issues beyond its practical administration. They requested prepared strategies for implementation, in preference to personally developing or adapting the interventions, seemingly content to trial and verbally review their effectiveness. Some teachers felt unaware of, and somewhat unprepared for, the developmental nature of the study, expecting their role to be more of a passive trialer of materials, rather than a joint curriculum developer and reflective practitioner. Some teachers, notably those in Schools A, B and C, were particularly proactive in developing and reflecting on the research, beyond the facilitation of the researcher. These schools have continued to develop PCs well beyond the completion of the study.

13.0.1 Facilitation

The role of facilitation in the face of teachers' unquestioning attitude, prompt questions as to the quality of curriculum development in schools. With the government's increasing emphasis on encouraging teachers to engage in classroom-based research and professional development opportunities (DfEE 2001), there is an expectation that more teachers will engage in self-initiated curriculum development. It is worth asking whether teachers will require significant levels of facilitation for success to be achieved if well-motivated teachers in this study, many of whom held positions of responsibility, displayed an uncritical approach to the assumptions of the study, unless these were drawn to their attention by the researcher. Their commitment was sustained, in most cases, for extended periods of time; however, often, consideration of its impact focused mainly on the immediate classroom activity or individual student impact, with less consideration of the underpinning issues.

Cooper (1993) found this to be a usual response when gathering participants' perceptions of teaching and learning in classrooms. This suggests that researchers should acknowledge that, although wanting teachers to share their understanding and experience, the process places additional demands on them. He considered that:

> Whilst sense-making processes are central to teachers' and pupils' normal activities, the articulation of these processes is far more important to the researcher than the teacher or pupil. Furthermore, this articulation process is both demanding, owing to its difficulty, and potentially threatening to those concerned with possible weaknesses in their thinking. (Cooper 1993: 325)

Maybe without the assistance of facilitators, teachers would become only superficially involved in a developmental reflective process, possibly lacking exploration of the underlying assumptions and implications of their research. This implies that teachers should receive facilitation, mentoring and support to engage more fully in reflection-in and –on practice (Schon 1983). Whether facilitation is provided from other teachers, or from external research support is for debate. However, Cooper also endorses the role of the facilitator in stimulating the participants to recall and describe experiences which are prominent to their memories – what he terms 'the surface features'. Further questioning and elaboration leads the research participant into generating more detailed accounts of their underlying beliefs, feelings and understandings, related to the experience. It was this latter process that proved the most crucial outcome of the teacher-researcher partnership in this study.

> The intention of this approach is to ensure that interviewees' accounts are grounded in their perceptions of the actual events of lessons. Where the interviewees do make generalised remarks, the researcher requests exemplification. It is, therefore, possible to distinguish between responses that are so grounded and those which are generalised... [The] second level of questioning may be, for the subject, of a higher magnitude of difficulty, in the sense that the subject is being asked to recall aspects of the situation which may or may not have been consciously considered at the time. (Cooper 1993: 329-330)

13.0.2 Reflection

The role of reflection during action research is reflected in Grundy's (1982) description of technical, practical and emancipatory models of action research, which vary in the level of evaluation and critical reflection invested in the activity. When applied to this study, the models suggest that teachers' actions, when independent of the researcher, related mostly to 'technical' action research. They engaged in reflection on immediate or pressing problems, seeking to deliver more efficient practice, focusing mainly on developing pedagogical strategies and skills for PC development. Golby and Appleby

(1995) recognised this to be a usual response from teachers, who generally do not readily, or independently confront their problems with a reflective approach, but place more emphasis on reducing the complexity of their immediate situations.

Kershner (1999: 426) suggested that finding out 'what happens' and 'what works' in school is, in itself, a powerful source of knowledge, and that these processes should not be belittled. Opportunities should be provided for teachers to become more aware of phenomena in their classroom. Most crucially, the benefit arises from encouraging and assisting teachers to move away from the mere evaluation of practice, focused mainly on solving problems, toward engaging in systematic and purposeful reflection on their work. It is hoped that change will result from more meaningful reflective processes. Such focused attitudes towards critical reflection typify Grundy's (1982) emancipatory model of action-research, which involves planning, acting, observing, reflecting and critiquing teaching and learning processes. Brooker and MacPherson (1999: 210) also consider this to be a means of extending descriptive evidence, and a way of capitalising on classroom experience.

> Action research... can be little more than a systematic way of getting things done with scant, if any, attention to its emancipatory possibilities (Kemmis 1994). If practitioner research seeks to be an example of emancipatory action research, it must have a critical edge (Aspland et al 1996) that places the research in a context and takes the reporting of its outcomes beyond the level of description.

It was evident in this study that reflection on the study was limited and that little progress was made where meetings were irregular. It is possible, however, that teachers viewed reflection and their action-planning to be dependent on the researcher's intervention, suspending action until the collaborative partnership.

The benefits of encouraging reflective attitudes are described by Lietch and Day (2000), who found that reflective practice has increasingly been recognised as essential to good teaching. Firstly, they suggest that without the capacity to evaluate assumptions about teaching and learning, teachers will increasingly become 'prisoners of their programs', thereby lacking the opportunity to deliberate between competing versions of good practice. Secondly, they view reflective practice as a means by which individuals can be helped to improve their self-knowledge, hence contributing to their professional understanding and development. Lastly, they consider reflection to be a central process of teachers' growth as inquirers. When undertaken collaboratively, this can generate knowledge about practice, rather than teachers being mere implementers of existing theory in practice.

Berliner (1987) recognised the integral role of reflection in professional development, suggesting that 'personal experience that is reflected on and examined, in order to derive ways to improve one's own performance, is a very valuable teacher' (ibid: 60). The motivation to learn in this way is what Berliner considers to distinguish novice and expert teachers, and he does not view experience to be an automatic precursor to expertise, unless assisted by reflection (ref. section 9.3.3, 10.2.11, Chapter 12).

13.0.3 School Culture

Within the current educational climate, the drive to raise academic standards dominates the majority of government-led curriculum initiatives, and this has led school culture and teacher pedagogy to focus heavily on achievement in these areas (ref. Chapter 2). The place for teacher-led curriculum development has, until recently, been limited. Despite its interest in the potential of sharing good practice and expertise, this study queries how, in a culture which focuses predominantly on academic standards, curriculum development can utilise action-research to influence practice in terms of students' PC development. What importance will PC development have in a culture where knowledge and fact-retention is of such importance? What importance will teachers' involvement in action-research have in an increasingly prescriptive learning environment?

It is useful to note the features of professional development which the DfEE (2001: 13) suggest are 'most likely to lead to successful changes in teachers' practice', and to consider the implications of these for action-research in schools and the wider dissemination of PC development initiatives. They suggest that change is likely to occur as follows:

- 'Where teachers are receptive to change, particularly because they believe it will help their pupils' learning.
- Where development involves:
    - a focus upon specific teaching and learning problems
    - opportunities for teachers to reflect on what they know and do already
    - opportunities for teachers to understand the rationale behind new ideas and approaches; to see theory demonstrated in practice; to be exposed to new expertise
    - sustained opportunities to experiment with new ideas and approaches, so that teachers can work out their implications for their own subject, pupils, school and community,
    - opportunities for teachers to put their own interpretation of new strategies and ideas to work, building on their existing knowledge and skills
    - coaching and feedback on their professional practice over a period of weeks and months. This is a particularly important element, and can be decisive in determining whether changes in practice survive.
- Where teachers are supported, by their head teachers or heads of departments, and by participation in wider teacher networks.'

Interestingly, teacher beliefs, reflection, experimentation, interpretation, coaching and support are integral to these suggestions, and reflect those features considered of significance in this study.

In terms of developing PCs in schools, this study has shown that teachers benefit from sharing their perspectives, endorsing the value and pertinence of PCs. In the short term, this is a means of enhancing learning, and in the longer term, as enhancing necessary skills and characteristics for success in life. Where teachers and managers held such views, the study found there were improved opportunities for action-research and for embracing PCs alongside subject knowledge (ref. School C). In some cases teachers played a pivotal role in affecting practice, irrespective of departmental, school culture or support, due to their personal interests and beliefs (ref. Schools A, B and F). Benefit may ensue from encouraging a school-wide learning environment, with time allocated in the curriculum to allow teachers to engage in action-research.

13.0.4 Influencing factors

Although the teachers reacted well to the researchers' suggestions, and mostly sustained their efforts, various factors influenced their attitudes and actions. It could be argued that these teachers 'should' already have considered the implications of their approaches to students' personal development, and 'should' already have facilitated improvement. However, irrespective of strong personal philosophies or dedication to students' improvement, teachers were influenced by the current culture of curriculum development in schools, levels of teachers' understanding of the area of work, attitudes and motivations towards change and incentives to progress. The likely impact of these factors in different contexts cannot wholly be predicted, but consideration of them will be of benefit to the integration and sustainability of curriculum development in schools.

13.0.4.1 Teachers' motivation

Teachers' willingness to trial new approaches relates to their readiness to take risks, a feature considered indicative of effective leadership, and identified in high quality or expert teachers (HayMcBer 2000, Bevins 2000). For most teachers, motivation towards the study was sustained by their interactions with the researcher, and a sense of responsibility towards the wider research group. Where teachers were involved in a collaborative process, they were increasingly open to adapting practice, and trialing interventions, as long as this was rewarded by improved student performance. Teachers seemingly felt justified to take risks when working within the remits of the study.

[Interview 78: 12.12.01]
38: Jayne: ... I probably tried more group work than I'd normally do for maths and we used the PCs to try different teaching styles, in order for the students to have the opportunities to test their PCs... it was more active than it would probably be, ... involvement in the project changed teaching styles to some degree... and then PCs also made me change the Maths as well.

[Final Evaluation, A3]
The weight carried by the University backing the pupils' work also gave credence to what was being suggested they do. It wasn't just me saying they should work like this.

It is questionable to what extent motivation can be stimulated and sustained in the intensive activity of action research if a researcher is not an active collaborator. It is undoubted that the researcher's intervention in this study engendered and complemented teachers' motivation, and impacted positively on their commitment. Cooper (1993) suggests that this can result partly from researchers offering insight into classroom life, which is normally outside of the teacher's field of awareness, or from them offering particular areas of expertise. This study found that teachers' motivation benefited from facilitation and reflection, and was a necessary precursor to change, influenced heavily by personal philosophy, school culture and external influences. Once change was embedded, however, teachers required less facilitation to sustain motivation.

It is concerning that irrespective of their personal philosophies or motivations, teachers, who later proved to be highly committed, required a stimulus to react to, what they claimed to be, their inherent beliefs. It is suggested that where PC, or other initiatives, are to be disseminated that similar facilitation may be required, however this may be available to a considerable extent within the school or by colleagues.

13.0.4.2 Understanding

Along with practical support, teachers also benefited from regular one-to-one and larger meetings, where the research was discussed, for example in terms of wider contexts, and on-going developments in understanding PC development. It was apparent that teachers valued the opportunity to acquire understanding about the nature of PCs, the interventions and the associated assumptions. This proved not to be an essential feature of the work, given teachers predominant concerns with practical materials and classroom resources.

The DfEE (2001) highlighted similar findings, suggesting that teachers' desires to explore underpinning research were generally overridden by the need for classroom resources and support. They noted that experiences of Continued Professional Development (CPD) were mainly one-off events or short courses, often away from the school, of variable quality and relevance, or delivered by a range of external providers. They reported that what teachers saw as high quality CPD, was focused training on specific skill areas, underpinned by excellent teaching materials, and direct support in the classroom.

These perceptions, may themselves, relate to school culture focusing on initiating change efficiently and effectively, as in recently introduced educational initiatives, e.g. the National Literacy (DfEE 1998b) and National Numeracy (DfEE 1999c) strategies, where teachers have been increasingly expected to deliver prescribed syllabuses, with limited deviation and adaptation. It is possible that teachers in this study compiled unquestioningly with the research, not requesting in-depth understanding of the area of work, because they were more used to receiving and delivering initiatives, not to constructing and influencing their development. Everton *et al*'s (2000) research endorses this finding, reporting that for many teachers the main concern is to enhance their subject knowledge, such that many in-service courses have emphasised content rather than process. They referred to the work of Woods *et al* (1997: 60), which suggests that the nature of teaching is increasingly a technical activity, with the majority of teachers accommodating, concurring and allowing changes to impinge upon them.

This study leads to queries about whether curriculum development can effectively take place when teachers only have limited understanding of an area of work.

13.0.4.3 <u>Incentives</u>

The notion of teacher incentives is crucial to their involvement in action research, and relates to the issues described above. What are the current incentives for teachers to introduce and sustain change in curriculum delivery?

What factors may prove influential in disseminating the PCs initiatives? What factors prove influential in involving teachers in action research?

Teachers' biggest incentive was the payoff and reward from the research process itself, in terms of improved student-teacher relationships, student behaviour, student self-awareness, professional development etc. that ensued. Ultimately, however, all teachers remained overwhelmingly concerned with the implications of the research for students' academic achievement, still driven mainly by academic standards. One incentive was the impact or influence the study had on students' academic scores, and where this was viewed positively, teachers maintained a commitment to the work.

For teachers to experiment with new approaches, they required achievement-related incentives and support. This study suggests that in order for teachers to more readily become involved in curriculum development, management structures, and ultimately government policy, innovation within the curriculum should be encouraged. Indeed, the CPD Review (DfEE 2001) has already recognised such opportunities, providing financial incentives in 'Best Practice Research Scholarships', 'Individual Learning Accounts', 'Professional Bursaries' etc. Such developments are welcome. However, continued assessment, curriculum and standards pressures compete for teachers' time and motivation. This study questions the position of PC-related curriculum development, given its non-statutory nature. It could be overlooked by a range of assessment-driven and statutory areas for improvement. The incentives for teachers to engage in long-term development in this area, may be best achieved if supported by government policy – an optimistic, yet necessary precursor to large-scale dissemination.

13.0.4.4 Implications

The development of PCs has been shown in this study to be as dependent on teachers' motivation, understanding and philosophy, as on the school culture and incentives within the systems. Where PCs are to be targeted areas of development within the curriculum, training and facilitation are of particular importance. The provision of materials and collaboration with others has supported this process, as has providing resources that teachers can readily access.

Training teachers in PC development, and guiding and assisting them to tailor interventions to their contexts, is expensive and time consuming. Encouraging teachers to reflect on practice, taking the role of action-researchers and reflective practitioners, can help them gain ownership and understanding of different aspects of the teaching and learning processes. This study suggests that it is of benefit for teachers to be involved in curriculum development, with opportunities to engage in collaborative activities focused on personal interests and beliefs. In this study the process was enhanced where teachers developed and tailored resources, gaining proficiency and confidence in the use of PCs.

For future dissemination, teachers are likely to initially require support or incentives, either facilitatory or financial. Where development work is supported by management, or through policy, more teachers will have access to such opportunities.

13.0.5 Summary

The role of the teacher in PC curriculum development is influenced by a range of factors which have bearing on the way in which it can be integrated into practice, and how teacher-researcher interaction can facilitate progress. The findings of this study suggest that teachers can benefit greatly in terms of their professional development when involved in curriculum innovation, although a considerable level of support is required from facilitators. In order for PC development to be integral to curriculum delivery, schools, and ultimately educational policy makers, will need to:

- support and facilitate teachers to engage in the process of action research
- encourage reflective and collaborative partnerships between teachers, researchers and facilitators, so that they realise their personal philosophies, and recognise their influence in the classroom
- influence school culture to encourage curriculum innovation, moving beyond the exploration of statutory components of policy and curriculum

- provide incentives to motivate and encourage teachers to reflect on practice and curriculum delivery, and the influence that contemporary research can have on improvement
- provide relevant, high quality training for teachers in the processes and knowledge associated with curriculum development, reflection and specific areas of interest, i.e. PC development
- monitor the quality of curriculum development, such that interventions are cost and time effective and represent the targeted purposes of development.

The findings also suggest that teachers will need to:

- consider and identify their personal motivations and understandings
- react positively to curriculum innovation, showing willingness to take risks, and trial new approaches
- reflect, independently and with others, on the nature and purpose of their teaching, and its areas for development
- find ways to address government policy whilst also addressing personal/school development interests
- engage in processes of action-research where possible, adopting the role of reflective practitioner
- seek out advice and training where necessary.

13.1 TOWARDS A UNIFIED UNDERSTANDING OF PCs

A second key issue to emerge from the study was the way in which teachers, and the researcher, arrived at a common understanding of PC development. It focuses on the relationship between theory and practice and how this resulted in a theory-driven, yet practically-orientated approach.

13.1.1 The teacher-researcher collaboration

Gaining a unified understanding of PCs, through the development of the behavioural framework (ref. Appendix A11), was an essential precursor to classroom activity. Reviewing literature provided a secure grounding for understanding, categorising and condensing the skills and characteristics that defined the PCs. Teachers and employers justified the relevance of PCs within educational and workplace environments, and ten PCs were found to sufficiently represent 'personal capability'. Collaboration between teachers and the researcher encouraged a 'user-friendly' attitude. Teachers, viewing the process from a classroom perspective, clarified and simplified terms to enable their direct application to teaching. The researcher, however, maintained a theory-driven emphasis when refining the framework. Further adaptation and condensation of the framework resulted from the application of PCs in teaching.

This collaboration resulted in the framework having both theoretical and practical emphases, and thus encouraged teachers' ownership and understanding of the work, and enabled the researcher to maintain consistency between the groups. Alternative approaches, such as the development of the PC framework and interventions solely by the researcher would have enabled research literature to be the main or sole influence on PC definitions in the classroom. Teachers might, in that situation have adopted a transmissive and evaluative role using pre-prepared materials and reporting on their impact and influence on students. The research would have been specific, under direction from the researcher, with limited flexibility for teachers' development or adaptation of materials. This approach might have limited teachers' sense of ownership and resulted in a less autonomous commitment to the study. Teachers' appreciation of the flexible and interactive nature of the research might have been hindered by this approach, possibly to the exclusion of their participation. The main advantage would, however, have stemmed from the improved consistency to PC definitions across the research schools.

In contrast, the research could have transferred full ownership for development to the teachers, with them identifying the desirable behavioural objectives and PC interventions. This approach might have enabled teachers to co-ordinate students' development in line with their personal beliefs and understandings, and to tailor activities to suit their individual purposes. From a research perspective, lack of consistency between schools would have limited the generalisability of outcomes and resulted in varied perceptions and understanding of the nature and definition of the PCs. The likelihood of utilising up-to-date research literature may have been far reduced. Everton *et al* (2000) indicate that practising teachers have limited access to recent research literature unless prompted in higher educational studies. The basis of the work might have stemmed mainly from teachers' personal beliefs. However, to its benefit, the approach might have encouraged teacher empowerment and control through professional engagement with a study. Lack of consistency and reliance on individuals' sole perceptions would be viewed as compromising the purposes and outcomes of this study.

The researcher's choice of a collaborative approach gave teachers' ownership during the development process through integrating their opinions, allowing them to input and differentiate approaches within a framework of development, and encouraging reflection and consideration of relevant issues and recent literature. Establishing common understandings of PCs encouraged a collaborative partnership, where teachers felt part of the development of the work, even though the researcher had overarching influence over the study's progress. Teachers' insights ensured the research and the researcher had a 'real-life' classroom perspective on a theoretical base.

13.1.2 The relationship between theory and practice

During the course of classroom research, the PC framework was a source of reference for teachers and students to consider, target, develop and assess individual or group needs. The choice of PC focus was fully dependent on the students' needs and the teachers' choice, and this resulted in two approaches to their selection. Teachers either:

1. identified a PC, i.e. teamwork, and focused teaching and learning on providing opportunities to develop it over a period of time, or,
2. chose PC behaviours which suited the regular delivery of lessons on an on-going basis, thereby adopting a general approach to development, targeting different PC areas at different times.

Either approach was acceptable to the researcher, who sought to gain understanding from the teachers' use and application of PCs in classroom contexts. Encouraging teachers to work regularly with the materials was of utmost importance, and was facilitated by the flexibility of the research design. Allowing teachers to use strategies that suited their teaching styles, and their students' needs, was of paramount importance in ensuring regular and sustained use of materials. If this were not the case, teachers might not have been so readily involved in the study.

Consequently, teachers targeted some PCs more often than others, i.e. teamwork, verbal communication, self-image and self-management. PCs such as social intelligence, critical thinking, tenacity and self-motivation, received more limited attention. The relationship between theory and practice questions the extent to which theoretical research can influence pragmatic curriculum development.

This study drew on theory from a broad range of fields (ref. Chapters 2, 3, 4), giving the researcher and teachers a base from which to develop interventions and materials. Similarly, theory significantly assisted the interpretation and analysis of findings and played a crucial role in the design and interpretation of the research, although its classroom applications were less direct.

In order to integrate PCs into regular teaching, teachers required easily accessible, and clear-cut strategies for implementation. They were keen to ensure that the PC interventions were concise, yet theoretically underpinned. They consciously refined and condensed the research activities to slot easily and quickly into classroom teaching. Strong preference was given to 'off-the-shelf' activities, as opposed to constructing or developing strategies themselves. Although encouraged to do so, few teachers were keen to reflect on theory-based literature, seeing this as the researcher's role rather than their own.

The application of theory to practice within curriculum development is sparsely addressed within the literature. Desforges (2000) summarises what teachers claim to want and need from research, reinforcing the attitudes and actions of the teachers in this study, who wanted, felt they needed, and gave precedence to:

1. standard and stable models of learning
2. coherent, organised, well established findings
3. vibrant working examples of success
4. research results converted as far as possible into the technologies of education – into curriculum or other pedagogic materials.

(*adapted from* Desforges 2000:2)

Teachers were too apprehensive towards deviating from the norm to trial more innovative approaches to curriculum delivery, e.g. extended projects (School C only). This stemmed from the limited time they had to plan, deliver and monitor the NC and other curriculum initiatives. Everton *et al* (2000) also found that NC pressures negatively influence teachers' consideration and reaction towards theoretical research findings, noting that teachers mainly engaged with up-to-date literature in official publications, newspapers and on training courses.

The researcher provided an external, theory-driven perspective in this study. The approaches were grounded in theory, but also represented practical and effective PC development in the classroom. Teachers encouraged a pragmatic interpretation of theory, focusing firmly on student-focused language and enhancing the ease of delivery of interventions for use within a subject curriculum context.

This pragmatic emphasis led the PC behavioural framework to consist of the most pertinent aspects of each capability. For instance, although appreciating verbal communication skills are influenced by non-verbal aspects of body language, intonation, and eye contact (ref. section 5.5), these were not specified within the framework, where precedence was given to the need to share, listen and justify opinions. Where they had time to do so, some teachers introduced these aspects through specifically designed activities, demonstrations and discussions (ref. School B).

An example of how research literature contributed to the final use of the PC behaviours in a classroom setting is illustrated in Table 13.1.2. Garrett &

Satterly's (1990) identification of four operational processes to solve problems is related to the PC objectives and presented in positively phrased, student-centred language. For younger children or those with particular learning difficulties, these objectives were clarified further.

Garrett & Satterly (1990)	PC objectives	Simplified PC objectives
• **clarifying the problem** – where the individual identifies as clearly as possible what is to be investigated	• to find out what the problem is really about • to use what is known or found out to move on • to consider other interpretations of a problem	• to sort out what the problem is really about • to use what we've already found out to help us
• **formulating a hypothesis** - enabling consideration and elaboration of possible strategies, highlighting the most viable solutions	• to predict strategies that might work	• to think of strategies that might work
• **testing the hypothesis** – systematically gathering information, avoiding trial and error approaches	• to investigate a problem to find a reasonable solution • to avoid jumping to conclusions • to use feedback to move on	• to look into the problem to find a solution • to think about other peoples' ideas to avoid jumping to conclusions • to listen to what others tell me about solving the problem
• **analysis of results** – undertaken in view of the context and other influential conditions in order to rationalise and validate the solution.	• to draw understanding from what has been found • to apply knowledge and understanding to other areas	• to find out what has happened • to find out why something has happened • to use what I've found out in other things

Table 13.1.2: ***The theory-practice relationship in PC framework development***

This encouraged teachers to consider theory-driven approaches in light of their practice and personal understandings, which proved to be a strength of the study. The teacher-researcher partnerships benefit from a theory-practice association, and led to broader questions of whether pedagogic change, is best stimulated when teachers are able to make informed choices in a research process, and whether shared expertise between a researcher and teacher improves the curriculum development process.

This study suggests that although noteworthy benefit was achieved from teachers' exposure to theory and expertise, their choices were significantly influenced by the practical limitations and opportunities within NC subject delivery. Most impact stemmed from co-ordinated reflective discussions with teachers, colleagues and the researcher. Independent reflection on theory was less frequently undertaken, which suggests, that where curriculum development aims to adopt a theory-practice relationship, a facilitated reflection process may be of increased value.

Teacher engagement: Everton *et al* (2000: 179) associated teachers' apprehension towards engaging fully with research theory with their emotional commitment to teaching, suggesting that:

> Because the notion of 'evidence-based practice' has the potential to challenge, not only one's personal beliefs about 'being a teacher', but also to threaten one's sense of solidarity with the school and the wider professional community, it may require considerable emotional adjustment on the part of the teacher before research findings based on other colleagues practice in other schools can be applied to one's own situation.

It is possible that some teachers in this study dismissed research theory, viewing it as questioning their pedagogic choices, feeling intimidated by what they perceived to be the 'proven' or 'chosen' teaching approaches. Deferring blame to external factors, e.g. student behaviour, management support etc. (ref. School D), or unenthusiastic responses to classroom observation (ref. School E), may have stemmed from such feelings of unease or insecurity. Ultimately, for theory to have a secure place within action research, teachers require confidence to honestly and objectively reflect on their circumstances, and to have the emotional stability to endure any crisis of confidence that may ensue from reflection on it. The role of the researcher may be pertinent in easing apprehensions, and confirming the utility of current practice.

13.1.3 Summary

This study suggests that it is beneficial to have a facilitated process by which teachers and researchers are brought together, to review and reflect on theory and practice. This process has encouraged shared understandings, resulting in theory-driven and practically-feasible methods. Arriving at a consensus may, however, as shown here, result in a limited or condensed version of theory having direct application to classroom pedagogy. Where this appears to be the case, teachers and researchers benefit from collaboratively considering the purpose and application of the research, and reviewing the utility of its outcomes. Providing opportunities to involve teachers in the developmental process, encouraging them to reflect and raise their understanding of the underpinning concepts, further benefits their sense of ownership and contributes to their professional development.

The PC framework provided a good basis for students' overall development, however further exploration of each capability would be of benefit and enable additional differentiation of approach, and more comprehensive application of capability-specific theory in practice. Dedicating additional time within, or external to the curriculum benefits teachers through improved opportunities to reflect on theory, its applications to practice, and to overcome possible apprehensions towards their integration.

This study suggests that for educational research to be effective, schools, and ultimately educational policy makers, will need to:

- openly endorse and provide opportunities for teacher-researcher partnerships
- champion and disseminate the findings of educational-based curriculum development.

Teachers will need to:

- find opportunities to engage in, and learn from the trialing of interventions, approaches and strategies aimed at student improvement
- maintain commitment and engagement with curriculum development, overcoming, where possible, curriculum, financial or time constraints
- seek out, consider and establish, links between educational literature in relation to teaching practices
- be willing to persevere with action research, with or without the support and involvement of educational researchers.

As significantly, researchers will be required to take an active role in:

- forming closer links with teachers to establish stronger links between educational theory and classroom practice

- providing support and working collaboratively to promote the use of educational theory in curriculum development
- being open-minded to change required for theory to be effectively utilised in classroom settings
- assisting teachers in the analysis of findings, facilitating evidence-based outcomes
- addressing issues in educational research, which teachers are concerned about in practice.

13.2 THE PROCESS OF CHANGE

Understanding of the 'teaching', 'learning' and 'development' of students' PCs was gained as the study progressed. Opportunities for students to practice and display particular behaviours were stimulated by explicitly recognising, teaching and monitoring PC development. The study's findings suggest that inherent in these adapted learning approaches were a number of processes underpinning students' and teachers' actions. The processes are influenced by the: school or classroom contexts; individuals' philosophy; level of facilitation. PC development resulted from the interaction of knowledge development, self-assessment, action planning, action and reflection. A proposed model of PC development (ref. Figure 13.2) suggests the nature and relationship of these processes, which are discussed below.

The findings suggest that the processes are developmental and on-going. Individuals initiating PC development demonstrate behaviours, such as those outlined in the behavioural framework, less frequently, although they may hold the potential to do so. Greater proficiency results from a proactive approach to using knowledge, self-assessments, action plans, and actions, to target and improve PCs. Belief in personal potential is significant in engaging in and facilitating processes of PC development, which rely on the commitment and self-motivation by those involved.

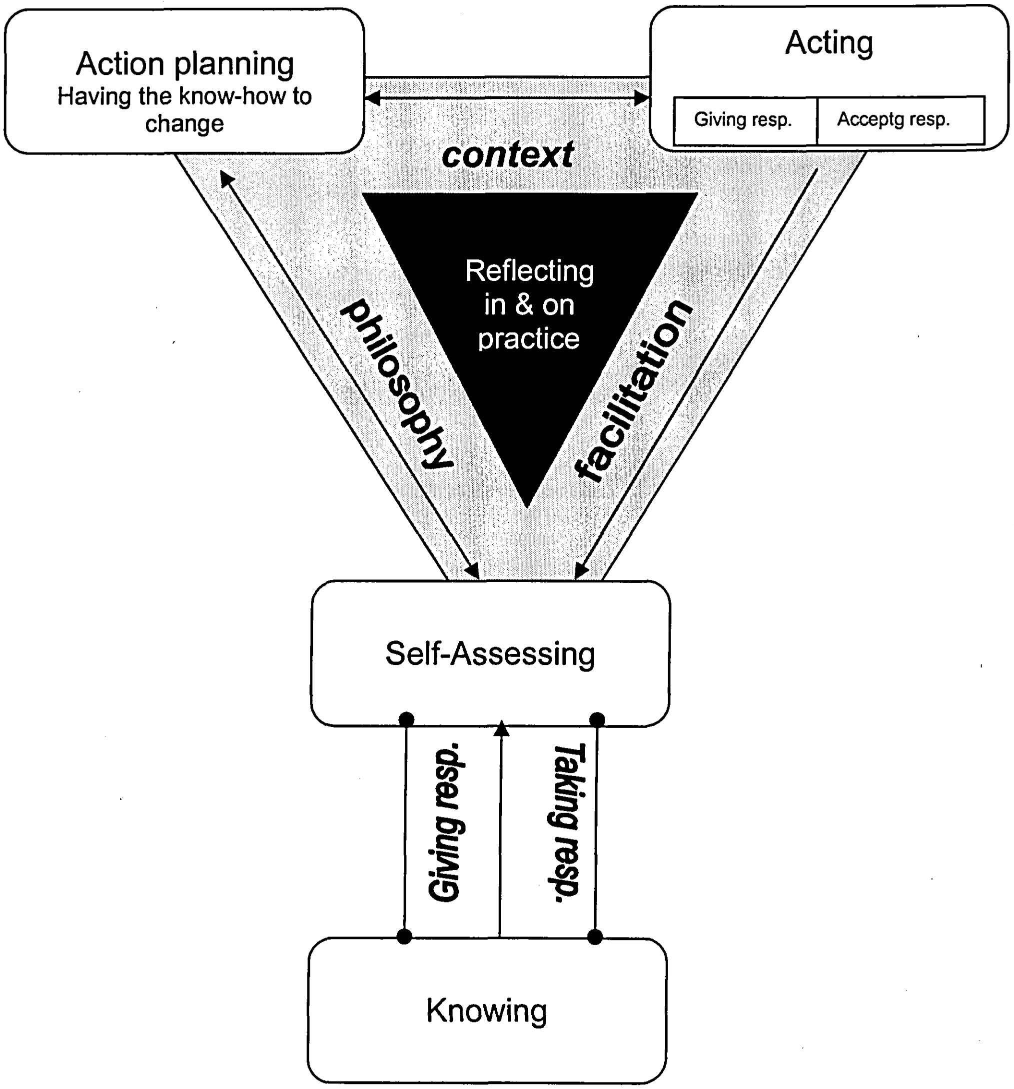


Figure 13.2: The Process Model of PC development

13.2.1 The Process Model of PC development

The process model (Figure 13.2) was derived from the analysis of teacher and student activities. It simplifies and gives commonality to the wide range of activities undertaken, and represents a model of developmental processes. The researcher, however, continues to question:

- whether these processes fully represent the range of activity that was, or must be, undertaken to improve personal capability
- in what ways, and to what extent, the processes were affected by the influence of context, philosophy and facilitation
- the sequential or cyclical nature of the model.

The model is pivotally dependent on whether individuals fully engage in PC development, adopt personal responsibility for improvement and:

- are capable of change
- want to change
- view it as personally relevant to change.

13.2.1.1 Knowing

Gaining knowledge of the purpose and nature of PCs seems crucial to understanding 'what' and 'why' PCs are being developed. Various strategies were used to teach students about PCs, through their explicit recognition in subject learning, using the behavioural framework, incorporating them into learning outcomes, and developing specific activities for target setting and demonstration (ref. sections 7.3.2, 10.2.4). These strategies prompt the questions 'What's this all about?' and 'Does it affect me?', raising awareness and understanding of the meaning and application of PCs in, and to everyday contexts.

Establishing and knowing what is expected from PC development is a key aspect of the process, providing individuals with the necessary knowledge to take responsibility for improvement. It encourages a self-directed approach to development, where knowing stimulates self-reflection and self-assessment.

Collaboration and facilitation from others assisted, endorsed and supported the development of knowledge. This development was dependent on teaching and learning contexts which facilitated autonomy, and relied less heavily on highly prescriptive or directed teaching approaches.

Knowledge is considered a prerequisite of improvement and it is questionable whether the individuals can effectively undertake such processes without sufficient knowledge about PCs, and their relevance to, and influence on short-term and longer-term development. Where knowledge gives power to progress, lack of knowledge may result in either 'doing it, but doing it badly' or 'not doing it at all'. Undertaking PC development with little understanding of its purpose or relevance may result in a highly mechanistic approach, where processes are undertaken with limited learning and personal commitment (ref. School G). In contrast, knowing about PC development encourages individuals to:

- be aware and conscious of improvement
- consider their relevance
- realise development is cyclical and progressive
- be equipped for ongoing commitment through increased engagement.

13.2.1.2 <u>Self-assessing</u>

Self-assessment encourages students to consider 'What can I do?' and 'What can't I do?', drawing on their improving knowledge of PCs and their related behaviours, to question 'How does what I know of PCs relate to me and my actions?'. This introspective assessment of PCs requires an honest approach, stemming from a commitment to personal improvement. Various strategies were used to encourage this, involving discussion-based activities between peers, parents and teachers, scoring techniques and quizzes. All methods provided indications, and raised awareness of individuals' capabilities, by encouraging consideration of PCs in everyday activity.

Self-assessment is viewed predominantly as a monitoring and learning-tool, as opposed to a summative grading technique. The outcomes of self-assessment are twofold:

1. *Target-setting* - as a stimulus for PC improvement
2. *Evidence-gathering* – as a recording and monitoring strategy enabling the assessment of progress in PC development.

Individuals varied in their ability to self-assess and to provide evidence of improvement, although this improved with experience. Facilitation improved commitment to the task and enhanced the quality of descriptive evidence, however, the validity of these assessments also required consideration. Relying on individuals' honest representations of themselves prompts questions about whether they are able to make effective personal judgements and whether teachers' views make useful comparisons. Effective self-assessment presupposes that students are not influenced by what is perceived to be 'good' practice, and do not contrive evidence to suit the assessment. The development of personal profiling tools (ref. section 14.2.3) indicates that student and teacher assessments have high correlation, suggesting that students generally provide realistic assessments of themselves. It is important to recognise these issues and to maintain that assessment of PCs remains 'assessment for learning'.

13.2.1.3 Action planning

Action planning encourages individuals to map out strategies for improvement based on their identified targets, and stimulates questions of 'How can I improve?' and 'Do I have the know-how to change?'. It relies on a basic understanding of methods and strategies to enhance PC development. In some case studies this was assisted by the use of GRASP (ref. sections 7.3.2, 10.2.8), and was influenced by the specificity of chosen targets. Where targets focused on particular behaviours, e.g. 'to justify my opinions during discussions' more direct application, with limited action planning, was required, whilst broader targets, such as 'to have respect for myself', posed more difficulty. Individuals benefited from explanation, role-modelling and demonstrations on these occasions, where scenarios illustrated practical actions aimed at improvement.

Ideally, action planning transforms PC targets into practically-orientated strategies to be practised and improved through regular commitment to action. It benefited from reflection, which encouraged plans to directly address what and how improvement is to take place. If appropriate, action plans may also draw on the expertise and support of others.

The action planning process would benefit from further research. This might catalogue strategies, techniques or activities which prove useful in developing focused action plans. Difficulties mainly related to individuals having the 'know-how' and strategies to affect change, although knowing about development and recognising areas for improvement, teachers and students experienced difficulties planning for change - knowing how to practically influence improvement. GRASP proved useful in facilitating the:

- clarification of purpose
- identification of expected outcomes
- consideration a range of possible strategies
- identification of the most appropriate course of action
- monitoring, controlling and reviewing of progress.

This process encouraged a focused approach to considering and identifying methods of improvement, although further insights would be of benefit.

13.2.1.4 Acting

Action requires individuals to consider, 'Am I doing what I planned to do?' and 'Am I changing my behaviour effectively?'.

Action provides a platform to practice, evidence and develop PC behaviours, stimulating further improvement through a cyclical process of undertaking, monitoring and control of performance. Learning from action, in this way, is fundamental to improvement. It affects further self-assessments and action plans, and contributes to knowing about development and its integral features.

Taking action relies heavily on personal commitment, and individuals cannot be forced to change. Although facilitation and context play important roles in providing and stimulating opportunities, action relies on individuals' willingness and self-motivation. To some extent this process can be viewed as pivotal to longer-term development, and relies on individuals' personal philosophy and volition.

13.2.1.4 Reflecting

The processes of knowing, self-assessing, action planning, and acting are influenced by reflection, which informs individuals of their progress, and influences future actions. Reflection in this model provides insights into development, such that individuals engage in a learning process which is relevant and tailored to their needs, understandings and actions. Reflection-in and –on-action are well-recognised features of developmental processes, aimed at promoting and encouraging the role of reflective practitioners (Schon 1983).

Reflection-in-action encouraged individuals to consider 'How am I getting on?', 'What will help me improve now?' or 'How can I help myself now?' This stimulated individuals to think about their actions during activities, promoting responsiveness to improvement. Reflection-in-action related primarily to the 'process' of activity, whilst reflection-on-action focused on the retrospective evaluation on a product or outcome. Reflection-on-action questioned 'How have things gone?' 'Did they go well, and why?, 'How could it have been improved?', 'What have we learnt for next time?'. In this study, reflection-on-action was the main source of evidence. It was facilitated in collaborative settings.

Reflection was influenced by three factors: individuals' philosophy, the context for development, the degree of facilitation provided.

Individuals' personal philosophies were relevant in that they reflected on what they believed was appropriate to them. Such beliefs influence peoples' perceptions of the nature of improvement and their willingness to take responsibility for development. An extreme example is an individual who believes it appropriate to use expletives when talking to their peers. As such, they may judge their actions, and those of others on this basis with their reflections reinforcing this belief. This study has shown that individuals who believe PC development to be of little relevance, will react accordingly and be less willing to take responsibility for improvement.

Context also influences the manner in which reflection-in or –on-action takes place. 'Context' refers to the factors which describe a social setting, and in this study referred to the dynamics of the classroom: the students; teachers; management; environment; etc. These factors necessitate consideration during reflection in order to appreciate the environmental influences on PC development and the implications for an individual's ability to affect change. Contexts which valued PCs, provided opportunities for engagement, learning and application of desirable behaviours, through less directive teaching styles, were more conducive. However, this approach may not suit all students, and the findings suggest differences between higher and lower ability students (ref. section 9.3.7).

Facilitation and support were identified as key influences on individuals' ability to reflect. Adopting a collaborative approach to reflection where a peer, teacher or the researcher prompted the reporting and analysis of perceptions. Such reflections benefited from increased specificity and objectivity. Facilitation ranged from one-to-one discussions to general group feedback, dependent on individuals' needs, also influenced by confidence, self-image and academic ability.

The process of reflection, with its relationship to participants' philosophies, contexts and facilitation, underpins PC improvement. It encourages a proactive developmental process that steers and influences self-assessment, action planning and action. Where reflection is not used as a tool for learning, it may have limited impact and merely provide a log of progress. Ultimately, the process model of PC development relies on a reflective learning cycle.

13.2.2 Concluding Statement

The processes for change were influenced by the teacher and students' roles, and the degree of responsibility adopted by the individuals. Where teachers provided opportunities for students to take responsibility for their work, drawing on and applying PCs, they better enabled actions and behaviours to be displayed. Where teaching environments were more limiting, providing students with less opportunity to practice PCs, their opportunity to address personal targets or action plans was restricted. Enabling students to take responsibility was a key feature in taking ownership for PC development and was influenced by context, philosophy and facilitation.

The findings suggest that PC development, in the ways described in this and other chapters, is most suited to an on-going developmental process. Dependent on their context, philosophy and facilitation, individuals can engage with the processes and improvement strategies at any stage in their development. According the process model, individuals engage in reflection, self-assessment, action planning and action, given a knowledge of the purpose, relevance and nature of PCs.

The study has illustrated that PC development is progressive and that it relates to the individuals and contexts. It can be defined by an overarching framework and represented by a process model.

13.3 PCs AND THE SCIENCE CURRICULUM

This study has shown that the Science curriculum can provide opportunities for PC development, although PCs are not considered to be subject-bound. Both subtle and major changes in classroom practice enabled teachers to explicitly value and regularly highlight strategies for students' PC improvement, however, longer-term integration and change may require more fundamental policy change.

Actively engaging students in learning through the use of practical tasks, project work, group work etc. was found to encourage students to practice and improve targeted areas of PC development. The practical nature of experimental and investigative science encouraged opportunities to develop PCs, such as teamwork, verbal communication, self-management etc. during the course of subject learning. In contrast to didactic teaching styles, these opportunities enabled Science learning to:

- be collaborative between students and the teacher
- be student-centred, focusing on personal and academic needs
- include more hands-on experiences
- promote discussion, target setting and self-assessment of PCs
- refer to more realistic or real-life contexts.

Although teachers experienced the challenges of limited time, heavily prescribed curricula and assessment pressures, their efforts indicated that the integration of PCs through the Science curriculum is feasible, given their motivation and support. Their experiences question the basic structures of the Science NC and the rigidity of its assessment frameworks. Encouragingly, however, recent moves by the QCA to introduce new assessment-for-learning tasks at KS2 and 3 may suggest a willingness to be more flexible.

Chapter 2 raised the concerns within the contemporary Science NC, indicating that teachers felt constrained by its overly prescriptive, fact-based, often inflexible and time constraining nature, its limiting impact on professional autonomy and the resulting decline in practical Science activities. These concerns were borne out in this study.

The findings suggest that in order for the processes and strategies for PC development to be utilised more widely, and to overcome the barriers identified above, a change in classroom practice and curriculum delivery is required. Such changes were triggered by the commitment and motivation of individual teachers or Science departments. More widespread change would benefit from supportive policy statements.

13.3.1 Is there a need for a change in policy?

The prescriptive nature of the Science curriculum concerned teachers, who experienced pressure to fulfil syllabus requirements within specified time frames, resulting in didactic and instructional teaching styles. The opportunity to change teachers' approaches relied mainly on their personal intent and volition to achieve syllabus aims, whilst integrating the PCs.

Teachers who were motivated to consider and revise their teaching styles and to trial research interventions, were successful in targeting and making progress with students' awareness and proficiency in PCs. Active teaching and learning styles were effective in promoting student-centred and collaborative learning opportunities and this was further enhanced and facilitated where teachers received departmental, management or researchers' support.

Teachers considered these changes to not only address PC development, but also to motivate students towards Science learning. Teachers described increased engagement with activities, improved classroom relationships, enhanced student commitment to tasks and improved self-esteem and behaviour. In one school (ref. School A), teachers considered that the approaches contributed to the improvement in Science test scores, whilst others valued the greater opportunity to differentiate Science teaching to students' needs.

The urgency or demand for policy to alter or limit Science curriculum content has not therefore been found in this study to be as significant as questioning the pedagogy used to deliver it. Despite concerns that its content is not sufficiently relevant and contemporary (Millar & Osborne 1998), the opportunities to develop PCs within the curriculum have been mainly dependent on the teaching and learning approaches used to deliver it. The time pressures, although mentioned in this study by the majority of teachers, were alleviated by removing structured timetabling arrangements to allow for increased flexibility within curriculum delivery (ref. School C).

The increased emphasis on active teaching and learning strategies, the integration of PCs and the flexible use of time are indicative of the use of project work. Case Study C suggests that project work provided a useful means of addressing curriculum requirements, and enhanced subject learning whilst targeting the development of students' PCs.

Ultimately, schools, departments, teachers and students were clearly aware of, and influenced by, the assessment structures imposed by government policy through national tests. Teaching approaches and departmental targets reflected the assessment-driven culture predominating classroom activity. In spite of teachers' personal or school philosophies endorsing the integration of generic skills and characteristics within the curriculum, assessment requirements still impacted strongly on teaching and learning in this study. Teachers valued working more flexibly within prescribed schemes of work and programmes of study, viewing the benefits in terms of professional development and student motivation.

The findings of this study reflect those found in others (Nott & Wellington 1999, Jenkins 2000a, b, Donnelly 2000a, b, c).

> ...the secondary school science curriculum of England and Wales is not seen as sufficiently flexible to allow teachers to respond to the needs their pupils. It is also seen as responsible for narrowing the range of practical activities that teachers feel they can undertake in the laboratory and for reducing pupils' enjoyment of scientific education. Such a science curriculum, buttressed by bureaucratic forms of accountability, is a science curriculum in difficulty. (Jenkins 2000a: 335)

These effects question the nature and purpose of national testing, its utility and impact on curriculum delivery and outcomes. Teachers in this study felt limited by imposed structures, and by the impact on teaching resulting from standard assessment tasks. The findings lead to a consideration of their necessity, frequency of use, and ensuing benefits, stimulating the following queries.

- What does the nature of national assessment tasks indicate about what is valued in teaching and learning outcomes?
- National assessment of the Science curriculum directs teaching towards the achievement of good tests results. Is it useful to grade successful teaching and learning? Do SATs mostly indicate students' ability to retain and reproduce facts, and teachers' ability to teach this?
- National assessment of the Science curriculum limits opportunities to focus on and develop students' PCs. Does it demonstrate to students the influence of PCs on their overall achievement and success, now and in the future?
- The teaching of NC Science leads to a depreciation in the relevance of its practical and investigative style, and limits students' collaborative work. To what extent will students have the opportunity to develop and improve their PCs within their subject learning?
- National assessment in the Science curriculum does not explicitly recognise features of learning. What implication does this have for addressing the identified skills gaps in employment?

These questions are broad and although they require further debate, this study has suggested that indeed national assessment structures impacts significantly on teaching, learning and curriculum development, to the extent that explicit recognition of PCs relies mainly on teachers' willingness to tailor their pedagogy. Although management support is favourable, it was rare in this study and only significantly evident in one school.

The study suggests that PC development would benefit from having equal importance with academic subjects. However, prompting policy change may require a staged process, where the value and influence of PC development is incrementally illustrated through a commitment to curriculum development, and a clear correlation with subject achievement. It would be useful to encourage policy makers to consider:

- endorsing the value and relevance of PCs within the Science curriculum
- acknowledging the processes and range of beneficial behaviours encompassed by PCs
- suggesting a better balance between the drive for academic standards and the focus on students' PC development
- encouraging further interest in curriculum development which targets the nature and development of PCs within the Science curriculum
- considering the implications of this study in wider subject arenas
- supporting further research into exploring a relationship between PC development and academic achievement.

Such changes will most likely require perseverance and commitment from the education sector. The challenge of addressing such issues is reflected in Donnelly's quote (2000c: 32), which indicates the difficulties in integrating PCs nationally.

> Approaches, both to teaching and to curricular specification, that might allow some space for individual engagement with science and its' teaching for both teachers and pupils, have a low priority within the centralised apparatus that has been devised... The potential for a personal and human(e) dimension within science education, always a delicate plant in the face of the authority and power of science, find little place in the National Curriculum, as it is experienced by teachers.

13.4 SUMMARY

This discussion highlights the pertinent issues and considerations emerging from the study, in developing an understanding of the nature and implications of students' PC development through the Science curriculum. It stimulates further debate as to how teachers can enhance the opportunity for improvement, and the processes of change which requires facilitation and support. The critical review of these issues indicates that, although, this study has broken new ground, providing examples of how PC development can be integrated into the Science curriculum, more research and critique will further develop its findings. Pertinent issues, such as assessment structures and teachers' roles and incentives, indicate that fundamental curriculum change may lie beyond the control of classroom practitioners, with implications for school management and policy makers.

CHAPTER 14

Conclusion

This chapter draws a conclusion to the issues raised in the thesis, highlighting opportunities for further work, and the main strengths and limitations of the study, closing with final remarks.

14.0 THE STUDY

The study's aims were successfully met, gaining an understanding of the teaching of PCs through the Science curriculum. It has offered an innovative approach to the development of PCs, demonstrating teachers' perceptions and experiences, to provide recommendations for pedagogy and practice. The understandings provide strong indications of the processes and strategies by which PC development can effectively be integrated into Science. The findings are not considered to be exhaustive or definitive, however set foundations for further work.

The ten generic PCs were applied to Science teaching in various ways. Operational definitions and materials to promote reflection and assessment aided their integration into busy classroom environments.

Although teachers' involvement was challenging and time-intensive, it was possible to encourage curriculum change by promoting reflection-in and on-action. Effective teacher-researcher partnerships and the action-research approach exploited opportunities for reflection. Although teachers were initially unquestioning of the underpinning aspects of the research, the collaborative process encouraged the consideration of relevant and pertinent issues.

Teachers benefited from support and training to stimulate change, which engendered an ethos of innovation, autonomy, and professional responsibility. Encouraging teachers' involvement in the differentiation of, and reflection on their teaching proved a significant process, although it required on-going facilitation and support from the researcher.

The transferability and application of this work into wider school settings may be influenced by external factors, such as teacher philosophy, national trends in educational reform, and academic assessment requirements, although these should not be viewed as fundamentally limiting. The enthusiasm of the teachers in this study, driven by their commitment to students' overall development, illustrates how these potential constraints are not insurmountable.

14.1 CONTRIBUTION TO KNOWLEDGE

The original contribution to knowledge has arisen from:

- exploring how an action research intervention can motivate change and contribute to teachers' professional development
- exploring the debate generated amongst teachers, educators and employers about the role of subject teachers in the development of students' PCs
- a clearer understanding of the role and value of the PCs within the subject curriculum
- generating operational definitions for the application of PCs within the subject curriculum
- a deeper understanding of teachers' experiences and perceptions of the development of PCs through the Science curriculum, by:
    - improved knowledge and understanding of the teachers' role in raising student awareness and understanding of PCs, by creating teaching and learning environments which effectively promote PC development
    - improved knowledge and understanding of the types of teaching and learning strategies that facilitate or inhibit the development of PCs
    - improved knowledge and understanding of methods by which to assess PC development
- a deeper understanding of the teacher's role in curriculum development and research, and the implications this has for them, the researcher and the research

To varying extents, the assumptions made at the inception of the study were borne out. The researcher assumed that students' PCs, enhanced through subject learning, could lead to more 'effective' learning. The findings have illustrated that focused intervention on developing PCs can positively contribute to students' learning and subject engagement. Where teachers integrated PCs into their teaching, students' awareness and understanding was enhanced, and this impacted on their behaviour and attitudes. Teachers considered the Science curriculum to be a viable means of regularly addressing students' self-awareness, self-assessment and understanding of PCs. The relevance of focusing more strongly on these areas relates to influencing youngsters' abilities from a young age, and endorsing the potential and relationship of personal and academic development. Ultimately, the aim is to influence learning in schools, to improve youngsters' potential, be it work- or life-related.

It was assumed that teachers had been steered towards 'delivering' content knowledge, with limited emphasis on personal development. Teachers and research literature supported this assumption. National testing and NC pressures often limited or restricted PC development through the subject. This is of concern when the value and significance of these skills is of increasing relevance for job recruitment, sustainability and success. However, encouragingly, when given opportunity, support and guidance, teachers succeeded in adapting curriculum provision to address these needs.

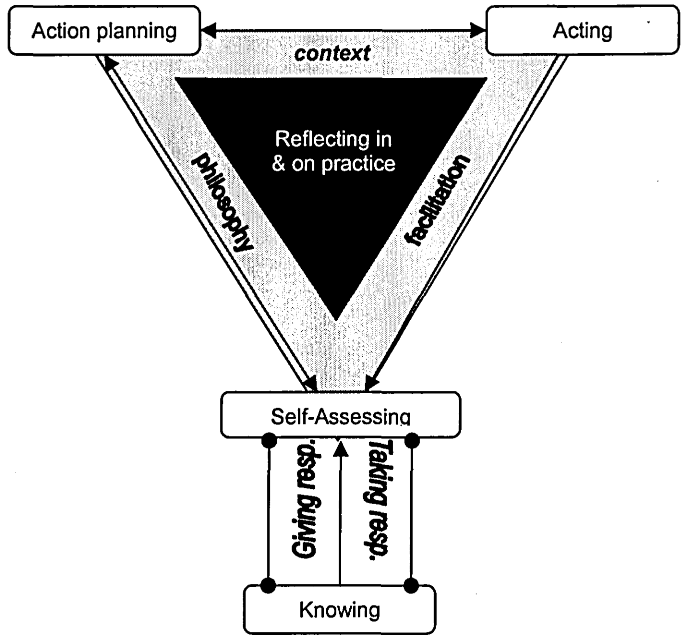
The researcher assumed that all students 'should' have regular opportunities to develop PCs within Science. The outcomes of the study suggest that this can be achieved using particular strategies and processes, which form key recommendations from the study.

Strategies for developing PCs were found to benefit from (ref. Chapter 11):

1. making PCs explicit
2. target-setting and evidence gathering using monitored self-assessment
3. adapting teaching and learning strategies towards the increased use of active and cooperative styles
4. providing regular feedback
5. differentiating approaches and feedback for more or less able students
6. PC quizzes for testing underpinning knowledge.

Processes of PC development (ref. section 13.2) have focused on five areas:

- knowing
- self-assessing
- action planning
- acting
- reflecting.



These approaches steer teaching and learning away from pure subject content, to a more person-centred approach, aiming to enhance the relevance and utility of knowledge and understanding. The study has picked up on relevant national agendas, and provides an exciting and thought-provoking insight into the impact PC development has on students' learning, suggesting a change in curriculum focus and practice. This may benefit from more fundamental policy changes.

14.2 OPPORTUNITIES FOR FURTHER STUDY

Throughout the study additional work has been underway, which has illustrated the potential for PC development in wider educational arenas. The use and development of the PC interventions continues in at least three of the schools involved in the study. Where development continues, schools have endeavoured to disseminate the research cross-departmentally. The wider involvement of Local Education Authorities has also been explored.

14.1.1 Applications in Primary Education – The ProJect Programme

The 'ProJect' Programme followed the noted successes in the first two years of the study, and provides a teacher continued professional development programme focused on integrating PCs and project work into the Year 5 curriculum. The initial year's pilot (September 2001-2002) stemmed from School C's interest to further their involvement with the main study and benefited from a DFES Community Bid Grant. This involved eight primary schools in the design and trialing of two project units, which integrated Science, DT, Literacy and Numeracy, with an strong emphasis on PC development.

This programme relies on teachers' professional development and reflection, through their involvement in curriculum improvement and innovation. The generic research interventions, emergent strategies and resources were differentiated for use with Year 5 pupils.

Integrated project work proved effective in engaging and motivating pupils and teachers towards Science and other subjects, and also provided flexibility within subject delivery to explicitly target and develop pupils' PCs. Teachers have described the impact of collaboration and partnership with other teachers, as well as expressing enjoyment in reviewing the delivery of the NC. They have endorsed the use of PCs within their whole school settings, and consider the positive long-term impact of their involvement in the programme.

The implications of this work on the broader understanding of PC development relate to gaining improved understanding of the:

- perceptions and experiences of teachers, students and parents with respect to the relevance and development of pupils' PCs
- teaching, learning and self-assessment strategies most suited to the development of PCs within primary school
- use and application of the generic research interventions and emergent strategies in the primary-age phase
- teachers' and students' role in the development of PCs
- applicability of key processes and the hierarchy of development of PCs within the primary subject curriculum
- progression of PC development from KS2 to 3.

The benefits of this project have been noted more widely during conference and dissemination activities, leading to further financial funding being awarded by

AstraZeneca Science Teaching Trust for September 2002-September 2003. This award will enable the ProJect programme to extended to a further 18 schools (36 teachers).

14.2.2 Enterprise Education – Lifelong Learning

During the study, PCs were also identified as supporting personal development through Enterprise Education schemes. They have subsequently been incorporated into the training structures for 'Europrise' programmes which are organised and funded by Nottinghamshire County Council and European Social Funds (September 2000-to date). This work further extends the research and focuses on developing PCs with individuals in their upper-teens to mid-twenties.

These programmes aim to promote entrepreneurial, enterprise and PC development to improve preparation for the workplace, or as a stimulus for new business opportunities. The programmes aim to help identify and capitalise on opportunities for personal development, through setting realistic goals, and implementing strategies for achieving success. They focus on improving participants' self-awareness, to encourage lasting change of people's attitudes, self-confidence and ownership of their life and career.

The PC interventions of self-assessment were used to identify, target and promote personal development. The use of discussion documents, one-to-one tutorials and being explicit are key strategies in monitoring individuals' PC development. Short reflective tasks encouraged the self-assessment, reflection and evaluation of progress. Many of the techniques used in the classroom setting were transferable to these programmes, although the basic skills of some individuals, and their low self-esteem, were more prominent in these groups.

A recent evaluation shows participants to be positive to the programmes. They had experienced positive change in their self-confidence, self-esteem, assertiveness, improved understanding of business strategies and techniques, and goal setting. The PCs contributed to their improved self-awareness and understanding of recognising and influencing personal change.

Further programmes involving the PCs have also been initiated (Enterprise for All: January 2002-December 2003), which will disseminate PCs to people of school through to middle age. This programme aims to improve their ability to manage their financial, business and personal success by developing knowledge and skills in Enterprise Education.

14.2.3 Student Personal Capability Index

The assessment and profiling of students' PCs was of particular interest and challenge within the study. Discussions within the research supervisory team led towards the development of a 'Student Personal Capability Index', which, through the use of the PC behavioural framework, forms a diagnostic assessment tool for PC development. It focuses on students' perceptions of the frequency with which they display the PC behaviours, and leads to a profile of student PC behaviour.

The index was piloted with 900 students (Year 7-Year 13), and was internally and cross-validated with internationally recognised psychometric tests. Each student completed the Personal Capability Index and one other test, which was associated with areas related to PCs, such as self-esteem, personal-responsibility and self-liking, and were also supported by teacher assessments of selected students. Factor analysis was undertaken to group statements, and teacher-student assessments indicated that students' self-assessments provide a valid representation of their status.

The index will form the basis for further understanding of student differences in PCs across the secondary age phase, as well as testing the significance of behavioural statements identified in the PC framework. Potentially the use of the diagnostic tool will complement PC development in a classroom or external setting, where particular strategies or techniques can be identified to meet individual students' needs.

14.2.4 Further interests

Further interest to extend the study stem from a range of areas, such as:

- exploring how lower ability students can be better supported in their PC development and self-assessment
- exploring the relationship between the influence of gender and age on PC development
- improving the validity and structure of the PC quizzes, and analysing their potential as indicators of PC development
- exploring the underlying influences of teacher commitment to research of this kind, and whether experience and managerial pressures are significant factors
- determining whether the transfer of knowledge of PCs directly impacts on the pupils' performance
- establishing whether a causal link exists between self-motivation, self-image and PC development
- exploring whether PC development links with theories of constructivist learning
- establishing the factors which influenced the noted improvement in Science tests scores in School A
- researching the approaches for enhancing and assessing creative development
- exploring the relationship of PCs with scientific capability.

14.3 STRENGTHS AND LIMITATIONS OF THE STUDY

The strengths and limitations of the study relate both to the development of PCs through Science, and to the action research ethos that was important to teachers' involvement and development.

Key strengths emerge from:

- analysing and gaining understanding from a wide range of data sources, reflecting and interpreting teachers' perceptions and experiences over extended periods of time

- providing the stimulus for teachers to think and reflect on their personal beliefs and pedagogy, and how these were manifest on a day-to-day level
- encouraging collaborative reflection between teachers, the researcher, and university staff, prompting attention from school and departmental management
- involving teachers, from a range of contexts, to commit themselves to exploring new approaches to teaching and learning focused on students' personal development within the context of academic provision
- encouraging a new emphasis on the teaching and learning of Science, such that the impact of teaching was recognised beyond purely students' academic and cognitive development
- influencing attitudinal change at a teacher, classroom, and student level, such that direct impact on students' PC development was noted, catalogued and reviewed
- demonstrating and recording practical strategies for influencing and assessing students' PC development, in Science and other subject teaching
- the flexibility of research methodology, encouraging teacher participation and influence on progress
- significantly impacting on teachers' continued professional development.

The findings were strongly influenced by the researcher's personal commitment to the study, which proved to be necessary for sustainability in the majority of schools. Future attempts to replicate or further the study should allow for appreciate the perseverance required to coordinate, log and interpret and analyse teachers' perceptions and experiences over time. There were obvious benefits from enabling teachers to work collaboratively, although sustaining such a high level of support from an external researcher proves costly. It is worthwhile speculating on the benefits of a similar action research process, in which teachers act as 'co-action researchers' with their colleagues. The limitations of such a study focus on the:

- labour intensive involvement of a researcher/coordinator, limiting the sustainability of the process

- diverse and broad PC focus adopted in the research schools, limiting the in-depth understanding of the nature of development in specific PC areas
- range of student groups, thus limiting comparisons between schools
- limited statistical data to demonstrate the significance of PC development on students' Science academic achievement.

The findings confidently illustrate that the strengths of the study outweigh its limitations, and provide useful indicators for improvement.

14.4 FINAL REMARKS

It is the researcher's aim to continue the work in this area, and to consolidate and develop its findings. It is her intention to ensure that the efforts of the teachers, and herself, do not just remain mere words bound within this thesis, and will endeavour to further its findings. Sustained efforts to ensure the understanding of PC development continue, with the intention that these might eventually impact on national educational policy reform. Interest in this area is developing, and receives attention from influential organisations, such as the QCA, DFES and DTI, as well as corporate businesses, such as AstraZeneca. Only through the willingness and commitment of teachers, with the support of research and management teams, can insights into classroom practice and innovation can be most effectively achieved.

It is hoped that the organisations identified above, and others, continue to facilitate research and development of this type, and value and respond to its outcomes and implications. May such interest continue, so that the idealistic view of schools as places where PC development is explicitly part of the curriculum and classroom activities, is more than well-intended rhetoric, and become an achievable goal.

14.4.1 The Science Curriculum in 2020

The following excerpts represent the researcher's view of the possible outcomes of a system which either negates PC development in an advancing technological society (A Digital Mind), or which integrates it into regular Science teaching (A Conscious Mind). These are meant purely for speculation and enjoyment, a feature which has permeated the conception, undertaking and completion of this study.

A Digital Mind

Miss Briggs entered the classroom in a flurry, placing her over-weighted bag on the front laboratory bench.
"Your web page today is w, w, w, dot pulleys dot, ac, it's on the science intranet," she explained as a large folder tumbled onto the floor. 'The National Curriculum 2020' looked like a well- thumbed document, which shed its pages on hitting the cold, tiled surface.
"Damn!" Briggs muttered, as the hub of activity saw students shuffling towards computer screens around the room. She scrambled to slide the test papers back into their wallets and calmed to recompose the document, whilst the students settled in front of small, laptop screens.

"OK, are we all logged on now? – Have you all found the site? Remember next week's exam will be based on this, so it's best that you concentrate and listen carefully."

A few grumbles from the two lads at the back of the class reminded Briggs that the technician still hadn't been down to fix the broken function buttons. The other students viewed the simulation and listened to the metallic sounds of the dictation, explaining the forces interacting on various parts of the pulley system.

Briggs made her way around the classroom, stopping at times to post the homework activity on the students' web page, and picking up their homework from her illuminated inbox.

Slowly working through the question pages, with a click and a shift of the mouse, students interacted with their screens in efficient and well-rehearsed ways, hardly blinking to take breath, with the short sharp actions of their wrists. Briggs looked on with a challenged expression, 'Was this really what she'd been trained for?' she wondered, but her thoughts were soon dispelled as a furtive grin from the passing head teacher, indicated his pleasure with her teaching style.

"Once you've finished that, let's move on to the investigation," she told the students, who turning their heads, maintained eye contact with the animated character on their screens.
"Remember you've been set homework and I'll expect your response on my email by 8pm tomorrow evening. As for now," she continued as silence was broken in the class by the boys still struggling to shuffle their chairs next to a friend.
"Come on John, sort yourself out, we're up to the investigation now. Oh yes, it's w, w, w, dot, investigation slash pulleys dot ac, you'll really enjoy this one!"

A Conscious Mind

Miss Briggs entered the classroom in a flurry, placing her over-weighted bag on the front laboratory bench. The students bustled their way into the room in a rowdy, yet orderly manner. As John entered the room he spotted a folder skimming its way across the bench and heading for the cold, titled floor. Over-stretching for the save, he grabbed the 'National Curriculum 2020', although hadn't been quick enough to gain hold of the CD insert. Briggs turned with a start and silence fell across the room at the sound of the brittle plastic box bouncing to its rest.
"Soz Miss," John muttered, as the class mocked his usual haphazard style.
"Thanks, I'll need that now, can you set it up for me?" she smiled.

Briggs settled the group of twelve quickly, introducing the lesson as a research investigation. As the whirr of CD kicked in, a simulation of a pulley system threw itself onto the electronic white board.
"Do you remember this from last week? We looked at the forces involved in the construction of the Millennium Bridge, well today's job is to research the reasons for its original faulty design."
The students giggled and scorned the video clip of the bridge's launch. 'Hmm,' Briggs thought, 'that seems such a long time ago now'.

The students paired with their buddy and grouped themselves into four as the purpose of the investigation was highlighted on the screen. The display shimmered as the sunshine beamed onto the screen, nearly blocking out the PC targets.
"Just before you start, can we be aware of what we're trying to do here," Briggs checked.
"Oh Miss, don't panic, you know our team's improving, you said so yourself. We're better than the others at managing ourselves and being creative."
"Just checking we all know what's helpful, Ami, you know things have changed since…"
"…Yeah, since the days of the Ark, when my mum says all she did was tests!"
"Don't be cheeky, let's just focus on what we're here for," she said, laughing wryly together.

The students moved strategically around the room, using laptops, the internet and textbooks to resource their research. Briggs moved around the room, working alongside some students to help explain the relationship of the forces, discussing their personal targets, and stopping to post their homework on the staff-student intranet. Later in the lesson she stopped to review progress and asked John's group to feedback on their findings. The students articulately indicated the information they had found and described in detail the processes and skills that each had developed in the process.
"I think we still need to find out more about the materials used in the structure, and we'd like to explore some improvements. We've been a bit slow to share our work out, but Ami's in charge today - she's delegating work better though."

Briggs ushered the students on, before the lunch bell rang.
"Remember you're finishing this for homework, we'll present it next week" she said as they bustled out of the lab, "… I'll expect it in by 4pm tomorrow, you can email or hard copy – which ever you prefer," she called as the last flick of hair disappeared behind the doorframe.

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Appendix A1: CASE STUDY REPORT- SCHOOL B

Period of study: 20 months (November 2000 – December 2001 with work continuing).

0.1 GENERAL SCHOOL DESCRIPTION

- a voluntary aided co-educational primary day school, for 198 mixed infant and junior pupils (4 and 11 years).
- situated in a broadly average working class, urban area.
- small proportion of pupils from black minority ethnic backgrounds (5%)
- 19% of pupils are identified with special educational needs
- children start the school with an average overall level of attainment, and achieve above average standards on leaving
- pupils have very good attitudes and good behaviour

0.2 Emma

Emma, aged 29, is a KS2 teacher specialising in primary science. She entered the teaching profession in 1996 after completing a BSc (Hons) Science & Technology with Primary Education degree. She worked in special education for two and a half years before joining mainstream education. She began working at the school in 1998 as a Year 5 class teacher at this school, where she holds additional responsibilities as Science Co-ordinator, and for Peer Mediation training. She had no previous experience of educational research prior to her involvement in this study. She received some encouragement and support from her head teacher for undertaking the research.

0.3 THE STUDENT SAMPLE

Two classes of Year 5 (9-10 year olds), approximately 60 in total. Pupils were of mixed-ability and mixed gender groups and taught by Emma for all subjects.

0.4 INVOLVEMENT

Emma's involvement in the study was stimulated in November 2000 during preparations for an OFSTED inspection (Phase 1). Her continued involvement was linked to the KS2 Project Initiative undertaken as a result of School C's interest to explore the development of PCs through the use of integrated project work in KS2 (Phase 2).

<u>Phase 1</u>: November 2000 – August 2001
<u>Phase 2</u>: September 2001 – December 2001(ongoing)

<table>
<tr><th></th><th>Event</th><th>Issue</th><th>Evidence</th></tr>
<tr><td>1</td><td>Planning & Activity
Emma and the researcher collaboratively decided to adopt the three generic research interventions of:
- making the PCs explicit
- using the GRASP framework
- target-setting and reviewing the PCs
Due to the age of the pupils the core PCs were targeted.

The core PCs were:
to share opinions and ideas with others (Verbal Communication)
to listen and respond to other people (Verbal Communication)
to seek advice when necessary (Self Management)
to co-operate with others (Teamwork)
to help reach agreements with others (Teamwork)
to keep track and monitor what I am doing (Self Management)
to avoid giving up easily (Tenacity)
to organise and plan how to go about a task (Problem Solving)
to know what I do well in (Positive Self Image)</td><td>COMMITMENT TO PERSONAL DEVELOPMENT
The school already encouraged the setting and evaluation of personal targets based on literacy and numeracy development. These were mainly addressed by individual pupils and were not necessarily reviewed or emphasised within regular teaching. Teachers provided written feedback in books and through end of term reports.

Emma valued the core PCs, considering them to provide a more standardised approach to pupil target setting.</td><td>[Researcher's Log 12.11.01]</td></tr>
<tr><td colspan="4">ACTION:
• Core PC objectives to be emphasised regularly within classroom lessons, displayed in the classroom and incorporated into pupils' individual personal target setting programmes.
• GRASP to be used mainly in science lessons, as a lesson-planning format and also to structure pupils' investigation reports.
• Pupils to be introduced to the framework during an introductory session, delivered by the researcher, where they would be encouraged to use GRASP as a self- and work-management tool. GRASP to form a permanent classroom display
• Emma aimed to make explicit the success criteria for the majority of lessons once she had integrated it successfully into the science lessons.
• Pupils to be encouraged to choose an individual PC target. Whole class and individual review of PC objectives planned to take place through discussion during plenary sessions.</td></tr>
<tr><td>2</td><td>20.1.01: Initial thoughts on progress
After 2 months Emma attended a review meeting for all research schools, at which time her perceptions on progress were gained.

GRASP framework effectively implemented.</td><td>EXPLICTNESS/ AWARENESS
Explicit aim setting helped pupils become more aware of the areas for specific focus, and resulted in pupils being more focused on achievement.

PC display assists this encouraging the pupils' to evaluate progress and achievements by marking which core target they think they have achieved and how.

ETHOS
Being a Catholic school the PCs link to Personal, Social and Moral Education, and Peer Mediation training.

ATTITUDE
Pupils' attitude towards PCs is very positive, they like sharing their achievements with others.

ABILITY
Especially good for less able pupils</td><td>[Review Meeting Questionnaire, 20.1.01]

[A6] 'Initial feelings are positive and I feel that there have been benefits, however formal assessment of this has not been carried out yet. The overall benefits are that the children are more focused and more switched on due to the clear aims; all pupils can experience success regardless of their academic ability.'</td></tr>
</table>

		as it encourages better listening and responding skills. Higher ability pupils better able to focus on more than one PC, whereas lower ability find it difficult to concentrate on more than one discrete target. **GRASP** Provides a very clear structure which is specific and focused, enables pupils to understand what is expected of them and also helps teacher with marking.	
ACTION: Emma planned to continue using the interventions, making PCs explicit and reviewing progress in class discussions. Written pupil self-assessment formats were introduced to encourage pupils to provide evidence of their perceived improvement. Emma considered it useful to provide pupils with visual reminders of their personal PC target and this was achieved using desk-top target cards.			
3	**10.3.01: Interim Evaluation Questionnaire** Cath completed an evaluative questionnaire five months after commencing the interventions. Continued emphasis on the PCs and the trialing of self-assessment strategies resulted in the core PC objectives being addressed 'a great deal' within regular cross-subject delivery.	Generic interventions considered useful in encouraging pupils to 'think about their personal abilities, not just academic achievements' [A2]. **CURRICULUM CONSTRAINTS** Heavily prescribed curriculum considered to constrain the level of commitment to the research interventions. Requirements to incorporate whole-school policies and a range of other initiatives for literacy, numeracy and PSHE, led to some difficulties in maintaining the emphasis on PCs, especially written self-assessment strategies. **PUPILS' PERCEPTIONS** Emma expressed difficulty monitoring and assessing pupils' PCs development when it was based on their own perceptions of improvement. The accuracy and reliability this evidence was questioned. Pupils descriptive evidence improved this. **RESPONSIBILITY** Setting personal PC targets based on end-of-term reviews highlighted pupils' their strengths and weaknesses. This was considered useful for encouraging pupils to take more responsibility for improvement. **ADDITIONAL TEACHING TIME** Religious Education, collective worship and Circle Time (PSHE) activities used to assist the integration of PCs. Such opportunities allowed time to given to discussing and exemplifying terminology and expected behaviours.	[Interim Evaluation Questionnaire. Emma.10.3.01]

		GUIDANCE GIVING Teaching PCs was considered to be associated with a process of guidance-giving through which appropriate behaviours could be modelled, described and practiced. Reinforcement was then provided formatively during most sessions. **AWARENESS** All pupils considered to have become increasingly aware of PCs, although on-going attention to development required personal commitment and perseverance. Lower ability pupils considered to be more self-confident from achieving success in at least one personal target. **TEACHING** Teaching considered to be more focused on required outcomes of PCs and academic knowledge. Use of PCs enabled more specific provision of pastoral care and feedback. **GRASP** GRASP considered useful and was used flexibly to clarify lesson aims and success criteria. Increased awareness of the lesson purpose was considered to be beneficial when reviewing lessons, as pupils were better able to reflect on what they achieved and how to achieve it.	[Interim Questionnaire: 10.3.01] 'Some pupils are more aware than others because they are more self motivated and focused about their targets. Others are not bothered and think when they have achieved their PC once, they don't need to try to be consistent and consolidate this gain.' [IQ/A15]. 'an excellent resource but *very* time consuming to plan each lesson with'
ACTION: Short weekly self-assessments activities used to catalogue where improvement had been made. Emma requested more assistance with the teacher-assessment and pupil self-assessment of PCs, hence the researcher attempted to adapt and improve the KS3 self-assessment structures, and to explore the possibility of developing pupil self-assessment quizzes. These aimed to provide a measurement of pupils' understanding in the core PCs.			
4	**2.4.01: Meeting** A visit to the school enabled a classroom observation and discussion of the impact of the PC interventions. Pupils questioned about what they considered the purpose of PCs to be.	**EXPLICITNESS** Individual PC targets are an integral part of the classroom discussion and activity, with visual displays, homework activities and personal feedback regularly undertaken. Emphasis is placed on the PCs during the course of activities and reviewed in a number of regularly used systems. **PUPILS' PERCEPTIONS** PCs considered to be useful in: - making pupils more aware of what they need to work towards - reminding the pupils of the need to remember and work towards their areas of development - helping to address their personal development Pupils considered that talking to others, having more regular	[Researcher's Log: 2.4.01]

		opportunities to note down evidence, and having a resource which enabled them to note the event soon after its occurrence, would be of benefit to the self-assessment of PCs. **DIFFICULTIES** Difficulties mainly from the evaluation and self-assessment of PCs, where pupils found difficulty remembering and recognising experiences that could be used as evidence. **SELF ASSESSMENT** Noted improvement in pupils' ability to self-assess, aided through the revision and refinement of self-assessment frameworks and worksheets.	
ACTION: Emma aimed to encouraging peer reflection during self-assessment exercises, and allow more time during lessons for the recording of activities during plenary sessions. The desk-top target cards were adapted to incorporate a section in which pupils could note down when they had worked towards their personal target (Appendix 26).			
5	**2.4.01: Pupil PC Quizzes** The researcher designed 'Pupil PC quizzes' to gain insight into pupils' knowledge and understanding of PCs (ref. Appendix 23). Emma trialed these with the students and the researcher marked the scripts using the PC objectives as a guide and awarding marks to insightful answers.	Pupils responded variably to the quiz, illustrating some difficulty with particular aspects of it. Generally they were aware of PC objectives and used them when advising others. On average pupils two or three answers per question were given, gaining a class average score of 5.4 from a possible 12 marks. Answers to the questions illustrated varied understanding and scores did not necessarily correlate with pupils' general academic ability. Emma considered the scores to reflect the pupils' general PC aptitude, however some pupils' were influenced heavily by their literacy ability.	[Pupil Quizzes]
6	**7.6.01: End of year reflections** Classroom observation and general discussion enabled the researcher to gain an insight into continuing progress. Emma discussed her experiences with the researcher [23.7.01], describing how, despite her initial apprehension, her belief in the need to contribute to pupils' personal development encouraged her ongoing commitment to the interventions. She drew on its close relationship with other Year 5 initiatives such as Peer Mediation and Circle Time which aimed at improving pupils' self and social awareness [Interview 57: 23.7.01].	**TEACHING AND LEARNING** PCs considered to continue to influence pupils' self-awareness and personal development. Emma considers her lessons to be more focused and pupils' learning styles, however still finds difficulty engaging pupils effectively in self-evaluation. Desktop reminder cards are useful for the pupils to note down their perceptions. **PUPILS' BEHAVIOUR** Personal and lesson objective setting was considered to positively affect the pupils' behaviour. The explicit recognition of PC targets and desired behaviours enabled an improved awareness of the valued aspects of personal and social activity, which stimulated	[Researcher's Log 7.6.01] 'The visit to Emma's school was extremely positive today. She has fully integrated the PCs into her target setting and lesson structures and the pupils are very aware of what the PCs are all about and the relevance to their own development. Emma also actively uses GRASP during lesson delivery – mainly science at present

		behavioural change. Focused attention on behaviour led to increased opportunities to share and discuss development, where pupils experienced rewards when reacting positively. **PROFESSIONAL DEVELOPMENT** Emma viewed her involvement in the study as a stimulus for professional development by reflecting on her own teaching strategies and the purpose of particular tasks. Her on-going commitment to improving teaching pedagogy and differentiating provision encouraged her to pro-actively alter her teaching styles and assessment strategies. **TEACHING STRATEGIES** A usual range of teaching strategies where used with an emphasis placed on PCs. The use of active teaching and learning strategies, such as group work, discussions, presentations, and demonstrations enabled further emphasis on academic and PC objectives.	although purpose and success criteria are reinforced regularly in other subjects.' [Interview 57: 23.7.01: 4] Emma: "... I think it's been beneficial because it makes me look closer, it makes me look at my objectives... So I do think it's made me be more specific, more focused in that area."
		ADVANTAGES OF PCs - Development of pupils' life skills from an early age. - Opportunity for lower ability students to achieve success in their learning. - Extension of the Catholic ethos of the school and the provision of personal, social and moral education. - Improvement in the clarity and purpose of teaching and learning across a range of subject areas. - Explicit recognition for pupils that learning is about personal qualities as well as academic development.	[Interview 57: 23.7.01: 22, 28]
		COMMITMENT Pupils were considered to have taken their PC targets seriously, with only a minority of students exhibiting disinterest in adapting their behaviour. Students approached work with enthusiasm, despite the initial difficulties with self-review and assessment.	[Interview 57: 23.7.01: 24]
		CLASSROOM MANAGEMENT & PERSONAL COMMITMENT Time and classroom organisation was considered influential in the integration of PC interventions into the primary classroom. Incorporating time for review and self-assessment were notably the most difficult areas to address amidst statutory learning	[Interview 57: 23.7.01]

		requirements. This was considered to be crucial, which, if not addressed, would negatively influence the success of the initiative. Emma did not consider the availability of time to discourage dissemination of PCs into other schools, however appreciated that her personal philosophy strongly influenced her commitment.	 [Interview 57. 23.7.01: 53-58]
ACTION: Emma wished to continue her work on PCs into the new academic year (September 2001) with a new class of pupils. She planned to encourage the pupils to become more familiar with the meaning of each PC target and its related behaviours. She aimed to encourage the demonstration and practice of the skills, by maintaining focus on particular objectives for the period of a week. The use of self-assessment and review would be taught and practiced in accordance with this, using whole-class evidence building to explain the form and type of evidence that would be applicable.			
7	**29.06.01: Parental Questionnaires** All parents were asked to complete an evaluative questionnaire to elicit their opinions on the focus and impact of the PC interventions. Despite the anonymity of the responses, the condensed length of questioning and repeated encouragement, only two parental responses were gained. *(Appreciating that this sample is non-representative, the responses have been summarised briefly as they bear insight into the perceptions of this limited few.)*	• Parents considered the PCs to be relevant to their youngsters' future success. • Both agreed with the school in explicitly addressing PC development. • One parent [P2.Q1] queried whether some children are mature enough to work on all the PCs in one year. • Both considered the target setting and evaluation PCs to have benefited their child, helping them to: - develop their capabilities at school and home - assist in raising awareness of areas for improvement - encourage independent or team learning - successfully promote home-school partnerships. • The reflective process was considered to have assisted the children 'a little bit'. • Explicit attention on PCs through subject teaching was considered to encourage pupils to 'relate the benefits of possessing these attributes to their work and increases their relevance' [P2.Q5]. • One parent considered themselves to be able to assist their child's PC development 'a great deal' in helping them to relate PCs to their homework and general life at home and play [P6.Q6].	[Parental Questionnaires: 29.06.01 – P1 & P2]
8	**18.7.01: An External Perspective** An external perspective on the pupils' PC development was given by a Peer Mediation teacher who worked within the school as part of the 'Quaker Peace Education Project' over a period of ten weeks. She presented the researcher with the following review of her perceptions.	The teacher reported a heightened awareness of these skills in comparison to other similar aged groups. **IMPACT** Pupils were observed to be well above average in the range of skills and were able to cross-reference their PC targets. A range of	[External Evaluation: 18.7.01]

		anecdotal evidence was supported to exemplify these claims.	
9	**13.7.01: Pupils' Opinions** Towards the end of the school year Emma encouraged the pupils to consider how she could improve the use and delivery of PCs in forthcoming years. The majority of comments related to the need for more time to evaluate their PCs and to reflect on the comments Emma had given.	Pupils suggested that: - more time was needed to read the teacher's comments. - more time was needed to think about what they were going to do to improve. - more things could be done together to understand more about the PCs. - targets could be taken home. - the PCs need to be made more understandable. - after school clubs could be set up to develop understanding in the PCs. - the teacher could verbally review the PC targets with the students at the end of the day. - it would be useful to work on one specific PC over the period of a week. - the target setting sheets could be made more clear.	[Pupil/teacher opinions: 13.7.01]
ACTION: Emma positively reacted to the pupils' suggestions and planned in the forthcoming term to: a) give more time to the completion of target setting sheets b) brainstorm how students can work on the PC targets as a class c) identify key PCs which will be targeted over a day or week d) review the PC at the end of the day e) allow the students to make a target card for them to take home			
10	**Phase 2: The second year of the study** The researcher suggested that she share her experience of PC development with other primary teachers becoming involved in a related study. The new study was an extension from School C's involvement in the research and aimed to explore the development of PCs through integrated project work at KS2. Emma's experience was considered to be beneficial in training other teachers by demonstrating the use, advantages and difficulties of integrating PCs at primary level. Emma agreed to these proposals and became an integral member of the project team. Emma agreed to pilot a range of materials prior to the project's dissemination in all project primary schools. The materials were produced by the researcher and teachers from School C and addressed the Year 5 NC in the specified subjects in a more innovative and student-centred way. The integration and development of PCs was of high priority and was encouraged with the use of active teaching and learning strategies, reflective and self-assessment strategies and specifically designed PC activities. The subjects were integrated and presented within a theme, through which the pupils were given opportunities to learn the required subject knowledge and develop PCs, drawing away from subject specific and more formalised methods of		[Interview 57. 23.7.01]

	teaching.		
11	**12.9.01: Planning & action** The researcher visited the school in the initial weeks of the new school term, to introduce the PCs and GRASP to the new Year 5 class. Pupils self-assessed themselves on the core PCs as a means of target setting. Each pupil was provided with personal folders in which to collate their PC evaluations and self-assessments. These aimed to provide more structure to student self review. Emma allocated six weeks to focusing specific attention on the core PCs, targeting one core PC per week. The focus of the work relied heavily on making PCs explicit and incorporating regular self-review. Emma endeavoured to provide the pupils with time at the end of each day to review their progress in note form, culminating in a longer homework activity at the end of the week. The researcher provided a variety of revised review and self-assessment structures adapted for primary-aged pupils. Less emphasis was initially placed on GRASP although Emma was keen to use it where opportunities arose.		[Researcher's Log: 12.9.01]
12	**23.10.01: Initial perceptions on progress** Emma had used the allocated Religious Education curriculum time to focus more specifically on the development of particular PCs. This enabled focused discussion and short practical tasks to be undertaken to enhance pupils' understanding and use of the targeted PC.	**IMPACT** After 6 weeks work with her the new class Emma considered the interventions to have been successful, despite progress being hindered by teacher absence and school activities. **TEACHING PCs** Specifically designed activities were developed, such as short listening tasks, co-operation challenges and problem solving activities. Emma encouraged pupils to use, practice and review their behaviours, and found it useful to encourage students to explain the behaviours they exhibited and how they could improve them. **SELF-ASSESSMENT** Focused activities plus short daily evaluations and weekly homework reviews were considered beneficial in reinforcing the PC work and highlighting pupils' development. Parents had been encouraged to provide their opinions on the child's development and generally were supportive giving feedback. **DIFFICULTIES** Emma considered it difficult to judge the specific level of impact the activities had had on the pupils' behaviours, finding difficulty in making definitive claims that	[Interview 66. 23.10.01] [Interview 66. 23.10.01: 24] Emma: "… the children need the brainstorming sessions to work out what the words mean… there are lots of things they need to sort out. They need specific activities that are just looking at that particular skill, and then you can develop that by putting it into other curriculum areas."

		changed behaviour, and added personal responsibility had resulted specifically from the targeted interventions. She was confident, however, that the pupils exhibited increased awareness of the PCs due to the exercises, and they were more familiar with the meaning and implications on their behaviour during learning. Sustained behavioural change was considered to require longer periods of intervention, longer that the six-week period. **OBJECTIVITY** Emma had experienced difficulty gathering objectively focused reflections from pupils, who tended to inaccurately evaluate their abilities. Practice in these activities notably encouraged more realistic estimates of development and the quality of evidence improved. Written PC evidence was considered worthwhile for highlighting achievement and development.	 [Interview 66: 13-14]
ACTION: Having established the use and assessment of PCs, Emma commenced the use of the integrated project work. For a period of six weeks, Emma endeavoured to allow two days per week to the project scheme. Making PCs explicit and self-assessment were integral to the activities and were achieved using the established frameworks.			
13	**13.11.01: Classroom Observation** The researcher visited the school to observe the class. It was evident that the notion of target setting, PCs and GRASP had become an integral part of the teaching pedagogy and pupils' activity. Many 'off the cuff' references to core PCs, as well focused introductory and plenary discussions encouraged the review and evaluation of PC behaviours. Considerable time was taken asking the students focused questions such as, 'What's this PC all about?', 'What does 'sharing our opinions' really mean?, How might you do that in this activity? Who has done it well and how?'. Groups of pupils were used to model good behaviours.	**SELF ASSESSMENT** Student personal folder self-assessments were completed to a high standard. Importance is placed on these, although Emma continues to find difficulty allocating necessary time to complete the activities. **INTEGRATED PROJECT WORK** A flexible classroom structure had been created during project activities, where normal lesson breaks (usually of one hour periods) were collapsed to enable activities to regulate the amount of time required. The use of PC review was incorporated more easily into this approach, often taking place in verbal and note-form, with longer evaluations undertaken as homework activities.	[Researcher's Log, 13.11.01] 'The PCs are integrally linked to Emma's teaching, almost seamlessly now. GRASP is used, however, much more in the way of specifically dedicated activities. Emma will choose activities which she considers to be most applicable (often science-based) and will use GRASP to structure her own delivery as well as the children's work.'
14	**13.11.01: Phase 2 Parental Questionnaires** All parents were asked to complete an evaluative questionnaire and of the 32 pupils, nine parents replied [13.11.01]. Seven parents agreed with the emphasis the school was placing on PC development, one had no opinion and one disagreed. *(It is appreciated that these views may not be fully representative of the views of the*	**PARENTS' VIEWS** The responses present a generally positive view of the work being undertaken with the PCs, however questions were raised as to the appropriateness of the work for pupils' of this age and ability. **Relevancy of PCs** Seven parents considered PCs to be highly relevant or relevant. Two parents did not feel they were	[Parents' Questionnaires – Year 2: 13.11.01: Parent 1-9]]

	non-responding parents.)	relevant to their child's development [P7,9]. **Impact from target setting & evaluating PCs** Children are encouraged to: - develop communication and teamwork skills [P1] - think about what has been learned [P2] - think about their potential [P3] - set achievable targets [P4] - analyse and look at the way they work [P5] - know what they are aiming for [P8] Two parents considered these processes too much to deal with [P7] or too complicated for their child [P9]. **Difficulties target setting & evaluating PCs** Children experienced difficulty knowing which targets could be set [P1], however other children overcame their difficulties [P2], needing help at first but found evaluating easier [P3] or asked for advice [P4]. One parent considered his son to lack motivation/interest [P7], and another considered a lot of training to be required [P9]. **The perceived benefits of reflection** Ranged from a 'great deal' to 'not at all'. Children considered to: - be more able to look back at what they had done in order to improve [P4] - have improved in their ability to express themselves and think about what they do [P5] - have benefited in the short term and improvement was difficult to sustain [P7] - have experienced no impact from the process [P9] - need more time [P3] **Advantages** Parents views varied, noting: - few advantages, if any, it could be done in non-curriculum time [P1] - that it gives children a better understanding of the subject matter [P2] - that it is always good to encourage positive self image [P3] - the ability to concentrate on weaker points therefore raises her general learning ability [P4] - regular attention will hopefully reinforce positive messages [P8] - no advantages [P9]	'I believe [my son] has gained some insight into thinking through his work, rather than just writing down answers just to get work finished.' [P2]

		Methods by which parents can contribute to pupils development - discussing targets and enabling children to take part in other activities in which such skills are relevant [P1] - going through school work and explaining the PC goals which are relevant to what is being done [P2] - discussing PCs and pointing out when the child does well and how they could improve [P5] - by practicing at home what is learnt in school, thus illustrating the application of these skills to extra-curricular life [P8] - showing good examples and discussing life in general, through a common sense approach [P9]	
15	**10.12.02: Pupils' Questionnaires** Pupils were asked to complete a short semi-structured questionnaire to gather their opinions on the use of PCs and project work during their three-month involvement.	**PERSONAL CAPABILITIES** Pupils considered PCs to be about helping themselves improve in areas which would benefit them throughout their lives. This included getting on with others, sorting out problems and improving behaviour. Pupils suggested the good things about PCs to be the way that they could work with and make friends, become more confident about work, co-operate and listen more to others. **PROJECT WORK** • Pupils found project work fun and exciting and different, yet sometimes hard. • Pupils enjoyed working in groups on project and making things and a variety of activities. • Pupils expressed difficulties in various ways, such as always being relied on in a group, not enjoying particular activities, finding it difficult to work with some people, having to put in extra work.	[Pupils' Questionnaires: 10.12.02]
16	**12.12.01: Final Reflection on Phase 2** Towards the end of the winter term the researcher encouraged Emma to reflect on the second phase of the study, where project work had been a key focus of activity.	**GENERAL OVERVIEW** The pupils regularly used PC terminology during discussions and were considered to have become more independent in their learning. The use of peer and parental reflection had continued and was considered to have encouraged honest feedback during the review of PC development. **ABILITY** Less able pupils, especially those with special needs, found difficulty understanding the purpose of PCs, and were less able to reflect and self-assess themselves. The objectivity and detail of their	[Interview 79: 12.12.01]. [Interview 79: 12.12.01:10]

		self-reflections was considered to be 'bitty and repetitive', experiencing difficulty breaking down PCs into discrete behaviours The use of one-to-one teacher-student discussions assisted pupils. **Target setting, evaluation and the NC** Strong emphasis was placed on objective evaluation of progress. Emma recognised the relationship between the development of reflective and evaluative skills used with PC evaluation and the requirements of the NC. She capitalised on opportunities to develop generic evaluation and reflective skills. **TEACHING & LEARNING STRATEGIES** An increased range of active teaching and learning strategies and cooperative group work had been used. GRASP had been used mainly in science lessons, whilst setting success criteria had continued to be incorporated in most teaching sessions. Emma viewed this framework as a means through which she was encouraged to make the purpose and lesson criteria explicit [Interview 79: 39-44]. **EXPLICITNESS** Students were encouraged to identify the PCs involved in particular activities, as opposed to the teacher stating at the beginning of a session. Emma adopted a more formative approach to teacher assessment and feedback. **CLASSROOM MANAGEMENT** The management of PCs in the classroom continued to challenge Emma amidst the necessary day-to-day curriculum requirements. The provision of time within a school day during which pupils could review and record their PC development was an area which was recognised as important, however difficult to incorporate. **PUPIL SELF-MOTIVATION** Pupils' PC development was considered to be integrally influenced by the pupils' self-motivation to improve. Pupils' inclination to succeed in areas other than the NC, was a key feature of their motivation to target and review their behaviour.	[Interview 79: 12.12.01:20] Emma: "It's reflected in the NC, the core NC. Pupils have to evaluate, everything they're supposed to do they're supposed to evaluate, be it in verbal or in written form. Even in art they're supposed to evaluate their own work and look at that of others and evaluate that, and how can they improve. In English that's one of the skills, drafting, evaluating, making it better, it's a skill they've got to be able to do, they've got to able to look at themselves critically and say 'What is it I've got to do here?" [Interview 79: 12.12.01: 30] Emma: "There are children within the class who for reasons... are not motivated to put that effort in... They need to be self-motivated in order to achieve

		PROJECT WORK • Pupils had reacted very well to the project believing in the theme and context, and thus applying themselves well to the activities. • Pupils did not view the project sessions as 'real lessons', however were developing and using their subject knowledge to a good standard. • The pupils were highly motivated towards the work and this is very much the influence of making it 'real'. • PCs were more implicit in most sessions apart from in science-based sessions. Pupils were being encouraged to make the links between the activities and the core PC objectives. The teacher supports this by encouraging the pupils and providing the opportunities which stimulate reflective discussion. • All PCs have been covered in a variety of ways. The activities require pupils to use a range of PCs, and focus has moved from one PC being targeted per week to a more diverse approach. Specific PC activities also help teach the PCs and what they mean in the context of the project theme. • Pupils exhibiting behavioural problems prior to the activities are tailoring their behaviour in order that they can be involved in project, during which time they were focused and cause little problem. • The NC objectives were being fulfilled through theme-related activities.	these personal capabilities, because if they're not going to do that and instead sit back, then they can't really do a lot of the PCs... There will be a lot of PCs they don't do because they're not self-motivated."
17	**19.02.02: Final Meeting** During the analysis of the case study a number of issues arose which were addressed through questionnaire. The data is presented in the Case Study Findings & Discussion (ref. section 10.2) in order to avoid duplication.		

Appendix A2: CASE STUDY REPORT - SCHOOL C

Period of study: 25 months (November 1999 – December 2001).

0.1 GENERAL SCHOOL DESCRIPTION

- an independent school, located an urban area
- student intake fully representative of the catchment area, including students from deprived areas
- aims to allow full inclusion for all students, and to ensure that all fulfil their right to a broad, balanced, relevant and differentiated curriculum
- is distinctive in its approach to the curriculum, focusing strongly on the academic and social development of its students. Delivers BTEC, vocational courses and International Bacheloriate, alongside GCSE
- is commitment to the development of student technical and personal competences
- is distinctive in its endeavours to be innovative and forward thinking in all aspects of school life

0.2 THE TEACHING GROUP

Six teachers, assisted by a senior member of staff.

0.21 Senior management: Assistant Principal, Paul, aged 49, science specialist in Chemistry. Carries additional responsibilities for curriculum timetabling, assessment, recording and reporting, and oversees the KS3 & KS4 curriculum. Experienced in curriculum development and management, his current post enables him to be involved in a range of innovative developments. In his managerial role for research, he had responsibility for timetabling, finance, University-School liaison and general support. He became involved due to a strong commitment to the development of competence through the curriculum, considering PCs to be useful method for enhance student learning.

0.22 Design and Technology (DT) staff

Peter: Design Technology specialist, 18 years experience. Entered the profession after twelve years as an engineer. Worked in three other schools before joining the school in 1991. Four years experience as the KS4 Co-ordinator for DT. He had some awareness of educational research and became involved in this research on the recommendation from the College manager.
Richard: aged 43, Technology specialist, 6 years teaching experience. Entered the profession after a lengthy period as an engineer. Holds responsibility for Post-16 Engineering courses. He was aware of research methods and was invited to become involved in the study.

0.23 Science staff

Julie: aged 28, Biology specialist, 3 years teaching experience. Entered the profession following 3 years in a Molecular Genetics laboratory. Holds responsibility as Special Educational Needs Co-ordinator, Year 7 Co-ordinator and Post Graduate Certificate of Education Mentor. Towards the end of the study she took responsibility for the management of the KS2 extension project (ref. section 14.2.1). She was aware of research methods and considered the study to be important.
Sarah: aged 28, Physics specialist. Maintains responsibility for coordinating KS 3 Science.
Tim: aged 41, Science/DT supply teacher, entered the profession after a lengthy period of time managing his own business. He became involved in the research in December 2001, approximately twelve weeks into the study.

0.24 Mathematics staff

Jayne: aged 31, Mathematics specialist, 5 years teaching experience. Entered the profession after a career in finance. Holds responsibility for Head of KS4 Mathematics and a Year 11 tutor. Towards the end of the study she took responsibility for the management of the KS2 extension project. She had been asked to become involved in the study and was generally unaware of research demands.
Clare: aged 26, Maths & Engineering specialist, 3 years experience. Qualified in Engineering before completing PGCE course. Currently responsible for mentoring PGCE and NQTs candidates for Mathematics and recently appointed Staff Training and Development Coordinator for the school.

0.3 THE STUDENT SAMPLE

Four Year 7 groups, approximately 100 students in total, represented half the year cohort. Control group used with other remaining Year 7 students. Involvement in the study began on entry to Year 7 (September 2000) and into Year 8 (September 2001). Student groups were mixed ability and mixed gender, aged 11-12 years.

0.4 INTEGRATED PROEJCT WORK

The school had over 10 years experience of integrated project work, conducting twice annual, week-long projects, aimed to encourage students and staff to work collaboratively on whole-school themes. Year 7, 8 and 9 students are encouraged to work together, and are provided opportunities to encourage self- and team-management skills. Teachers from the range of subject areas plan and deliver activities with a specific focus on cross-curricular links. Creative and Key Skill development are characteristic features of these opportunities, which are non-NC linked. The school management considers it to be a more flexible means of encouraging diversity of teaching opportunities and approaches.

	Event	Issue	Evidence
1	**25.11.99 Meeting** Initial contact with school manager during a Royal Society of Arts seminar. Seminar related to the development of a competence-based curriculum and linked to the notion of PCs as well as the schools' interests.	**MANAGEMENT SUPPORT** School adopted a proactive role towards innovation and curriculum development	
ACTION: Further meetings planned to explore research possibilities for PCs study			
2	**28.01.00, 28.02.00 Meetings: Planning** School-researcher relationship strengthened. Research to capitalise on school's experience of project work. Key areas of interest for project design: a) NC linked b) focus on PC development through cross-curricular subject teaching c) to enable students to develop knowledge and capabilities through project d) provide opportunities for cross-tutor group work e) allow teachers to plan and deliver subjects cross-curricularly through the project theme f) use long-term projects, 6-8 weeks in duration, 4 over the academic year	**CROSS-CURRICULAR PROJECT WORK** Strategy to use project work to develop subject knowledge & PCs.	[Researcher's Log: 28.1.00, 28.02.00]
3	**3.4.00 Meeting: Organisation** With school Principal and manager (Paul). Proposed use of generic research interventions in projects: - making PCs explicit - target setting & reviewing PCs Use of A-D scale and PC materials. On-going research to provide evaluation. • Start date: September 2000 • Four student groups identified (100 students), half the Year 7 cohort. • One-day per week to be allocated to projects over academic year (2000-2001) • Projects duration: 6-8 weeks • 2 Science, 2 Maths & 2 DT lessons. • Equal status of PCs • Additional curriculum allocation for Science and Maths for 'standard' teaching methods. • Opportunities for students to work in a variety of groupings, in less formal settings • Teacher:student ratio of 1:16, fifty students coordinated by one teacher from each subject. • Access to resources and rooms, nominal additional funding.	**MANAGEMENT SUPPORT** Full management support Desire to formalise assessment of students' skill development in project. PCs viewed positively and central to projects. Timetabling & resources organised enabled cross-tutor group flexibility. Extra staffing, reducing student-teacher ratio.	[Researcher's Log 3.4.00]
ACTION: Preparation of research resources for teachers (teacher handbook, A-D scaled discussion document and assessment frameworks)			
4	**Involving the teachers** Researcher introduced aims of the research to the teachers: using integrated project & PCs. Staff identified potential project themes in order that significant aspects of Year 7	**BOTTOM-UP APPROACH** Teachers involved early on in the study. Teachers positive to proposed	

<table>
<tr><td></td><td>schemes of work were to be covered.
Proposed themes: 'Energy', 'Construction', 'Children', 'Famous People'.

Teachers accepted the generic research interventions and were keen that PCs be written into schemes of work for each project, and to outline main PC emphasis for particular activities.

Teachers agreed that students would keep PC self-assessment profiles and all would plan opportunities for review.
Teachers agreed to be observed and interviewed throughout the course of the year.</td><td>interventions and research.

Teachers given choice over project design.</td><td></td></tr>
<tr><td colspan="4">ACTION: Researcher to prepare first project (Energy).
- PCs to be made explicit regularly by all teachers
- self-assessment activities to be completed at least twice every six weeks.
- Teacher's assessment of the students' development suggested in order to corroborate personal perceptions.
- PC display materials to be placed in all project workrooms.

Designing and disseminating pilot assessment materials within school Project Week</td></tr>
<tr><td>5</td><td>18.5.00-26.5.00: Pilot Study
<u>PURPOSE</u>: to trial and evaluate suggested frameworks for student PC self–assessment.
<u>PROCESS</u>: 12 teachers, 12 students groups (over 300), Year 7, 8 and 9. One week project.
Self-assessments related to quantitative scores for each PC. Students required to score their improvement.

<u>EVALUATION</u>: 5 out of 12 evaluative teacher questionnaires returned. Student self-assessments returned to researcher.
Researcher observation and informal discussions.

<u>FINDINGS</u>:
-PC assessment frameworks used differently across the project groups. Teachers emphasised PCs to different extents during the project [PilotD].
-All teachers agreed with the principle of the PCs framework.
-Teachers recognised PCs as features inherent to project work.
-The terminology of the PCs was understood and interpreted by most students.
-Some teachers highlight need to carefully explain the aim of the self-assessments to students.
-All teachers considered radar-graph format to be easy to use (ref. Appendix A17), however overall self-assessment process viewed variedly.
-Scoring progress was viewed variably

Teachers agreed given more guidance the framework would be effective. Some standardisation necessary to make the criteria more meaningful, measurable and less subjective.</td><td>

SELF ASSESSMENT
Variation in teacher discussion and emphasis influenced the manner and standard of self-assessments completion.

Most students able to complete self-assessments, but some find difficulty identify PC development during project. Explaining purpose carefully for students aided accurate and truthful responses.

Scoring emerged to be very high or very low. Evidence for skill development requested in order to gain 'honest' rather than 'modest' self-assessments.

Discussion documents may have portrayed skewed image of desirable personality, also viewed as too complicated and detailed [PilotA, PilotC]</td><td>[Researcher's Log 26.5.00]

[Pilot Questionnaires]
'Self-assessment frameworks able to 'focus students' achievements' [PilotA] and 'encourage students to think about the skills they gain… good for average to low ability children, as it gave structure to their own assessment' [PilotB]

'Scoring progress somewhat like a magazine questionnaire, where you can guess a desired answer to gain a maximum score.' [PilotB]
'Not clear whether</td></tr>
</table>

	EMERGENT CONSIDERATIONS - *Completion of self-assessment frameworks did not indicate understanding of PC development.* - *The numerical scoring of PCs provided little indication of PC improvement.* - *Targets setting done informally, with no system of action planning built into the framework.* - *The development of PCs was viewed as a long-term process.*	**AGE** Older students more confident in completing personal assessments; younger students require more assistance. **GENDER** Male students more confident in self-assessment, resulting in possible over-estimation of their ability. Female students considered more self-critical. **SELF ASSESSMENT** Reflections mainly reflected improvement in subject or craft/skill development. Number scores bore little resemblance to PC behaviours. Teachers considered that numerical scoring hindered the understanding of how personal capability improved, as little evidence was gathered to explain it. Lack of focused target setting and action planning diminished the relevance of the activity, resulting in little effort-investment. The short duration of the project provided limited opportunity to observe significant change in behaviour.	we are assessing anything as opposed to colouring in boxes.' [PilotC]
ACTION 1: Teachers to openly discuss PC targets, methods for self-improvement, and perceived improvement. The encouragement of more objective judgements to be encouraged by students explaining and giving evidence for their self-improvement. **ACTION 2:** Use of the discussion document to enable students to compare their own performance to characteristic PC development. These indicators were considered to aid the standardisation or levelling of the development, and to replace numerical scoring. **ACTION 3:** Teachers to regularly highlight the PCs inherent in particular activities to increase students' awareness of the use and development of PCs. **ACTION 4:** 6-8 week projects to be devised over a period of one academic year, in order to encourage long-term PC development.			
6	**22.5.00: Questionnaire: Teachers' initial perceptions** Julie and Sarah provided their opinions on the relevance of PCs.	**EXPLICITNESS** Concern raised as to level of explicit attention given to PCs. There was an implied hope that PCs were encouraged by teachers, through teamwork aimed at developing personal responsibility. **SCIENCE** Science was considered an appropriate vehicle for PC development. **SELF ASSESSMENT** Teachers stressed need for improved strategies for PC integration and assessment structures for PCs.	[Sarah: 22.5.00: A1] 'These skills have been missing from school-leavers for years… I have for a long time believed that the personal development of the students is more important than filling them full of facts which only remain in their short term memory for a matter of hours/days/weeks, and only serve to improve a school's ranking in the league tables.

		RELEVANCE The level of interest in PCs considered to increase in future.	[Julie: 22.5.00: A1] 'If a student leaves at 18 with all of these skills, an employer will gain a person who is committed, imaginative, independent, yet can work as a team member and has the ability to evaluate a situation. I feel at present this is not the main focus for some teachers when planning their teaching.'
7	**27.9.00: Observation 1** Observation and review meeting was held three weeks into project work (Energy). Project work received well by students and teachers. Variety of teaching and learning strategies being used with a strong emphasis on teamwork and communication. Focus on problem solving, creativity, positive self-image and tenacity PCs. Use of a wide variety of teaching & learning approaches: oral presentations, games, group discussion, teamwork using the 'jigsaw approach', research, problem solving tasks in Maths, practical 'hands-on' DT work, and more formalised subject skills teaching. Students have begun target setting and reviewing PCs using discussion document and collating in personal portfolios. Use of discussion document. PCs predominantly implicit.	**ENJOYMENT** Learning style considered enjoyable and fun by students. Particular enjoyment in working with others and in a more informal manner. **CROSS CURRICULAR** Cross-curricular approach considered useful in illustrating links between subjects, as opposed to separate subject teaching. **AWARENESS/ SELF ASSESSMENT** Most students highlighting higher ability descriptors on discussion document – overrating PC ability. Evidence collection proving difficult, assistance needed to identify events to exemplify PC development. Brainstorming session to recall activities considered useful. Review of assessment sheets to promote this. Some students' awareness of PCs developed as more adept at noting personal strengths and areas of development. Some students' targets more detailed than before. **EXPLICITNESS** Teachers to be encouraged to be explicit with PC objectives to raise students' awareness at the beginning of lessons, and review at the end to assist self-assessment and evidence collection. Initially intended, however demands of project delivery had resulted implicit approach.	[Researcher's Log 27.9.00]

	Teacher logs not completed.	**RESEARCH DATA** Teacher logs problematic due to time implications. Group meetings, questionnaires to take priority. Planning of projects time intensive and require more allocated opportunities.	
ACTION: Projects to continue with a stronger emphasis on explicitly recognising PCs.			
8	**7.11.00: Main Feedback Meeting** Review meeting for 'Energy' project, planning structure of work for 'Toys' project. Very positive response from staff. Subject areas considered to benefit from an integrated approach. The NC requirements had been met using the project structure, aided occasionally by the use of more formalised teaching opportunities ('training sessions'). Pupils had begun to develop more confidence in managing themselves in different teams, working between subject areas and transferring different subject skills. 1. The links between the Maths and DT curriculum were evident and allowed for related work to be delivered. 2. The opportunity for creative development was increasingly evident within open-ended activities.	**ENJOYMENT** Students noted to put more effort into their work. **NC** NC requirements met. **BETTER TEAMWORK** Students said to be more self-reliant, managing work independently. Beyond normal students ability. **CROSS CURRICULAR TRANSFER** The transfer of skills between subject areas emerging to be a strength of project work. Subject knowledge being consolidated and applied across subject boundaries. **CREATIVE DEVELOPMENT** Was facilitated through open-ended activities and more choice within tasks.	[Interview 26: 7.11.00: 86] Peter "We think that the kids have really valued everything, they see a whole purpose to it all because of their targets and they knew how it was all going to fit together. It's like there was a willingness to take everything one stage further." [Interview 26: 7.11.00: 58] Jayne [Interview 26: 7.11.00: 87] Peter "The students were a lot more questioning, they sort of were questioning their own groups… The Maths was generating the DT, and at times I could have stood back and watched because they seemed to be self-generating what they were doing. Now they wouldn't normally do that in Year 7…they seemed to have taken that skill to a much higher level than normal Year 7's."
9	**15.11.00: The students' views** A sample of 3 students per tutor group (12 in total) were identified as a four focus groups, on the basis of their high, average and low academic ability. They were group interviewed to elicit their views on PCs. Four interviews were undertaken, transcribed and coded, resulting to two main categories of response: Project work and PCs.	**ENJOYMENT** Students generally considered project work to be a fun, enjoyable and challenging way of learning. **TRANSFER** Students highlighted the challenging nature of applying their knowledge and understanding across different subjects and in less formal ways.	[Interview 23: 15.11.00: 12-15] [Interview 22: 15.11.00: 16-22]

		AUTONOMY & CHOICE Students responding positively to more autonomy and choice **GROUP WORK** Emphasis on group work viewed positively by students, who enjoyed working with friends or other students. Impact on learning. Increased teacher attention leading to one-to-one support in a more flexible learning environment Establishment of group dynamics an issue for some students, who although valued increased interaction, also recognised the difficulties in reaching collaborative agreements within groups. **PCs & TARGET SETTING** Students' perception of PCs linked mainly to tenacity and teamwork. PC target setting was considered useful in enabling students to pay specific attention to personal areas of development, however frequent reminders were needed. Students valued project work but did not wish that all subject teaching was approached this way.	[Interview 23: 15.11.00: 17] "You get to choose how you do it, instead of being told how." [Interview 25: 15.11.00: 4] "Usually in lessons the teacher tells you what to do and you just do the work, but in project the teachers will give you the assignment and you can get on and decide ways to do it." [Interview 23: 15.11.00: 29] One student described this in terms of 'individuality', explaining this to be when, "...you get to communicate and work with others but you also get to do things on your own. Having more freedom to have other ideas." [Interview 24: 15.11.00: 17-26].
10	**15.11.00: Student Questionnaires** The student cohort (100 students) completed a short student questionnaire, aimed to elicit their perceptions of PCs, opinions on the project work, and their views on the influence of target setting on their PC development.	**PCs – Self-Improvement & Confidence** Students' perceptions of the PCs linked strongly to notions of self-improvement, target setting and increased confidence. **Target setting** Students considered target setting positively, viewing it to aid PC development. Students explained that targets helped them focus on achieving goals and improving personal achievement.	[Questionnaires 15.1.00] Student A: 'I think PCs are about helping us understand what we will need to know now and in the future and to help us set targets for ourselves. It will also help us in our work and it makes us more confident.'

		Many viewed target setting as a means by which to identify weakness, and some did not consider the value of target setting for personal improvement, due to their lack of effort investment. A minority of students felt that the targets did not influence their schoolwork at all. **PROJECT WORK – Cross curricular** 80% of students highlighted that they considered project to be a 'better' way of learning as opposed to regular lessons. Students' opinions focused on the active and cross-curricular nature of the work and the perceived benefits or difficulties this incurred. 20% preferred regular lessons as opposed to project.	Student F: 'My targets have helped me a little bit by making me feel confident and thinking to myself "You have to reach these targets – you can!"' Student M: 'Targets haven't helped me because the person I try to co-operate with, won't co-operate back.'
ACTION: Continuation of research approach. Emphasis on explicitly highlighting PCs and refining self-assessment procedures and formats. Researcher to maintain contact and to assist in the compilation of project schemes of work.			
11	**17.11.01:** **Staff Interim evaluation questionnaires** Three teachers completed interim evaluation reports from which four main categories of response were compiled to summarise the responses given. Teachers highlighted aspects of the project work which facilitated or inhibited PC development, as well as the broader implications of the work.	**PROJECT WORK: FACILITATING PC DEVELOPMENT** by increased use of: Group and teamwork Oral presentations Research activities Discussions Investigations Team teaching – enabling more communication between subject areas Design and Technology opportunities which increase creativity and motivation **INHIBITING PC DEVELOPMENT** by didactic teaching and task heavy projects. **BENEFITS OF PROJECT WORK** Target setting more readily achieved. Student's increased self-awareness from the reflective process. Effective use of self-assessment. Improved transfer of skills. Students seem more focused on work and meeting objectives. Students more able to work in groups. Students more aware of their own and others' strengths. Students readily identifying PCs which assists the target-setting process. **Negative aspects/concerns** Time restrictions limit opportunities	[Interim Questionnaires 17.11.01]

		to target set and evaluate the PCs. Time is needed for staff and students to become familiar with the PC terminology and paperwork activities. Concern over meeting NC requirements. Improvement necessary for assessment structures.	
12	**27.11.00: An External Perspective (1)** An external educational consultant from the Royal Society of Arts observed and commenting on the project work.	**STAFF INVOLVEMENT** Staff clearly motivated by the work and respond well to working as teams. Felt this further developed their professional skills. Clear indications that the staff were supportive and respond positively to the initiative. **SELF ASSESSMENT** Staff recognised the need to talk with individual students to assess and record their capabilities and set new targets. Some overall assessment had been done. Discussion with students encouraged self-evaluation, evidence collection and the setting of future targets. Specific time needed for discussion leading to effective evaluation and target-setting. At this stage some, though by not all students' comments were rather bland. Teacher validation of self-assessments needs to be integrated. Assessment and evaluation proved to be an area highlighted for further development. **DT** The work in the project was considered to be heavily DT based. **ENJOYMENT** Immediate response from students was very positive. **LEARNING** Students tended at first to talk in terms of subjects. When asked about other learning, they referred mainly to teamwork and its effectiveness. Some identify ways in which teams did, or did not, work effectively. **PERSONAL CAPABILITIES** All had a clear understanding of the way in which the personal capability sheets could be used.	[External Report 27.11.00] [24]' Notes in the students' files were often very discerning – particularly considering the age of the group. It was clearly less easy to translate perception of current development/ attainment into future targets with a clear view as to how these might be reached.' [29] 'We learn more' 'It's more fun' 'Different teachers help with different things' 'It's a better way of working' 'In Maths you learn one thing – Maths. In projects you learn different bits of things and how to put them together.' 'It's better. You help each other.'
13	**13.12.00: Feedback** Researcher visit to school enabled teachers to voice concern over the progress and	**ASSESSMENT** Assessment needs to become a high priority.	[Researcher's Log 13.12.00]

	processes of the assessment and evaluation structures for PCs and subject knowledge. Informal observations indicate PC objectives not being regularly made explicit in project sessions.	Students have not easily transferred their learning in project to more regular test questions, thus Maths results have fallen. Level of consolidation work and repetitive practice has reduced, although the application of the concepts has been much wider. Standard assessment formats for subjects has not facilitated the students showing their learning in project. **ACADEMIC STANDARD** Maths teachers concerned and may integrate more training sessions into the project time. **AWARENESS** Lack of explicit emphasis may influence students' ability to self-assess.	'The explicitness of the objectives at the start of a session is still not as evident as I would like. It may be helpful to provide the teachers with the laminates or overhead transparencies to make these more explicit in an easier way.'
ACTION: Student 'training sessions' to be integrated into project time, to allow for more formal teaching of basic skills. Lessons to be focused on project theme. Continued emphasis on explicitly highlighting PCs and refining self-assessment procedures and formats. Researcher compiling of project schemes of work and supporting PC interventions.			
14	**23.01.01: Controlled Observation 1** **Aim:** to compare the project and non-project students' performance on a team-based task, with respect to the core PCs. One and a half hour, controlled observation was organised four months into the project to compare project and non-project students PCs when tackling a short problem-solving activity. Teachers chose six students from the project group and six who had not been involved in project. The project students were chosen from the student focus group previously interviewed. Jayne presented the activity which required students to work as a team to design and make a self-powered vehicle. Both groups were allocated time and resources to prepare and undertake the task. Teachers were present during the task, adopting a facilitatory role, assisting students if approached or intervening if concerns arose. Two observers monitored the activity - an external observer with experience in the assessment of skills and competences at Vocational Qualification Level, and the researcher. Observation schedules completed which focused on 'core' PC behaviours. The quality of product was viewed as a	**TEAMWORK** <u>Project students</u> able to work productively as a team, being managed by one student adopting a strong leadership role. Minimal planning undertaken with 'trial and error' used as the main strategy for problem solving. Students persevered with the task, overcoming disagreements relatively quickly and reviewing progress during the task. Activity remained incomplete although significant contribution achieved. The <u>non-project students</u> also adopted a system of group dynamics, with one student in leadership role. Minimal planning for the task. Struggled to cohere as a team, with members becoming dissociated from the group for lengthy periods. Perseverance on the task was considerably less than project group, resulting in the quality of the final product being compromised. Students experienced disagreements, often not resolving these independently and requiring teacher intervention. **PERSONAL CAPABILITIES** Project students able to reflect on their teamwork with reference to the PCs.	[Researcher's Log 23.01.01, Appendix A27: Controlled Observation 1: Emergent themes]

	secondary priority with personal and social interaction taking precedence. Group interviews undertaken with the student groups, observers and teachers.	Non-project students able to identify problems they experienced, focusing mainly on technical abilities. 'Good' teamwork related to 'helping', 'waiting', 'sharing ideas' and 'holding things'. **PROJECT** Project students considered previous project work to have assisted them in undertaking the task.	
15	**27.2.01: 2nd Staff Interim Evaluations** Three teachers completed an interim evaluation questionnaire.	**PERSONAL CAPABILITIES** **Awareness** • Students have increased awareness of PCs, however sometimes only show superficial knowledge, and finding difficulty independently associating PCs with tasks. Improvement noted through more specific target setting. • PC development is task-led • Lengthier activities inhibit their focus. • Students find difficulty understanding when they have fulfilled a PC. **CONFIDENCE** Students exhibit increased confidence. **INDEPENDENCE** Students with high levels of PCs are more independent than able students not involved in the project. **ABILITY DIFFERENCES** More able students discuss PCs in specific detail; with less able students evaluating and target setting superficially. **TEAMWORK** Students work well in groups and teams. **TEACHING STYLES** • Students have improved opportunities for independent learning than would have been obvious in normal subject teaching. • Visual display materials have assisted in reminding staff and students of the PCs. • Teaching opportunities which assist the infusion of PCs include design and evaluation activities, investigations. • Didactic or fact-based learning inhibit the infusion of PCs.	[Interim Staff Evaluation Questionnaires: 27.2.01] [T1.Q1, T1.Q6, T4.Q1, T4.Q6, T4.Q13, T3.Q4] [T1.Q9, T4.Q1, T4.Q9] [T4.Q14] [T1.Q2] [T4.Q10, T3.Q7] [T1.Q7, T1.Q11, T4.Q7, T3.Q1] [T11.Q1] [T3.Q3c] [T1.Q4, T4.Q4] [T4.Q5] [T1.Q2, T4.Q2, T3.Q2, T3.Q3a]

		SELF ASSESSMENT Time limitations for assessment and monitoring activities have been identified as an area of difficulty when addressing the PCs. **CROSS CURRICULAR** Teachers value the opportunity to work across subject areas, noting the relevance of breaking down subject barriers and developing a wider range of teaching and learning styles. **CAUSE & EFFECT** Teachers attributed the resulting effects to be a consequence of the emphasis placed on PCs as this stimulated the style of approach and hence the teaching and learning strategies used within it.	[T1.Q14, M.Q18] [T1.Q8, T4.Q8]
16	**27.2.01: Reviewing the second project** Teachers and researcher met to discuss progress on the second project (Toys). Students worked more independently, with a greater emphasis placed on single subject teaching. The project focused strongly on DT, with the choice of designing and making a toy left to the students. Science and Maths were taught in relation to the toys constructed. Increased emphasis on making PC objectives explicit within project sessions. Particular attention on tenacity, creativity and problem solving capabilities due to choice of work. Some progress trialing new formats for target setting and self-assessment. Teachers capitalised on the evaluation formats developed by other schools and amended these to improve their own approach.	**AUTONOMY & CHOICE** Independent work provided increased opportunities for students to be more autonomous. Teachers considered the increased diversity of approach to increase students' motivational and creative abilities, as well as improving their own experience during the activities. **CONFIDENCE** Teachers considered students' confidence to have developed, influencing the extent to which they were able to capitalise on the increased level of choice within tasks. This subsequently impacted on their ability and enthusiasm to work independently on focused tasks. **TRAINING** Specific training in the subject areas was provided in order to teach relevant skills. **ACADEMIC STANDARD** Although in favour of creativity and diversity, teachers were reluctant to compromise on the quality of the students' final products. They considered it possible to achieve both and encouraged students to maintain a high standard of product at all times. **AWARENESS** Teacher and students' improved awareness of PCs influencing personal development. **CONTEXT** Project theme considered to influence the variety and style of	[Researcher's Log 27.02.01] Peter "They're working confidently, they're not messing around. They might be talking but they're talking about their project and they only come up to us if they need help, or we intervene if we think they need help. But the main thing for me is the enthusiasm of the kids, they actually want to be in the workshop." [Researcher's Log 27.02.01, Paul] I've come to the

		teaching and learning opportunities. **FLEXIBILITY** Less structured teaching opportunities encouraged improved differentiation, where teachers had more time to work with less and more able students. **PROFESSIONAL DEVELOPMENT** Teachers were supportive of the project approach, emphasising the benefits in terms of their own professional development.	conclusion that it's not just about project, it's the tasks and the context that you're producing, and more of the open-ended work, because it's more important, sorry as important as developing those [PCs]. *Because I don't think you can actually untangle the two, they're so tied up with each other."*
ACTION: Third project to be resourced where possible. Researcher and teacher to formalise initial ideas. Continued emphasis on explicitly highlighting PCs and refining self-assessment procedures and formats and using training sessions. Researcher to complete previous project schemes of work and continue supporting and monitoring PC interventions.			
17	**2.4.01: Project 3** New project (Structures) underway for one month. Evaluation of PCs made much easier with the use of the new target setting and evaluation sheets.	**TIME** Teachers expressed ongoing concerns regarding the time available to do the PC assessment. Giving teachers key roles to undertake the assessment work may be more productive.	[Researcher's Log 2.4.01]
18	**22.5.01: Controlled Observation 2** A second controlled observation was undertaken eight months into the study. **Aim**: to further compare project and non-project students' PCs when tackling a short problem-solving activity. Same two student groups used as in first observation. Researcher and the school manager acting as observers. Amended observation schedule used. Students required to work in teams to construct a pulley system. The quality of product viewed of secondary priority with personal and social interaction taking precedence in the observations. Short interviews undertaken after the activity with each student group, the teacher and the second observer.	<u>Project students</u> delegated work within their teams, working relatively independently for the majority of the task. 'Leader' identified by the group early in the activity, which students considered to be an effective use of each other's strengths. Planning and decision making undertaken predominantly by the two 'strongest' or most assertive members of the team. Students needed little direction when on the task and maintained perseverance. Students planned the activity and reviewed partially within the activity. Students considered better organisation and more time to be of benefit. Communication was maintained predominantly by the more assertive members of the team, with less assertive members listening more. Some off-task communication occurred but not to the detriment of the activity. Students considered their previous experience of project work to be of help. **PERSONAL CAPABILIITIES** Project students viewed PCs positively, considering them to assist in undertaking the activity.	[Researcher's Log 22.5.01, ref. Appendix A28: Controlled Observation 2: Emergent themes]

		CO-OPERATION Observers considered the project students' capabilities to be superior to the non-project group due to the frequency of more co-operative behaviours and fewer arguments. Non-project students experienced greater difficulty in team working, particularly with the co-operation and sharing of ideas. Arguments dominated discussions. Minimal planning, mainly trial and error. Observers considered the non-project students' PCs to be poorer, based on the lack of co-operative behaviours and the increased level of argument that dominated the activity. Students sought teacher assistance regularly, focusing mainly on the choice and use of apparatus as well as requesting to 'know the answer'. **GENDER** Boys adopted a competitive stance and girls within the non-project group. Boys were seemingly more active throughout the task, gaining confidence from on-going success, whilst the girls failed to complete the task, becoming demoralised.	
ACTION: Researcher to complete project schemes of work based on teacher feedback. Main feedback sessions to be organised to finalise project initiative for the first year.			
19	**4.7.01 Final Oral Evaluation** The researcher met with the teaching group to review overall progress on the Structures project and the fourth project (Gardens). Delivery of the final Garden project proved difficult due to summer activities, and hindered by the condition of the garden area. Students involved in the design, construction and planting of a garden plot within the school grounds. PCs of Teamwork, Verbal Communication, Tenacity, Creativity and Problem Solving were emphasised. Continued difficulty for teachers to explicitly addressing the PCs. The level of planning, active involvement and time pressures led teachers to focus less strongly on making PCs explicit. Despite this teachers found it beneficial when doing so.	**ENJOYMENT & MOTIVATION** Teachers considered students to be highly motivated towards their work, noting improved attitudes. **ACADEMIC STANDARD** Students' academic development maintained throughout project. Maths teachers continued to request more formalised approaches to teaching. Further monitoring and evaluation of subject content necessary within project. As the project curriculum had been altered from the standard Year 7 delivery, teachers recognised the need to log and evaluate the work covered. This was also important for maintaining consistency in provision between project and non-project groups. A review and audit of the project schemes were required in order to recognise content and PC coverage. **DIFFERENTIATION** Opportunity to re-group students into ability sets enabled the introduction of higher-level	[Researcher's Log 4.7.01] Richard "From the students point of view they've been as keen as mustard, they've really enjoyed it I think."

		concepts to more able students within project time and themes. **PERSONAL CAPABILITIES** Teachers agreed that students had mainly developed their teamwork abilities, commenting on noticeable improvement in students who had previously been heavily teacher-dependent. **TEACHING & LEARNING, CONFIDENCE** Active involvement of students in their learning through project work was considered to suit students' preferred learning styles, as well as providing opportunity for the development of students' confidence, skills and characteristics, especially in relation to team work. **SELF ASSESSMENT** Teachers discussed need PC self-assessment paperwork to be freely accessible to students, such that opportunities to self-evaluate could be more easily managed by teachers. The opportunity to include the self-assessment formats into student diaries was considered a valuable option. **ABILITY** Teachers considered students who were experiencing poor or challenging behaviours to need a longer time for observable PC development.	[Researcher's Log 4.7.01: 26] Peter "I think one of the biggest things with the Year 7 group is the fact that they're very able to work with each other, they don't argue so much. We had some students today making little planters, and they've all got little jobs together and they're working as a little team." [Researcher's Log: 4.7.01] Peter, re. 4 challenging students.
20	**Testing PC knowledge: Student Quizzes** Student PC quizzes were designed and trailed to gain insight into whether students' understanding of PCs could be assessed and whether this may indicate student differences (ref. Appendix 24). Two cohorts of students undertook the test: project students and the control group (around 100 students in each group). Teachers marked the tests, based on a mark scheme, with the researcher as second marker. Marks were awarded for insightful answers and those which showed evidence of understanding.	The responses were varied however indicated that students were better able to give advice on PCs than non-project students.	[Student Quizzes]
21	**June 2001 : Final Evaluations** Richard and the school manager (Paul) provided their opinions in a summary statement.	**SUSTAINABILITY** Too early to decide whether project will continue to be a success in the future. More time and analysis necessary before able to be confident. **TEACHER & RESEACHER INPUT** Success related to enthusiastic teacher team. The researcher's	[Final Evaluations: Richard, Paul: June/July 2001] [Manager A1] 'I didn't fully expect the effect it would have on the

		support has enabled teachers to concentrate on classroom activities and encouraged teachers to reflect on and discuss their experiences in a non-threatening manner. **ORGANISATION** Timetabling has been crucial. High profile within school gave the research precedence and value . **PERSONAL CAPABILITIES** Highlighting the PCs in relation to specific activities and situations, whenever possible. **ADVANTAGES** •Improved relationship between students and peers. •Working in teams - helps the students mature more quickly. •Teachers viewed the research as supporting their aims, being grounded in good classroom practice. •Positive impact on students' motivation. **DISADVANTAGES** •Paperwork in developing new schemes of work, and maintaining NC emphasis. •Time necessitated by planning and undertaking self-assessment work. • A reasonable budget to facilitate some aspects of the work. **IMPACT** •Students more socially aware, particularly amongst their peers. • Formalising the teaching and learning of personal skills. Focusing teaching inputs on PCs. •Wider range of teaching and learning styles which in provides better differentiation. •Increased teacher awareness of students' potential. •Students responded with enthusiasm and dedication whether in friendship groups, in teams or individually. •Extension into additional year groups due to enthusiasm engendered in students, teachers and school management. •Positive impact on teacher professional development	staff, which was very positive, and the much wider teaching and learning styles that resulted in.' [Paul, Summary] 'The project has clearly developed one of the most powerful tools in successful teaching and learning – that is it has motivated both teachers and students through a team approach.' [Richard, Summary] 'An example of improvement would be, at the beginning of the year when the students split up into groups of four and they're asked for someone to be the team leader. You probably get one volunteer, if you had the same situation now you would get three volunteers as you can see how their confidence has developed.' [Teacher 2. A7] 'The research has made me more aware of how adaptable students really are, they still continue to amaze

			me. They never seem to be fazed about whatever the situation they are faced with. I think the research has shown evidence for this.'
ACTION: Researcher to provide whole-school feedback in school conference, encouraging new teachers to be aware of the purpose and processes involved with PCs through project work. Researcher and manager to negotiate format for 2nd year interventions, and primary project. Researcher to ensure all feedback gained from Year 1.			
22	**Planning the second academic year** The research team and the school Principal decided to continue and expand the use of project work, following its success in positive feedback. From September 2001, all Year 7 entrants were to be involved in projects, integrating Science, Maths and DT. Year 8 projects to be initiated in Business Studies, Modern Foreign Languages and English Language. Involvement of over thirty staff in Year 7 and 8 projects, with over 800 students. Teacher to student ratio to be reduced to 1:25 from 1:16. Emphasis on PCs to be more structured, one teacher to co-ordinate self-assessment activities.	**IMPACT** Teachers expressed concern over the reduced teacher to student ratio, due to less cross-curricular teaching opportunities and lack of communication and contact between teachers for planning and delivery. **PERSONAL CAPABILITIES** •Teachers making PCs explicit and have allocated responsibility of undertaking students' self-assessment activities to key members of staff. •PC displays are evident in all project classrooms •Students maintain individual PC portfolios.	[Interview 74: 12.12.01: 2] [Interview 75: 12.12.01: 2]
23	**20.11.01/ 12.12.01: Final Reflections** Interviews with school manager & teacher group undertaken	Outcomes presented in the Case Study Discussion to avoid repetition, and have been used to support meaning statements (ref. section 10.3).	[Interview 70: 20.11.01] [Interviews 74-78: 12.12.01] [Principal Final Evaluation] 'Excellent – as teaching has been improved, especially by some teachers. Good progress has been made and developments into Primary schools. We are able to stretch the more able students.'
24	**3.12.01: An External Perspective (2)** The external educational consultant from the Royal Society of Arts observed and commenting on the project work for a second time. The consultant observed Year 7 and Year 8 groups undertaking project with the involvement of 30 teachers.	**TEACHER PERCEPTIONS** Staff feedback generally very positive, the main concerns being about planning time and ensuring that NC requirements adequately met, with pupils not being 'disadvantaged'. **AWARENESS** Pupils very articulate and enthusiastic, with the Year 8 pupils able to make comparisons with Year 7 experiences. Able to identify particular areas of	[External Report 2: 3.12.01] 'We're learning teamwork, tenacity, self-motivation, problem-solving,

		PC development. **ENJOYMENT** Students highlighted their enjoyment. **CO-OPERATION/ TEAMWORK** Students stressed the importance of working with others in project. **LIFELONG LEARNING** - It's good practice for when you get a job because you cover all the things you might need - There are 10 PCs on the wall. They're all the things you need in later life. They're all needed in jobs. **PERSONAL CAPABILITIES** Students aware of PCs and the processes which enable development and assessment. **CROSS CURRICULAR** Students stressed the benefit of linking subjects to 'real life' contexts and practical situations. They also valued the standard lesson support.	self-determination, negotiation.' 'More fun, more relaxed, because you're enjoying it.' 'You have to learn to work with people who aren't always your 'friends' 'We learn from each other.' 'We have to show evidence of the PCs. We make presentations with computer slideshows, PowerPoint, in the lecture theatre.' 'We set ourselves targets and review whether we've achieved them – things like meeting deadlines. We're graded on our project work.'
25	**The Primary Project** (ref. section 13.2.1) Due to the success of the secondary project the school was granted a DfES Community Bid enabling eight primary schools to become involved in a similar project initiative at KS2. Literacy, Numeracy, Science and Design and Technology, were to be delivered cross-curricularly with PCs as a joint focus to subject development. Project commenced in September 2001, targeting Year 5 (9-10 year old) students.	*Progress continues (Sept 2001-Sept 2002)*	

Appendix A3: CASE STUDY REPORT- School D

Period of study: 10 months (October 2000 – August 2001)

0.1 General School Description

- the main comprehensive secondary school in a rural town
- approximately 500, 11-18 mixed gender students
- socio-economic mix mainly White
- eligibility for free school meals is below the national average
- aims to promote:
  - challenge and aspiration
  - personal responsibility and consideration for others
  - good citizenship and readiness for life and work in a changing world
- On entry to KS3, student intake achievement meets national average academic qualifications/levels. By the end of KS3 and KS4, attainment tends to be well above the national average. 100% of students passed at least one A-level at KS5.
- Majority of students leaving at 18 move on to higher education.

0.2 Teacher involvement

Ruth, aged 44, a KS3 science teacher specialising in Science, started teaching in 1989 having previously worked for 9 years as a nurse. She completed a four-year BEd degree and worked in one school before joining the staff at the school in 1992. During 9 years service, in both full-time and part-time posts, she has teaching experience from Year 7 to 11. She sees herself as having no specialism within the Sciences and endeavours to gain experience teaching all areas.

Having previously been involved in educational research in association with The Centre for Science Education, she maintained a positive view of the impact educational research has on improving the curriculum.

0.3 The student sample

13 Year 9 students (6 boys, 7 girls), considered low ability with particular social and behavioural difficulties. The attentions of behavioural and educational psychologists and application of discipline strategies such as class report systems, proved of little benefit. The behaviour of a number of students in this class led to regular exclusion from science lessons and school in general.

	Event	Issue	Evidence
1	**28.9.00: Planning** Ruth joined the study relatively late having been referred from another research project within The Centre for Science Education. She was interested in curriculum development and self-improvement, and had experienced difficulties with a lower-ability Year 9 group. The students exhibited demotivated and challenging behaviours, resulting in poor acquisition of subject knowledge, and disruption to classroom control. Ruth's concerns met with little practical support from her department and senior management. Classroom assistant support was allocated for some lessons, involving three interchangeable support assistants. Three generic research interventions agreed: 1) <u>Make Teamwork and Verbal Communication objectives explicit at the start of each session</u>. Teamwork and Verbal Communication PCs identified most appropriate for sample group. A3 laminated objective sheets provided by researcher to be displayed and used for targeting and review of PCs. 2) <u>Incorporate PC self-assessment session at the start and the end of each main scheme topic</u>. Adapted target setting and assessment structures provided to facilitate the recording of students' PCs development. 3) <u>Where possible, the adaptation of teaching and learning styles to enhance the opportunity for PCs development</u>. Teacher-researcher discussions focused on encouraging project or teamwork mini-research activities, aiming to encourage students' active involvement and responsibility for learning.	**TEACHER PERCEPTIONS** Teacher considered PCs to be of benefit to the group due to their poor social skills. The majority of students displayed immature attitudes towards others and were viewed as childish and disruptive. **STUDENT BEHAVIOUR** Ruth expressed concern due to students' history of poor behaviour. She considered that group work often resulted in poor quality work. Students were heavily teacher-dependent and Ruth considered that a considerable amount of support and direction would be needed to engage actively in group and independent learning.	[Researcher's Log 28. 9.00]
ACTION: Ruth agreed to consider these suggestions seriously and to integrate them into subject teaching as frequently as possible.			
2	**14.11.00: Review Meeting 1** Meeting with Ruth to review the applicability of the interventions. Opportunity to observe the students during a science lesson. PCs objectives had been made explicit using the A3 laminates, and in reviewing progress in plenary sessions.	The written target setting and evaluation structures proved challenging, and had not been well accepted by the students. **ACTIVE LEARNING OPPORTUNITIES** Ruth received a positive response from the group where students were allowed to become actively involved in their learning. Increased responsibility, pace and team rewards stimulated increased motivation, better behaviour and a more focused and competitive attitude amongst students. The write up activity	[Researcher's Log 14.11.00] Ruth: "I think they enjoyed the practical, they all got involved, there were little groups that formed themselves. One person was quickly washing things out so they could start again. It was a quick activity and their wasn't much time for them to be

		proved a less motivating activity and caused Ruth concern. <u>Issues to address</u>: ***1) More specific PC objectives needed*** E.g. 'sharing my opinions with others' was broadly misinterpreted by students relating it to shouting opinions across the room to one another. ***2) Simpler behavioural objectives were required*** An inordinate amount of time taken to settle students down, resulted in limited opportunities for making PC objectives explicit. ***3) Focus to be placed on core PCs and social intelligence objectives*** Ruth felt that students needed to modify their behaviour to respect each other's feelings and adapt to people more appropriately. More relevant PCs were chosen. ***4) Positive feedback*** Provide students with positive feedback relating directly to the PC objectives was considered to be of benefit in highlighting their relevance and value.	disruptive."
3	**14.11.00: Observation 1** The researcher observed Ruth and the student group during a science lesson. Adopted a non-participatory stance.	**STUDENT BEHAVIOUR** Observation confirmed the challenging nature of the group. Ruth's lack of confidence in handling the group was considered by the researcher to compound this. **RESERACHER EFFECTS** The influence of the researcher's presence on group was unclear. Despite the researcher maintaining a non-participatory and low-key status, Ruth made frequent eye contact and engaged in conversations during the lesson, likening the experience to an OFSTED inspection. **PROFESSIONAL DEVELOPMENT** Ruth continued to express disappointment with her professional development. Her despondency within her role was confirmed, however she maintained commitment to this research.	[Researcher's Log 14.11.00] 'The students' behaviour was poor from the outset. They came into the classroom talking loudly, the register was undertaken within a myriad of other activities with pupils often responding inappropriately to Ruth (shouting out, not looking, not answering etc.).'

ACTION: Ruth aimed to incorporate targets which focused more on students behaviour such as, 'I will not talk when the teacher is talking', 'I will do as I am told', 'I will remember to bring my equipment (book, pen, pencil etc.) to every lesson', to the PC objectives. More specific positive feedback on PC targets. Preparation of worksheets. Researcher compiled worksheets to 1) highlight and make explicit the science and PC objectives, building review into the end of each session 2) limit and differentiate the science content that the students were exposed to 3) condense scheme-related work onto two A4 sides to limit the manipulation of textbooks by the students 4) where possible, emphasise active teaching and learning opportunities			
4	**Teacher diaries (Nov 01-Jan 02)** Diary entries (November 2000-January 2001) indicate student reactions to subject knowledge, the emphasis placed on PCs and ongoing problems with student behaviour.	**NEGATIVE REACTIONS** Students' initial reaction to the PCs was negative and although there was some later improvement this was seemingly not maintained.	[Ruth's Classroom Diary 1. November 2000-January 2001]
5	**12.2.01 Questionnaire** Ruth's comments more positive about impact of PC interventions.	**STUDENT BEHAVIOUR/ WORKSHEETS** New worksheets had proven useful in highlighting subject and PC objectives, reinforcing students' achievement. Reduced, more differentiated content aided delivery and minimised off-task behaviour associated with handling textbooks, and general classroom activity. **INCREASED AWARENESS** Improved explicitness of expected lesson outcomes raised students' awareness of expectations and boundaries. **IMPROVED ATTITUDES** Ruth noted increased student responsibility for learning and improved understanding and attitude towards PCs. **SLOWER DEVELOPMENT** PC development was considered slower for less socially developed students, although all exhibited some improvement in PCs. Most students able to target-setting and evaluate PC objectives to a good standard. **TEACHER DEVELOPMENT** In being more consciously aware of PCs, Ruth is disseminating it into other classes. Confident to adapt and produce new worksheets herself.	[Teacher's Perceptions Questionnaire. 12.2.01] 'At first they would not take the PCs seriously at all. Now they are prepared to write evaluations (with varying degrees of success) and set new targets' [Student A 12.2.01] [Student B 12.2.01]
ACTION: Ruth to construct new topic worksheets herself.			
6	**12.2.01: Classroom Observation 2 & Interview** PCs were highlighted, mainly focusing on 'meeting deadlines'. This was reinforced throughout the lesson and evaluated at the end.	**CLASSROOM ETHOS** Environment considered more conducive to learning. Diana's confidence seemed to have improved.	[Researcher's Log 12.2.01] [Interview 44: 12.2.01: 27-78] Alison: "PCs considered to be 'skills for learning'"

	Ruth experiences and perceptions were discussed with the researcher, highlighting the successes and challenges of the approach, relating to the classroom ethos and resourcing.	**RESOURCES** Main impact considered to stem from tailored worksheet design. Preparation of resources considered to be time consuming, yet well focused on necessary core skills with explicit PCs of benefit. **EXPLCITNESS & AWARENESS** Students being aware of PCs considered to impact on their behaviour. Reinforcement in a range of ways (verbal and visual) consolidates the emphasis. **FOCUS** Making PCs explicit has focused teacher and students towards personal skill development. Of benefit, especially with students who are of exhibit challenging behaviours. **TIME SCALE** Longer time scale to develop PCs considered to be beneficial. **TEACHING & LEARNING** This was considered to be a process of facilitated learning, where students, having been made aware of the PCs and had behaviours reinforced, better understood the meaning and purpose of the proposed behaviours, and as such displayed performance accordingly. **ACADEMIC STANDARD** Been maintained, and complemented by additional skill development. **PROFESSIONAL IMPACT** Interventions used with other student groups.	[Item 60] [62] "We're providing them with the environment to learn, facilitators I suppose that's what we are doing."
ACTION: Ruth planned to continue differentiating classroom resources, using the interventions of making PCs explicit and reviewing. Having expressed concern over the style of self-assessment forms a modified set of student self-evaluation sheets were devised for improving the structure of evaluation and provided for Ruth. The classroom support assistants to be issued an evaluation questionnaire.			
7	**Feb-March 2001: SUPPORT ASSSISTANT EVALUATION QUESTIONNAIRES** Three teaching assistants completed questionnaires. Responses were grouped into key issues.	**POSITIVELY VIEWED** All responses were positive towards the PCs, considering them to be of benefit to students, promoting a holistic approach to learning, encouraging self-reflection and social awareness. Students considered to be generally more focused on their work. **AREAS OF DIFFICULTY** • ***The ability of the students*** Settling students down to write their PC reflections was challenging, especially where	Assistant A, B, C Questionnaires [Ass B. FC] 'It is imperative that students have the opportunity to participate in their own personal development. ... Support staff can assist members of staff by simplifying instructions and breaking down set tasks into more

		classroom support was not consistent. Considered to benefit from one to one attention, and hindered by many low ability students. • ***The nature of subject delivery*** Students lose continuity and reinforcement where subject delivery requires varied methods of instruction and style. • ***The level of understanding about the concept and its purpose*** Some students lacked understanding of purpose from the introduction of the PCs. **FACILITATORY TEACHING APPROACHES** - One to one support - Question and answer time - Breaking down understanding & reassuring students - Explaining fully what the task is about - Demonstration and student participation - Simple tasks, broken down into a series of manageable steps - Clearly set out targets which are communicated both verbally and in written form - Good organisational skills by teachers - Ability to explain to student what is happening and the purpose of the PCs **INHIBITORY TEACHING APPROACHES** - Dictation, not allowing the students time to reflect - Not allowing the students to work in groups - Demonstration only by the teacher not allowing the students to participate - Lecturing on a given topic - Not including participation and feedback from the group - Written tests which are aimed at establishing levels of information - Poor organisation skills - Poor communication **STUDENT RESPONSE** Students were considered to be 'able to reflect on their work, their social interaction and all their personal capabilities' [Ass A Q6]. **ACADEMIC ACHIEVEMENT** Definitive answers on the impact of PCs on academic achievement was not given however two assistants noted improved	manageable activities, encouraging students to build up a range of personal capabilities at their individual pace.' <u>Assistant B [A1]</u> 'Focusing on individual students' capabilities and encouraging self-awareness are important facets of personal development ... This approach creates a more analytical and thoughtful methodology, students are more inclined to break down problems independently.' [Ass A Q7] 'I have evidenced certain students taking pride in their work and trying really hard. This has been reinforced by the teacher reminding them of their personal

		attitudes, arising from improved clarity of purpose within lessons. **SELF ASSESSMENT** Self-evaluation was considered an important factor, allowing the students reflect on their learning. Students seemed willing to identify targets and to highlight personal success. It was considered a constructive exercise in the sense of the analysis of teaching positive skills, and the evaluation of their effects. It was, however, not easily integrated - some students found difficulty verbalising opinions about their PC development. Students required high levels of one-to-one support to become familiar with the formats of evaluation documents and to complete them appropriately. One assistant questioned whether teachers had time to do this within the remits of their classroom teaching. The staff considered themselves to be able to contribute to the development of PCs, focusing mainly on one-to-one practical support.	capabilities.' [Ass B Q7] 'Those individuals in the group who do not require specialist support have benefited from this particular method of working – primarily because they understand the aims and objectives of this approach.'
8	**21.5.01: Classroom Observation 3** A meeting was held with Ruth three months later. A classroom observation was undertaken (Monday, 9.15 am-10.15 am). Lesson context - 'Populations and Pollution' – the influence of weeds. Classroom assistant present. Students entered classroom in an appropriate manner, settled down relatively quickly Introduction to lesson did not focus explicitly on PC and subject objectives. Introduction to lesson was mainly teacher-led. Some students quickly loosing concentration. Students found difficulty with set activities, posing many questions and eventually leading to its collaboratively completion. Students were given short investigative task within the school grounds.	**EXPLICITNESS** Concern over lack of explicit objective setting. Purpose of task less apparent, resulting in less focused activity. Move back to a teacher-centred approach. **ACTIVE INVOLVEMENT** Active involvement during the lesson was welcomed by students, stimulating enthusiasm and excitement. **BEHAVIOUR** During the activity some students' behaviour proved challenging, hence it was necessary to control them on an individual or small group basis. **AWARENESS** Students understood how to undertake the activity, however they were unaware of the purpose of what they were doing. Some could be found adjusting or altering results in order to improve their results.	[Observation Comment Form 21.5.01] When the objectives were made explicit it gave a clear structure to lessons, and when this doesn't happen it is very vague as to what and why content is being covered.
	Teacher-researcher discussions – Lack of explicit emphasis	Ruth commented on an improvement in students' behaviour and an improvement in	[Interview 48. 21.5.01: 1-6]

	Adapted lesson worksheets not produced for this topic of work. Interruptions from SATs testing made adaptation of the curriculum resources less time and cost effective. PC objectives had also not been regularly stated and reviewed in lessons on a verbal basis such that the progression of ideas for personal development had continued. Despite of this, Ruth spoke of the value and benefits of making the objectives explicit. **Self Assessment** Adaptation and alteration to self-assessment formats was ongoing across all the research groups. Ruth's adaptation of the self-assessment formats had limited the written evidence required from the students, and focused strongly on target setting with respect to test score performance.	attitude towards self-evaluation. She attributed this to the efforts made with making the PCs explicit. **SELF ASSESSMENT** Ruth felt that these amendments increased the accessibility of the documents and overcame the difficulties of time restriction and students' poor literacy skills. The reflective evidence base was however more limited, reducing the collection of specific anecdotal evidence; a feature which had been useful in exemplifying achievement. The reader was thus unable to evaluate the process of PC development in relation to specific behaviours. **IMPACT** General behaviour improved, however limitations on academic ability become more prevalent (below Year 6 standard). Students' thinking and analytical skills are poor, only one student illustrating tenacious and conscientious behaviours in independent work. Students view the teacher as a giver/ provider of information. Learning is characterised by the coverage of work, as opposed to the acquisition of knowledge and understanding. Ruth considered two factors to contribute to the improvements: 1. differentiation of textbook material - limiting and focusing the amount of work presented to the students in one session. 2. explicitly noting the objectives for each piece of work.	[Student A, B, C Self Assessments 21.5.01] [Researcher's Log 21.5.01] [Interview 48 & Researcher's Log. 21.5.01] "My gut feeling is that the PCs have had great impact at the beginning and end of each lesson." "If only someone had done this lower down in their education, in primary school even."
9	**13.7.01: Meeting** A meeting with Ruth aimed to discuss further insights into the research and to review the first draft of the case study. Due to school activities the PCs had not been emphasised as much in subject teaching, however, Ruth had involved the students in specially designed development tasks for PCs. The PC targets for individual pupils had been discussed mainly on an oral level.	**IMPACT** The value of the research interventions could be seen in the improved behaviour and overall temperament of the students, with improved teacher-student relationships and classroom ethos. These developments were steady however took a considerable period of adjustment before differences were observable. Ruth considered the change in the groups' behaviour to impact on	[Interview 53. 13.7.01: 2] [Interview 53. 13.7.01: 20] "... it's probably a combination of what we've done and their maturity."

		their behaviour throughout the school. **RESEARCHER EFFECTS** The researcher's presence was not considered to be intrusive.	
10	**May 2001: Final Evaluation** As Ruth's in-class involvement drew to a close she completed a final evaluation to condense her perceptions and experiences of the research.	**GENERAL IMPRESSIONS** Concerns that evidence gathering has not been consistent. E.g. evaluation sheets from pupils, teacher's approach, the targeted PCs. As such the teacher considered that data may not be comparable. **PC INTERVENTIONS** Positive views of the impact of the interventions, improving students' behaviour and encouraging improved attainment. ***Most effective strategy*** considered to be making the process simple. Repetition of PCs on a regular basis was beneficial to lower ability students, assisted in different forms ways: on paper, at the beginning of each lesson, on the board, verbally, and by going over the expected outcomes of each lesson in review and evaluations. ***Modification and simplification*** of targets and paperwork for lower ability students. **ADVANTAGES** • teacher had a better time in the classroom • students gained a better education in science due to improved classroom ethos • support from researcher and the chance to listen/talk to other teachers at the research group meetings • University backing the pupils' work gave credence to what was being suggested **DISADVANTAGES** • The time necessary to differentiate the work and to decide which PCs would be included in each lesson • cost of the worksheets and copyright constraints on scheme materials **IMPACT ON STUDENTS** Work with prescribed PCs were considered to have limited relevance for the class.	[Final Evaluation May '01] [A2] 'The impact on the pupils' behaviour was staggering, from virtually uncontrollable pupils, the whole class ended up being able to participate at some level and some made significant progress.' [A3] 'Personally, the advantages were that I had a much better time in the classroom than I could have imagined at the start of the academic year.' [A4] 'Making and copying the worksheets was a definite disadvantage, but worth it for the easier time in the classroom.' A5: It was wonderful to see the physical improvement in

		Clarification and simplification needed. **Self Esteem** Increase in self-esteem and self-confidence for the majority of the class. Students felt that someone was investing in them and therefore believed in them, which encouraged them to try harder for themselves. **IMPACT ON TEACHING** PCs made the teacher focus on what was really required by the students. Addressing basic behavioural issues was essential, which target setting encouraged and reinforced. Presentation of lessons and resources considered useful and transferable to other students with behavioural problems. **IMPACT ON TEACHER** Increased confidence. **MAIN AREAS OF IMPROVEMENT IN PCs** Recurring target for many students - 'to avoid giving up easily'. Students demonstrated behaviour on specific occasions, whereas previous work lacked tenacity. Teacher considered this improvement to result from ***increased self esteem*** resulting in more effort put into work.	posture when I handed out the certificates. One girl even went and showed her form tutor before dismissal at the final assembly. [A7] 'The research has given me back some confidence that I was losing, along with the battle to make the pupils behave in the way I wanted them to.'
11	**8.10.01 Final Meeting** The analysis of the case study promoted a number of issues which were discussed and clarified with Ruth.	Outcomes of these discussions are presented in Appendix A4 in order to avoid duplication.	

Appendix A4: CASE STUDY FINDINGS & DISCUSSION

SCHOOL D: A STORY OF SUBVERTED EFFORTS

The case discussion for School D, related to Appendix A3, is provided, and represents a story of subverted efforts.

A4.0 Overview

Ruth, an experienced Science teacher, approached the research study from the standpoint of continuing her own professional development, in addition to the academic and social requirements of her students. The case study tracks the teacher, faced with a group of thirteen challenging students in a rural school, over a period of ten months, during which time she resigned from her teaching career.

The case illustrates the challenges stemming from students' sustained low academic achievement and poor behaviour. Students' expectations of success were low in Science, possibly due to their consistent identification as a 'lower-ability' group by others. Generic research interventions met with limited success, although PC development was associated with the explicit recognition and review of PCs in Science, assisted by target-setting and written self-assessments.

A reflective and developmental discourse was maintained between the teacher and researcher, resulting in minor changes to teaching approaches through improved differentiation of activities.

The case suggests that the teacher viewed the experience as beneficial, impacting positively on students' self-awareness, self-esteem and behaviour, as well as improving the focus of lesson outcomes. The extent to which students developed PCs was tracked on a whole-class basis and indicates an overall improvement in students' attitude. The researcher noted some improvement in students' attitude, however maintained concerns over the classroom management structures.

A4.1 Key Points

1. The issue of ownership influenced the teacher's control over professional development. Increased ownership led to improved confidence and empowerment to adapt practice.
2. Students reacted positively to learning experiences which gave them active involvement and control. They responded with greater motivation and co-operation to the increased level of responsibility and choice in their learning, which enabled them to manage their own activities.
3. Amending worksheets to include PC targets resulted in the differentiation of content, and were reinforced positive behaviours, contributing to students' improved behaviour, self-awareness and self-esteem.
4. A contention between teacher belief and action emerged resulting in student involvement in learning being more passive. The teacher's main focus during lessons was to control the students' behaviour before introducing challenges at a more cognitive level.
5. Differences in perceptions of 'success' significantly influenced the teacher's actions throughout the study,
6. Although the research was valued, national testing demands took precedence, determining the teacher's choice of pedagogy and attitude towards students' PC development.
7. Students' behavioural difficulties were considered to relate more to the classroom management and teaching and learning strategies used by the teacher.
8. The teacher's expectations of students' success were low, and as such the students' behaviour could be said to relate to a self-fulfilling prophecy. The research prompted the teacher to change her view of the students.

A4.2 Key Point 1: Ownership

Ruth openly expressed her despondency with departmental structures, and viewed the research as a means of gaining ownership over her professional development [Researchers' Log 28.9.00, 14.11.00]. The case reveals how Ruth's fruitless search for professional development had reduced her self-esteem, which had been compounded by the successive allocation of low-ability groups [Researcher's Log 28.9.00], and limited opportunities to teach sixth form students. Her difficulties in disciplining disaffected students had negatively impacted on her subject teaching and her motivation towards the job. She recognised her low self-confidence at the beginning of the study, feeling disempowered and lacking control over her own development. She later commented on the beneficial effect of her involvement in the research [CSD: 10, Interview 44: 12.02.01: 55]

> [Final Evaluation, A7]
> The research has given me back some confidence that I was losing, due to the battle to make the pupils behave in the way I wanted them to.

Ruth seemingly used the research as an opportunity to voice her opinions, with an assurance that her efforts would be valued, her opinions listened to, and her professionalism recognised [Interview 64: 8.10.01: 1-2]. She felt supported by the University body, and this improved the control and credibility she had over her work. When asked how the research had affected her position within the department, she commented that,

> [Interview 64: 8.10.01]
> 99. Ruth: I think people were quite surprised, they thought 'Oh, she's working with Hallam University' you know, 'She must be alright then.' But it didn't change anything, they didn't change their behaviour towards me in any way. I think may be their attitude was slightly different, a little bit more respect. But not enough to be bothered.

Ruth commented that the researcher's support had prompted her to review and adapt her practice, and she valued sharing ideas and experiences on a one-to-one basis. She considered it to be a fulfilling, yet challenging experience, which she would have liked to have received from her own colleagues [Interview 64: 8.10.01: 4-6].

From the research, Ruth gained a sense ownership and empowerment, which had been lacking due to decisions predominantly being management driven [Interview 64: 8.10.01: 90]. This, and the teacher-researcher partnership motivated her commitment to the research. However, her eventual involvement was surprising, and illustrated stark differences between her verbal intentions and actual actions.

A4.3 Key Point 2: Students' active engagement in learning

Despite being a poorly motivated group, the students reacted positively to active learning experiences [CSD: 2], such as teamwork, research activities and practical investigations. These encouraged students to take ownership over their learning and to develop a range of PCs. These opportunities actively engaged students, by involving them initially physically and later mentally with NC Science topics. The approach assisted their development of subject knowledge and understanding, and also promoted opportunities to improve PCs such as verbal communication, self management and teamwork.

Ruth recalled two valuable experiences, which actively involved the students in a mini-research task and a science investigation [CSD: 5]. The fast moving pace, instilled through group competition, and greater involvement from collaborative working, stimulated increased levels of students' responsiveness and discouraged challenging behaviours. Students responded with motivation and co-operation to the increased level of responsibility and choice in their learning, resulting from the opportunity to manage their own activities within the boundaries set by the teacher.

When students were encouraged to take ownership in this way, in roles which necessitated co-operation, self-management, teamwork and thinking, they changed from passive absorbers of information to active participants in learning. In order to capitalise on these experiences, it was useful to explicitly and regularly reinforce the core PC behaviours [Interview 64: 8.10.01: 145]. Ruth also noted that she experienced a more conducive learning atmosphere, with fewer behavioural difficulties on these occasions [Researcher's Log 14.11.00].

During these activities students were rewarded on the basis of academic outcomes, as well as for the manner in which they worked. This valued a combination of PCs and academic skills. This proved stimulating to students, who reacted positively towards achieving personal targets, irrespective of their academic outcome. The influence of motivation towards learning is well recognised in existing literature (Deci & Ryan 1992, Brown *et al* 1998), and links here to the students' behaviour towards learning.

A4.4 Key Point 3: Redesigning worksheets

Academic and PC objectives were made explicit through the use of adapted worksheets, which Ruth and the classroom assistants reported to increase the focus on learning and personal development during lessons [CSD: 5].

[Interview 48: 21.5.01]
12. Ruth: [Making the objectives explicit] ...made a difference, I am sure they did. I think we needed to do that, it certainly got us sitting down and thinking 'This is what we should be doing', instead of the kids ignoring me, which is what it was at that time.

[Questionnaire: Assistant B. A8]
The teaching has become more progressively structured. There is evidence of sequencing and the methods used to encourage participation take into account the mixed ability apparent in this specific group of individuals. I believe the students feel a more positive sense of achievement when they have met the targets set at the beginning of the session, which in turn gives them more confidence to pursue other tasks.

The sharing of expected targets led to students and support staff to having a better understanding of the purpose of lessons, and students were encouraged to be more responsible for achievement, which had previously been mainly teacher-dependent. This shared responsibility stimulated a desire for students to concentrate on achieving identified targets replacing disinterest and disruptive behaviour. This improved student and teacher relationships and individuals' self-confidence.

The amendment of worksheet design to include PC targets also resulted in the differentiation of subject content. Worksheets were compiled initially by the researcher, and later by the teacher, and were focused on a limited number of key learning objectives. Previously, students worked from commercial textbooks, which were highly detailed and proposed a variety of learning activities. Ruth felt that the level of detail was overwhelming, and preferred the specificity of the study's designed worksheets, which clearly highlighted the aims of the lesson, both in relation to subject knowledge and PCs [CSD: 6, [Interview 44: 12.2.01: 29].

The clarity provided by the worksheets, and the reinforcement of positive behaviours, was considered to contribute to students' improved behaviour [CSD: 5, 9], self-awareness [CSD: 5] and self-esteem [CSD: 10]. The differentiation of work, enabled the students' abilities to be better matched, and promoted greater levels of academic success, also providing opportunity to achieve the PC targets. During review discussions, students gained a sense of satisfaction from fulfilling the lesson aims. This was different from their previous learning experiences, which rarely reviewed their achievements in relation to specific lesson objectives.

A4.5 Key Point 4: The contention between teacher belief and action

Unfortunately, observations led the researcher to recognise that active learning opportunities were in the minority and that, despite the research emphasis, learning remained predominantly teacher-centred, with limited reference to PCs. As such, a dichotomy emerged between what Ruth had expressed were worthwhile learning strategies, and what she regularly delivered. Two possible interpretations are suggested for this discrepancy. Firstly, that the students' ongoing poor behaviour caused her such concern that she resisted to trial these activities further. She may have considered better class control could be maintained through teacher-centred approaches, which limited students' physical movement around the classroom. Or, secondly, that despite the students' positive reaction to these activities, Ruth was unprepared for the planning that was required for these activities which increased the level of organisation for the lesson.

The data supports the view that Ruth's lack of self-confidence was a major inhibitory factor, and that she feared students' behavioural difficulties [CSD: 3, 6]. Indeed, Ruth confirmed that behavioural issues inhibited her from allowing the students to engage more actively in their learning [Interview 64: 8.10.01: 112]. Although recognising the benefits of 'active' learning opportunities, Ruth's practice was predominantly influenced by the need to experience a 'good' lesson, which she related to when students exhibited appropriate behaviours, such as, 'doing as they were told', and 'not talking when the teacher was talking'. These views were reflected in the amended PC objectives that Ruth set for the students [Final Evaluation: A2], and in her answers during interview.

Ruth stated that her main focus during lessons was to control the students' behaviour, before introducing challenges at a more cognitive level [Final Evaluation: A6/ CSD: 10]. Ruth found active learning opportunities difficult to manage, and opted for a more passive approach [Interview 64: 8.10.01: 132].

The researcher observed that when designed worksheets were not being used, the teacher did not explicitly state the lesson objectives. The students and assistants were, therefore, unclear about the purpose of the tasks and their relationship within the broader topic or the students' personal development [CSD: 8]. On these occasions, ownership reverted to the teacher, which inhibited the control and personal responsibility students had over their learning. PC development was consequently limited on these occasions.

It is interesting, that although Ruth perceived a marked improvement following the setting of PC and academic objectives through the designed worksheets, she did not use them as a matter of course. She highlighted some of the difficulties in maintaining this intervention, along with her enthusiasm for it.

> [Final Evaluation, A4]
>
> The time necessary to a) differentiate the text book/work, b) decide which PCs would be included in each lesson, c) make and copy the worksheets, was a definite disadvantage but worth it for the easier time in the classroom. The cost of the worksheets produced is also a disadvantage as well as the constraints due to the copyright on scheme materials (but it was worth it!)

There may be four possible reasons for her lack of sustained attention.

- Ruth may have felt she was actually making the purpose of the sessions clear and therefore did not consider further emphasis necessary.
- Ruth supported the use of the intervention, fully recognising its potential for the students, but felt unable to use it regularly because of limited time, which forced her to use it selectively.
- Ruth was not fully committed to the interventions and did not believe that they would benefit the students.

- Ruth inherently resisted change, which required considerable additional time and effort to introduce and maintain the interventions in her teaching.

The data suggests that Ruth outwardly embraced the interventions but was inhibited by the additional time required to implement change, especially with the student group. Despite full and frequent discussion regarding the benefits of active teaching strategies and explicit PC objective setting, she never fully integrated the interventions into her teaching. Although outwardly 'abiding by the research team rules', inwardly she seemed less convinced and lacked the necessary motivation to sustain change. The researcher felt that Ruth never fully resolved these personal conflicts and was torn between the research, the students, and curriculum requirements.

A4.6 Key Point 5: Differences in perceptions of 'success'

During the course of the study an insight was gained into what Ruth considered to be important outcomes from her teaching and the study, both in terms of subject knowledge and PCs. Essentially, the study focused on providing students with opportunities, during regular Science teaching, to develop a range of capabilities which were considered influential in students' development and future potential. The behavioural objectives were designed to promote a sense of personal responsibility, and to enhance the learning process. PCs were designed to develop individuality, to channel successful behaviours, and to promote better learning, by capitalising on personal strengths and weaknesses.

In establishing Ruth's view of what constituted a conducive or successful learning environment or lesson, she considered that there was a close relationship between a successful Science lesson and a successful lesson in developing students' PCs. She described a 'good lesson' to be:

[Interview 64: 8.10.01]

136. Ruth: ...one where nobody had walked out, nobody had thrown anything at me! Realistically... it's a lesson where you've got on well, you've been adequately prepared, the kids are coming in a good frame of mind to learn and behave themselves, and everybody's got their equipment with them, the equipment you've ordered for the lesson has worked and been there, there's been

enough of it. That the lesson has gone with pace and is at the right level, and at the end of it, you feel as though you've achieved something.

A 'good' PC lesson was viewed similarly, although the use of varied teaching styles was emphasised.

[Interview 64: 8.10.01]

140. Ruth: It's really what I said before. So, I'd have been well prepared, I'd have got these worksheets done with the PCs on them and the outcomes at the end as well. All the equipment would have been working and appropriate for their level – I can't stress that enough really. For my sort of kids, it would have had to be me leading it through. For me to be on top and feeling fine, and the kids would not have any personal problems and everything would just run smoothly... [The learning style would] depend on the PC. I would change the teaching style depending on which one I was intending to do. For example, the co-operating thing, you'd have to have some sort of team working activity. Whereas maybe if you were trying to do a critical thinking thing then they'd have to do something on their own.

These descriptions of 'good' PC lessons suggest the use of activities that engage students actively in their learning, although on previous occasions Ruth also identified successful learning environments as those in which the students 'sit down' and 'volunteer to ask questions' [Interview 44: 12.2.01: 27]. In this way, her priority to calm the students' behaviour seemingly continued to underpin the work [Final Evaluation: A2]. Ruth's view of success related more to conformity than to an increased sense of responsibility and diversity, as reflected in her adaptation of the proposed PC objectives (ref. Table A4.6).

Original PC objectives	Amended objectives
To share my opinions with others	I will not talk when the teacher is talking
To listen to other people	I will ask for advice if I don't know what to do
To co-operate with others	I will remember to bring my equipment to every lesson
To help reach agreements with others	I will always do my homework to the best of my ability
To keep track of my work	I will concentrate on what needs to be done
To organise and plan how to go about a task	I will do as I am told
To concentrate on what needs to be done	I will try not to give up easily
To respect other peoples' thoughts	I will share the jobs out fairly when doing practical
To act on what other people say when appropriate	

Table A4.6: ***Original & amended evaluative questions for student self-evaluation***

These changes were made independently of the researcher, and are considered different in both style and meaning. Whereas the original PC objectives focused on positive behavioural indicators, the amended statements highlighted negative attitudes or behaviours. Ruth suggested that her amendments were tailored to the student group, whom she considered needed 'lower order' objectives. It is relevant to note that these changes related only to the student self-assessment documents, and that she retained the original objectives when making explicit reference to PCs during lessons and in worksheets.

The amended objectives represented a significant shift of emphasis away from the proposed purpose of PC development. Although rules are essential within classroom environments, there remains a distinction between rules and PC objectives. Where rules aim to engender conformity, the PCs aimed to focus on individual or personalised areas of development.

The amended objectives were also set at a lower level of challenge for the students, which may have compounded their poor self-esteem and low self-image. Students of this age may well have viewed statements, such as 'I will do as I am told' or 'I will remember to bring my equipment to every lesson', as low order skills, thus enforcing a sense of low expectation from the teacher. This is in marked difference to the aims and purposes of PC development, which focused on improvement and increasing personal potential.

The teaching and learning of PCs through subject teaching, may, at times, benefit from simplified terms if students are unable to interpret or relate to the PC objectives. However, this simplification must result in a version of PC objectives which maintains their original purpose. This has been achieved with primary aged children who used the core objectives as their main focus (ref. School A).

A4.7 Key Point 6: The influence of academic test scores

Examination and test scores played a major role in Ruth's perception of success. The PCs promoted skills and characteristics that could contribute to improved academic achievement by increasing engagement in learning, and by enhancing students' ability to learn. The improvement of test scores was a potential spin off, however, it became evident that Ruth increasingly measured success in PC development by improved academic achievement. Although she accepted the relevance of PCs, for her particular group of students [Final Evaluation A6, CSD: 7], in practice her main priority was knowledge acquisition and retention [Interview 44:12.02.01: 3].

This was also emphasised by her amendments to students' self-evaluation documents, where reflective questions diverted students from action planning and review of PCs, towards tracking academic achievement (ref. Table A4.7).

Original questions linked to PC objectives	Amended questions linked to new objectives
What is your target?	What stopped you getting 100% in the latest test?
How will you reach your target?	What were the last targets you chose to help you get better marks?
Who might help you?	How did you improve these areas?
What have you done to meet your target?	Choose three targets to help you improve your work
What went well?	
What did you find difficult?	
What would you choose to improve on next?	

Table A4.7: ***Comparison of PC objectives***

Furthermore, pressures to complete the course syllabus, and to achieve results, led to 'drumming' information into students [Final Evaluation: A6]. Ruth struggled with the differing demands placed on her by the research, by the students, and by her department, and this forced her to compromise the purpose of the research. Possible reasons are that:

- from the outset Ruth's perception of the research was different from that intended, and she viewed the development of PCs as a means of enhancing cognitive ability
- Ruth's perception of the research was the same as that intended, however the requirements of the students (predominantly behavioural), and the requirements of the department (predominantly test-related), forced her to compromise the proposed ideas.

The latter appeared to be the case. Ruth's belief in generic capability development was evidently strong, given her discussions with the researcher, however integrating PCs within the curriculum resulted in a change in emphasis.

The requirements of the department, in terms of academic test results may have led Ruth to view the research of less importance than knowledge acquisition, and she therefore adopted an approach allowing her to work flexibly within the remits of both. As such, although she valued the research's potential benefits to her students and herself, curriculum demands took precedence, and determined her choice of pedagogy and attitude towards students' PC development [Interview 64: 8.10.01: 202-207].

A4.8 Key Point 7: Classroom management

The researcher's observations suggested that the students were below average ability for their age, and had difficulty with basic literacy skills [Researcher's Log 21.5.01]. Lack of pace during lessons, compounded by literacy difficulties, often led to demotivated behaviour from the students and the teacher. Despite this, the researcher considered students' behavioural difficulties to have related more specifically to the classroom management and regularly used teaching and learning strategies.

> [Researcher's Log 14.11.00]
> I have strong concerns over the methods of delivery, the standard of expectation and the level of personal self-confidence in Ruth... The students' behaviour was poor from the outset. They came into the classroom talking loudly, the register was taken within a myriad of other activities with pupils often responding inappropriately to Ruth (shouting out, not looking at her, not answering etc.) I feel that this is an area which could set the scene for the rest of the session and one which may be addressed in the future. What is expected on entering the classroom?
>
> The lesson progressed with a variety of interruptions, people coming in, pupils shouting out, pupils getting their things together, asking inappropriate questions, talking amongst themselves. The layout of the room did not assist the effective regulation of behaviour, being widespread, teacher at the front, and disruptive pupils together at the back.

This reflection is based on a lesson where only ten students attended. It is most probable here that poor classroom management strategies contributed to the difficulties for this group, coupled with poor academic and literacy abilities. It is the researcher's view that many of the students' behavioural problems related to Ruth's own lack of confidence, low self-esteem, and low expectations of the students.

Although Ruth seemed to attribute the main difficulties to students' poor behaviour, it is possible that the effects were compounded by her own reaction towards it. Early establishment of basic rules for entering the classroom, getting seated, and answering the register may have proved useful in establishing a positive and respectful ethos [Researcher's Log 14.11.00]. Indeed the data suggests that it was essential to establish effective classroom control prior to the research interventions having any success.

A4.9 Key Point 8: Low expectations

Why did Ruth have difficulty establishing control with the students? They were a particularly challenging group, and their poor reputation throughout the school could have negatively influenced Ruth's perceptions of them, which was further compounded by her lack of self-confidence. She frequently stated that she experienced difficulty with this group, and that her expectation for achieving academic improvement was low. Ruth later recalled that:

> [Final Evaluation, A2]
>
> I was at my wits end and had given up hope on making any progress with this class, I was fortifying myself against just coping with a miserable year.

The influence of teachers' expectations is recognised within research literature associated with the Pygmalion effect (Rosenthal & Jacobson 1968: 174). It is also related here to the students' poor behaviour. The central idea of this long-standing research is that, 'one person's expectation for another's behaviour could come to serve as a self fulfilling prophecy'. As Ruth's expectations of students' success were low, their behaviour could be related to a self-fulfilling prophecy. As such, where Ruth expected the students to react poorly, they felt able to continue. She attempted to tackle poor behaviour, yet if her expectation of them had improved, she might not have accepted the poor behaviours so readily, and this may have influenced the students' performance.

It is likely that the students were unclear of their ground rules when entering the classroom, and felt free to explore its boundaries. Prior to the study, the students' attitudes had become established and had been reinforced on several occasions. Once the study was underway, Ruth used the PC interventions to focus the students' attention on specific behavioural objectives, and reinforced them within her teaching. In effect, the students were being given guidelines for behaviour whilst in the classroom, which in turn led to the PC objectives becoming ground rules for basic classroom behaviour.

Following the introduction of the PC interventions, Ruth considered the classroom ethos to alter, from one where difficult behaviours predominated, to one where the students' behaviour improved [CSD: 6]. The sharing of expectations, both behaviourally and academically, enabled most students to engage more with their learning [Interview 44: 12.2.01: 28-29]. Although several students continued to exhibit challenging behaviours, Ruth spoke of an overall improvement in behaviour once guidelines were identified and reviewed, which she related to students' improved success and self-esteem [Final Evaluation: A8].

As lesson structures became clearer and the expectations more explicit, Ruth's own experience also became more positive, prompting a change in her view of the students [Final Evaluation: A2]. From a despondent, negative feeling where she was 'fortifying herself to cope', she experienced positive reactions from the students, which increased her own self-confidence when dealing with them. Her expectations also improved, and she was able to discuss specific occasions where particular students had conducted themselves appropriately, and had shown improvement on tasks. Ruth recalled,

> [Final Evaluation A2, A6, A7]
> The impact on the pupils' behaviour was staggering, from virtually uncontrollable pupils the whole class ended up being able to participate at some level and some made significant progress.
>
> An important spin off from this was an increase in self-esteem and self-confidence for the majority of the class. They felt that someone was investing in them and therefore believed in them, which gave the, encouragement to try harder for themselves. It was wonderful to see the physical improvement in posture when I handed out the certificates from the university.

> The research has given me back some confidence that I was losing, along with the battle to make the pupils behave in the way I wanted them to.

A4.10 Summary

This case is presented to illustrate the effects of the action research process with a less confident practitioner. This case describes the efforts of a teacher who was unsure of her future in the profession, and was endeavouring to take control of her own professional development and improve her pupils' behaviour towards learning. Her involvement with the research brought attention and external support, assisting her to cope with a group of challenging students. The main focus of the work resulted in tackling the students' social behaviour, with the aim of subsequently influencing their PC development. By differentiating classroom resources, sharing lesson objectives, raising lesson expectations, and instilling review and reflection, the teacher was rewarded by improved social behaviour, and better academic achievement.

This study demonstrates the impact of ownership of the learning experience, both from the teacher and her students. When active teaching and learning strategies were used, students had improved opportunities to take responsibility for learning, and to interact with each other. If sustained, these occasions had the potential to enhance PC development, especially in areas of teamwork, verbal communication and social intelligence.

The case describes how, despite good intent, teachers' practical and philosophical issues may significantly influence their actions, to the extent of compromising the research aims.

It is useful to consider this case in terms of the impact that the 'Hawthorne effect' (Diaper 1990) may have had on its results. This suggests that although PC development was to some extent successful in this case, it may not have been the main stimulus for the observed improvements. Indeed, the Hawthorne effect suggests that it is likely that any new structure would have benefited this group, as the teacher was able to invest more time to thinking and reflecting on her own practice. Although the PCs provided a context through which the teacher could reflect and take action, the actual result related may relate mainly to better classroom management and a more conducive learning environment, rather than students' PC development. The PC research, therefore, provided a platform for identification and resolution of the underlying issues for this group, a necessary precursor to further intervention or development. It is also noted in this case, that these improvements may also be the initial stages of a lengthier continuum of PC development, and, as such, provides an indication of how less able or more challenging students initiate improvement in this area.

Appendix A5: CASE STUDY REPORT - SCHOOL E

Period of study: 19 months (May 2000 – December 2001)

0.1 General School Description

- a secondary community comprehensive
- catering for over 1100 mixed gender, 11-16 year old students
- larger than the average secondary school, serving a large community in a relatively prosperous urban area
- student intake represents a wide range of social backgrounds, with overall socio-economic circumstances above the national average.
- considered to be very effective and to have excellent leadership and community links
- students start the school with an overall attainment level which matches the national average
- attainment on leaving the school is above the national average at GCSE level.

0.2 Sue

Sue, aged 42, is the Deputy Head and Head of Department for Science, with specialism in Chemistry and Biology. She entered the teaching profession in 1987 after spending time as a research assistant and as a hotel manager. After gaining Qualified Teacher Status she worked in two schools before joining the staff at the school 1996. She has 14 years experience in full-time positions and has been awarded an Advanced Skills Teacher award by the DfES.

Sue had previously been involved in educational research and was aware of its demands and methods. She wished to become involved in the study as a means of broadening students' learning experiences.

0.3 David

David, aged 45, is an experienced Biology specialist with 22 years teaching experience. Since qualifying as a teacher he has worked in two schools, with 20 years experience at School E. He holds the position of KS4 co-ordinator with additional responsibilities for the management of the Biology Department, the organisation and administration of Modular Science courses and has introduced the 'Cognitive Acceleration in Science Education' program at KS3.

He had no previous experience of educational research prior to his involvement in this study, and was interested to become involved to help develop students' learning.

0.4 The student sample

Two classes of Year 8 (12-13 year old) students, approximately 60 in total were involved in the first phase of the study, with additional groups involved to a lesser extent during phase 2. Students were of mixed gender, average to high ability groups.

	Event	Issue	Evidence
1	**Phase 1: Initial Involvement** Sue and David were recommended by their Local Authority Science Advisor due to the school's reputation for achievement in science and commitment to improvement.	**TEACHER COMMITMENT** The teachers' interest in the study stemmed from their personal commitment to educating students academically, personally and socially. Although acknowledging the value and need for both forms of development, Sue and David both felt that their science teaching had become compromised by the assessment driven curriculum, hence students' personal skills were not adequately being recognised in their teaching.	
2	**22.5.00: Initial Perceptions** Both teachers completed a questionnaire to elicit their initial perceptions of the study.	**DESIRABILITY** Both teachers considered PCs to be desirable for youngsters' social and professional development, viewing them as necessary skills for school and lifelong learning. They considered PCs to be of increasing importance as initial indications within curriculum policies increasingly emphasising vocational, thinking and transferable skills. **SCHOOL COMMITMENT** Sue and David noted that the school was committed to encouraging students' personal skills, in order to succeed in the workplace. However they appreciated that more explicit attention and time to pursue aspects such as 'creativity' would be of added benefit. **SCIENCE** Both teachers viewed the science curriculum as a medium for developing PCs, focusing strongly on the variety of teaching and learning strategies that would enable students to use and develop their skills. Both teachers felt that PCs could be emphasised more regularly through subject teaching, however revision of current provision would be required.	[Initial Perceptions Questionnaires: Sue:22.5.00: A1] 'Many of the PCs are what we would try to encourage and hope for in the children we teach. They cut across all areas of work at school and beyond and will enable better learning. They provide a greater range of strategies for achieving goals.' [David.22.5.00.A1] 'They are skills that can be used and built upon in other contexts in life – out of school, in further education, on work experience or in work after leaving school. They also encourage self-discipline and a positive view of oneself and ones own experiences, as well as encouraging work in social groups through sharing, accepting, and valuing one's own and others opinions.'
3	**8.4.00: Planning** An initial planning meeting enabled the researcher and the teachers to consider the role of the generic research interventions. Both teachers agreed to: - making the PCs explicit - using GRASP - using student target setting and self- assessment strategies		

	They wished that each student be given a PC self-assessment portfolio for monitoring personal development. *It remained unclear which student groups would be involved in the study at this stage.* However the teachers proposed the following interventions, which would be decided upon by the department prior to the new academic year in September 2000. 1) <u>Key Stage 4, gifted and talented students</u>: PCs to be integrated into new schemes of work, identified as lesson objectives. 2) <u>Key Stage 3</u>: A review of Year 8/9 modular program would aim to integrate the PCs into the scheme and lesson objectives. 3) <u>Year 7</u>: One-off lesson for ten students groups to be delivered by all teachers, with PCs as a prominent feature. Students to be involved in team investigations and presentations from which their PCs can be targeted, evaluated and discussed.		
4	**5.11.00: Initiating Research** Due to the pressures of school requirements Sue and David postponed the introduction of the PC interventions to November 2000, following one half term's work. Sue and David planned to: • target two Year 8 classes (one average, one higher ability). • integrate a series of independent or group research-based activities, which would culminate in class presentations, linked to the science topics. • target PC development mainly through the research activities, as opposed to general class teaching. • make PCs objectives explicit in the classroom. • target set and review PCs at least once within each topic of work (approximately every 6 weeks), especially during research/presentation activities. • review schemes of work to incorporate teaching and learning approaches which encourage PC development.	**TEACHER COMMITMENT** Although Sue considered that heavy school workloads hampered the initiation of the research, she maintained a strong personal commitment to the study. She viewed curriculum pressures as a threat to any curriculum development that involves the in-class trailing of interventions.	
5	**22.11.00: Getting started** The researcher held a meeting with the teachers after one month of work with the PCs. Emphasis has been placed primarily on positive self-image and self-motivation PCs. The students' self-assessment proformas have been adapted to suit their needs. Students are required to identify themselves on the A-D discussion document scale and then provide evidence for each of the behaviours identified. Students were set a homework research activity which required them to research	**EXPLICITNESS** The researcher encouraged the teachers to discuss with the students how the activity may have affected their PC development, as well as their knowledge acquisition. The teachers were keen to make the PCs more explicit within their regular teaching over the next half term, however appreciated the difficulties of sustaining this effort within the curriculum and school-imposed demands. **SELF ASSESSMENT** Teachers were encouraged to	[Researcher's Log. 22.11.00]

	and present a topic of work. They were given the option to work independently, in pairs or in teams, following an initial brainstorming activity where relevant types of issues were identified.	provide students with the opportunity to self-evaluate and give evidence for their PC development, as a homework activity. **CURRICULUM COVERAGE** The teachers were conscious of the need to maintain curriculum time for science and emphasised that in order for curriculum development of this type to be effective staff commitment was essential. **FLEXIBILITY OF RESEARCH DESIGN** Imposed structures were not viewed as appropriate, which resulted in a collaborative approach to organising research.	Sue: "The staff have got to find the time, believe in what they are doing and find a system that works for them."
6	**15.12.00: Classroom Observation 1** The researcher was invited to observe the students' presentations after one month's work. Approximately half the students worked with a partner and presentations varied from producing booklets, posters, Power Point presentations, reports and role-plays. Prior to the work the students had self-assessed their self-image using the A-D discussion document, and had set personal targets, which were later reviewed following the presentations. The researcher co-ordinated a lengthy class-discussion to elicit the students' perceptions of the task, and to reflect on their PC development.	Several pupils talked freely about their sense of personal achievement and also the difficulties they had experienced. **POSITIIVE IMPACT** The students talked positively of: • organising themselves and one another • checking work with partners and other people • researching information from a variety of sources • including communicating with the wider community • thinking critically about information they included and the form of presentation it would take. **AUTONOMY** Students seemed motivated by the autonomy they had acquired from taking charge of their own work. They commented that they had developed a range of capabilities balanced with scientific knowledge. **CHOICE** Students valued the element of choice in their learning, enjoying being able to pick something which interested them. They considered this to influence their motivation towards learning and the extent to which they understood the subject matter. **SELF CONFIDENCE** Nerves and common anxieties when presenting work to a larger group had been an issue for some students, however most felt that once they had completed the activity they were more confident from the experience.	[Researcher's Log. 15.12.00]

		SCIENCE They commented that they were unaware of how well their subject knowledge had developed until questioned by others. They noted that they needed to know the topic well.	
ACTION: Sue also planned to set the students a written self-evaluation to gain portfolio evidence of PC development.			
7	**8.1.01: Students' perceptions** A group of four students were interviewed as a representative sample of the class, in order to gain their impression of the PCs, and whether they considered them to be of relevance to their personal development. Students were willing to discuss their impressions, however found difficultly identifying the types of behaviours they related to PC development.	**SELF-MOTIVATION** The feedback from the group was positive and students generally felt that they had found self-motivation towards their research and presentation task. **TEAMWORK** Students felt motivated by presenting their work to others, and felt responsible to other team members. They were responsive to sharing work and did not wish to let others down. **CHOICE** One student, who had worked independently, commented that he was particularly motivated by having to organise and plan his own work. This was something which was considered different to regular learning experiences which were often teacher-directed, and allowed less choice. **CREATIVITY** All students desired to make an impact with their presentation and to 'catch people's attention'. This encouraged them to develop creative ways of presenting information and interacting with their audience. **ACADEMIC ACHIEVEMENT** Chris commented that the majority of the class work was to a good or high standard, with only a small number of students failing to prepare work well in advance. End of topic test marks remained average with no loss or increase in attainment.	[Interview 31, 8.1.01]
8	**13.02.01: Sue's perceptions** The researcher and Sue met to discuss her progress and to address some general issues relating to PC development. Along with specifically designed activities, Sue also used standard lesson structures to emphasise PC development.	**COMMITMENT** Integrating PCs regularly was not considered easy due to heavy curriculum and management pressures that both Sue faced. Sue viewed her continued commitment to the research to relate significantly to the schools' ethos, which focused strongly on encouraging students' maximum potential, and her belief in the significance of the work. **PROFESSIONAL DEVELOPMENT** Sue's perceptions of PCs had been reinforced by her involvement in the study.	Interview 13.02.01: 26-29] [Interview 45. 13.02.01: 1] [Interview 45. 13.02.01: 7] "... we will never teach the same again, because I'm a great believer that if you've gone through a process, and it's the

		She considered the reflective and focused attention on PC development to have significantly influenced her as a teacher. She viewed the opportunity as a strength and one which should not be influenced by external curriculum pressures. **CLASSROOM ETHOS** Improved classroom relationships were noted. The regular explicit discussion of PCs within science lessons was considered to have introduced another dimension to the students' learning.	process that matters... You are a changed person. Time is an issue but... only if you let it be, because you can use that excuse for anything. It just depends on how important you think it is and if you think it's important you'll do it."
		Sue commented on the improved team feeling within the group, by addressing the students' personal needs. The explicit recognition of PCs emphasised their value above and beyond the implicit emphasis that was previously placed. Specific impact had been noted with respect to a new member of the class. **GENDER** Providing explicit reminders of PC targets was effective at encouraging students to focus and reflect on their personal development. Sue observed students to react differently to their targets, noting male students to require more regular reminders to keep on target, whilst female students were better able to focus attention on science and PCs at the same time. Sue considered this to generally affected male students' work, whose organisational skills were seemingly less self-initiating than those of female students. **PROFESSIONAL DEVELOPMENT** Sue considered the PCs study to predominantly influence teachers and subsequently their teaching methods. She viewed the study as a way by which to re-engage teachers, leading to more inspired teaching approaches. **CHOICE** Sue felt the greatest change in her teaching approaches stemmed from increasing the students' choice in their homework activities. Increasing task choice was considered a particularly strong influence on student engagement and motivation towards science. The option to choose aspects of a topic of personal interest and to present work from individual perspectives	[Interview 45. 13.02.01: 9] "...[Another strength is] the children really, how strong this has built the team feeling in the group. That is just incredible." [Interview 13.02.01: 31-35 [Interview 45. 13.02.01: 45] "...The training of the teachers makes them become improved in particular skills themselves and they then become better at helping the children recognise their own skills." [Interview 45. 13.02.01: 55]

		significantly impacted on students' motivation towards their learning. **PERSONAL CAPABILITY DEVELOPMENT** Sue viewed choice and variety of teaching and learning styles as features which positively influenced the development of PCs. She noted a tension between the use of more varied methods and the emphasis to deliver prescribed subject knowledge. The use of more didactic teaching strategies were considered to have increased with the emphasis on fact retention stemming from assessment requirements. **TEACHING AND LEARNING OF PCs** Students' PC development was considered to be influenced by their innate abilities. Sue was unsure whether PCs could be directly influenced and taught, and considered the context of development to be a crucial factor in facilitating improvement. **TEACHER COMMITMENT** Sue's reflective attitude continued to influence her work with PCs, viewing it as an additional feature of her professional responsibilities and to improve her understanding. She considered that teachers' philosophies could potentially influence the uptake and maintenance of this initiative, and how some teachers would undoubtedly find it challenging.	[Interview 45. 13.02.01: 63] [Interview 45. 13.02.01: 73-75, 79] "I think everyone has potential to develop... That's their personality and that's that child, and as long as you can show them the benefit of change then OK they'll meet you half way… so the potential is there for everyone, of course, otherwise you wouldn't be a teacher, you are hoping that every child can get there, where ever there is." [Interview 45. 13.02.01: 96] "Some teachers' personalities will find this too challenging for them, because of the way they teach… there will be some schools where it will be very difficult. However I think the behavioural policies of the school and their own personal issues will out-shadow the issues."

ACTION: Work was planned to continue in a similar vein, by raising awareness of PCs and undertaking focused activities. Sue looked towards making PCs a departmental initiative following the first year's experience, however with an OFSTED inspection pending she was aware of the difficulties in maintaining emphasis on PCs over this period.

9	**27.6.01: Research Suspended** Despite Sue and David's commitment to the value of the research, the school's inspection requirements had caused in the research activities to be suspended. Both teachers were keen to re-start the research in the new academic year (September 2001).		
10	**Year 1 Final Evaluations** Sue and David completed final evaluation questionnaires to reflect their perceptions and experiences of the research interventions.	***Sue's Evaluative comments*** **ACTION RESEARCH** The research was considered to be guided by set criteria which remained fluid to take into account individual school's approach. Progress, application of the criteria and methods of evaluation were reviewed during each research group meeting, with particular emphasis placed on the validity and reliability of the claims. Sue considered this a 'necessary constraint' which catalysed the restructuring of the evaluation procedure. **MOST EFFECTIVE STRATEGIES** • Class discussion of the PC skills and their relevance to our lives. • Pupils reviewing themselves on the areas or strength in one PC skill. • Setting targets for students' improvements through individual or group work projects. • Revisiting student targets on paper and taking part in a class discussion about their newly found strengths. • Stating the PCs overtly in class, students knowing what is expected of them and their confidence growing. **TEACHER-STUDENT RELATIONSHIPS** The PC interventions were considered to enable the teacher to became more aware of the students personal needs. This understanding resulted in teaching and learning styles focusing and supporting students' improvement of PCs. **TIME** The expectations of the NC and associated tests was considered to restrict teachers in the undertaking of 'extra-curricular' activities within the classroom. **IMPACT ON STUDENTS** • Being connected with a research scientist. • Encouraging choice in homework activities and style of delivery to the class has been motivating for students. • The use of group work in homework	[Final Evaluation. Sue1] [Final Evaluation Sue: A3] 'I became more aware of the students on a personal level much more quickly. I also realised their fears and perceived weaknesses. During teaching I then tried to encourage and focus on teaching and learning styles that would support pupils more in their endeavour to improve their PCs.'

		activities has encouraged better time-management, delegation, teamwork skills as well as instilling and high expectation of preparation when speaking to an audience. **PROFESSIONAL IMPACT** The research affected Sue by encouraging: • appropriate **choice** for some homework's • appropriate **style of presentation** to give students more confidence, encouraging the science detail in their work to be of a higher quality • remembering more often to reflect on skills other than science knowledge and skills	
		David's Evaluative comments **OVERALL IMPACT** • An aspect of <u>professional development</u> emerged through the use of different <u>teaching and learning styles</u>, some 'risk taking' and reflection on teaching and in relation to students' learning. • Raised issues with respect to whether students are adequately prepared for the world of work. • PCs are viewed as a vehicle for developing life and employment skills across school subjects. • PCs are useful for all ages and abilities. • Raised issues re. the measurement of impact and effectiveness of PCs – objectivity versus subjectivity. • Time scale for the project and PC development may required extended periods. • Impact on overall academic performance is as yet undecided, however impressions of students' improved behaviour and motivation. • Interviews and questioning of students often produced positive responses.	[Final Evaluation. David1]
		USEFUL STRATEGIES/ INTERVENTIONS • Involving students in target setting, asking questions, having choices re. learning styles adopted, and reviewing their own performance. • The use a variety of learning styles, such that students had more ownership of their learning. • Differentiation of approach to work and its outcomes. • Reflection on the processes of working as well as the outcomes of their work. • Use of a range of ways to evaluate their performance, e.g. teacher	[Final Evaluation. David1: A2] 'In a topic on Sound, the students produced a spider diagram on which they wrote what they already knew about Sound, then they had to ask three questions about Sound that they would like to know more about. They then had to

		assessment, peer/buddy assessment. **ADVANATGES** • Developed a team of teachers who felt they had ownership of the project. • Regular meetings of teachers enabled the sharing of information, opinions etc. with researcher • Instigated reflection on teaching and learning styles that are used in classroom situations. • Raised awareness of what PCs are and their value in education and learning. • The researchers' work and proactive approach in producing materials for teachers and students. • The basis of the project in educational imperatives which has changed and progressed with time. **DISADVANATAGES** • <u>Time</u> to fully implement interventions, due to constraints from the NC and other projects. • <u>Time</u> to plan the PCs into schemes of work. • The difficulty of measuring the effectiveness of PCs. The inability to monitor effects on academic performance. from experience it does affect social interaction, individual and group learning, motivation and behaviour. **IMPACT ON STUDENTS** • Clearly motivated some students to produce a standard of work above average and requirement. • Improved behaviour, motivation and general working atmosphere in the classroom. • Improved work production and standard of presentation in some students. • Gave students more choice re. learning styles such that gained a sense of ownership. **IMPACT ON TEACHING** • Changed the learning atmosphere in the class and gave insight students which otherwise would not normally have been achieved. • Work on self-motivation highlighted some students low self-esteem such that work was adapted to help motivate them and give opportunities to improve. • Stimulated the use of alternative strategies in teaching. • Use of PCs with other groups of differing ages and abilities. • Increased teacher reflection on	research the answer to at least one question and present their findings to the class in any manner of their choosing. This produced a variety of different presentation methods and those students who under performed came out of the experience with ideas about how to improve in the future.' [Final Evaluation. David1: A4] '...from experience it does affect social interaction, individual and group learning, motivation and behaviour.' [Final Evaluation. David1: A4] 'Time to try things out. Fully integrating PCs can be expensive in terms of time spent on pieces of work and its evaluation. I have not been able to incorporate PCs into everyday working yet.' [Final Evaluation. David1: A7] 'Made me see students in a different light, i.e. it made me recognise their capabilities (they have surprised me at times with what they have produced and presented) and also that given the opportunities, they

		practice.	can develop PCs.'
11	**26.9.01: Phase 2: Overview of activity** The researcher met with Sue and David at the beginning of the new academic year to initiate research again. The use of target setting and self assessment as well as focused activities on self-motivation and self-image PCs were to be initiated.		[Researcher's Log, 26.9.01]
ACTION: Students were issued with individual portfolios by the researcher. Work to commence with lower and higher Year 8 groups. David to focus on a range of PCs, Sue to continue focus on positive self-image and self-motivation.			
12	**26.9.01: Reporting on progress** Although efforts were made to integrate the interventions into science teaching, it was unfortunate that changing curriculum pressures, some students' demanding behaviour and departmental demands hampered rapid progress. Insights were gained from two interviews with the teachers over the three-month period from (September-December 2001), during which time PCs remained mainly implicit with two groups of Year 8 students.	**TEACHING PCs** PC focused lessons or activities enabled students to be: - more motivated to deliver work in a way which they chose 'come at it from lots of different angles' - spend more time on developing ideas - giving more ownership to students, which leaves them more motivated for further activities. **TEACHER REFLECTION** The research stimulated increased reflection on pedagogy with focus classes and others. More attention being paid to developing 'better learners' as opposed to solely the acquisition of knowledge. **AWARENESS** Students considered to have a heightened awareness of PCs and their personal behaviour. **DIFFERENTIATION** Encourages an understanding that student differences are acceptable. **PC DEVELOPMENT** Developing PCs considered to be a long-term process, where understanding of PCs and evidence is built upon. Specific attention and interventions aids the development of self-assessment and evaluation skills. The use of <u>modelling</u> assists PC development, where teachers can illustrate to students the type of behaviours which are considered appropriate or suitable in different situations, and the process of self-	[Interview 63, 26.9.01] [Interview 69, 14.11.01] [Researcher's Log, 14.11.01] [Interview 63, 26.9.01: 49-53] [Interview 63, 26.9.01: 52-53] 'David: The knock on effect is that they're not as.... Sue:...as pudding-like.' [Interview 63, 26.9.01: 16-17, 24-27] [Interview 63, 26.9.01: 97] [Interview 63, 26.9.01: 120] "We can't all achieve the best in all the PCs because we're not machines. There's part of our genetic make up that influences the way we develop anyway, so children need to realise that being different is OK." [Interview 69, 14.11.01 82-83] [Interview 69, 14.11.01 1-4]

		evaluation.	
13	**December 2001: Research Suspended** Despite Sue and David's commitment to the value of the research efforts to maintain sustained progress with the research met with difficulty during the 3 months. Sue and David reflected on the second phase of the study in final evaluation reports. David's evaluation relates to a group of students from the second phase of research, who proved to be particularly different, in that they exhibited poor behaviour and attitude problems.	***Sue's Evaluative comments*** **ACTION RESEARCH** The research evolved with respect to comments and evidence from teachers and academic staff. The evolution of the systems and prompts were considered to have truly reflected successes and areas for further development over the two years. **EFFECTIVE INTERVENTIONS** • encouraging children to think about themselves, their strengths in the PC areas and those needing developing. • encouraging flexible ways of working – independent and with others. • identifying the anecdotes, which support our recognition of self. **ADVANTAGES** • Encouraging the teacher to think more carefully about the type of learners and pupils within the group. • Positive effect this has had on all the relationships in the classroom – generally more supportive. • Learning was considered to becomes more focussed on the individual child's PC skills, which support the whole child's development. • Students perceive teacher's interest and care to relate more overtly to them as opposed to just science learners. • PCs encourage reflective teachers and learners. **DISADVANGATES** • Time pressures from a demanding curriculum • The levels of literacy for less able pupils using the folders. **TEACHER COMMITMENT** PC interventions reinforce personal philosophy. ***David's Evaluative Comments*** **PC INTERVENTIONS** • Students enjoyed identifying themselves against the PC behaviour objectives for self-motivation and self-image. • Many students found writing down evidence for PC development, and relating it to their science work, difficult. • Some students could manage to	[Final Evaluation Sue2. 14.2.02] [Final Evaluation Sue2: 14.2.02: viii] 'The research has reinforced my belief in effective learning which occurs in an environment of mutual respect, challenge, praise, celebration and fun.' [Final Evaluation David. 13.2.02] [Final Evaluation David. 13.2.02, vii] 'There have been highs and lows but the experience has made me develop, think and question the nature of the objectives and the

		identify some targets for themselves but many had difficulty. • Setting two or three class targets was considered better than getting students to set their own. Class feedback could be given, relating to instances and individuals where positive behaviours were displayed. • Self-assessment activities proved difficult to use, with too much information. Use of the interventions from an early age was considered to be of potential benefit. PC interventions were considered of benefit for most ages and abilities, although they place an intellectual demand on top of what is being studied in the classroom. Students of lower ability or motivation may experience difficulty dealing with this. **DIFFICULTIES** • Time to dedicate to PC, development. • The difficulty of the extra demand of PCs on students. • Self assessment materials. **IMPACT ON STUDENTS** Some impact with better-motivated students in the group who were keen to set targets and try to follow them through, others lacked skills of organisation and concentration, to cope with the demands. **IMPACT ON TEACHING** Some PCs used in planning but explicit recognition considered to be limited. Emphasis continues and could be developed further if addressed across various year groups.	strategies I use to create learning opportunities for the students I teach. Using the PCs has created some different perspectives on the learning situation for me and for some of the students particularly from last year's group.'
Outcomes of these discussions are presented in Appendix A8.			

Appendix A6: CASE STUDY REPORT - SCHOOL F

Period of study: 19 months (May 2000 – December 2001).

0.1 General School Description

- a county secondary comprehensive
- catering for over 1100 mixed-gender, 11-16 year old students
- situated in an urban area, close to the inner-city
- catchment area falls below the average economic status
- students start at the school with an overall level of attainment below the national average
- students leave attainment remains below the national average at GCSE level
- the schools results are comparable schools of similar status.

0.2 Brian

Brian, aged 37, was the Head of Science with a specialism in Physics. Following the completion of a BSc in Biology/PGCE he entered the teaching profession in 1990 since which time he has maintained a full time post at the school. He was head of department for four years.

Brian had been involved in a previous research study associated with the Centre and was familiar with research methods.

0.3 Phil

Phil, aged 37, is a Physics and Chemistry teacher with six years experience. He entered the teaching profession in 1996 after undertaking a Post Graduate Certificate of Education in addition to his BSc (Hons). He worked in two schools before joining the staff at the school as Head of Chemistry in 1999.

Phil had previously worked as a Science Researcher and therefore had a good understanding of research methods and their uses. He wished to be involved in the study because of his interest in improving students' personal skills across the curriculum.

0.4 The student sample

Three groups of students, approximately 90 in total, were involved in a two-phase study. Students were mixed-ability, mixed-gender groups. Initially Andy focused the research on a group of Year 7 students, followed by Phil's work with a Year 7 and Year 8 class.

<u>Phase 1</u>: Year 7: September 2000 – May 2001 – Brian
<u>Phase 2</u>: Year 8: May 2001 – September 2001 – Phil
Year 7: September 2001 – December 2001 – Phil

	Event	Issue	Evidence
1	**Phase 1** Brian became involved in the study following his involvement in a prior research study with The Centre for Science Education. He had been identified as a keen and creative teacher, willing to become involved in research and curriculum development projects.	**TEACHER COMMITMENT** Brian's interest in the study stemmed from his personal philosophy that learning is a lifelong process which should be approached proactively.	
2	**22.5.00: Initial Perceptions: Brian** Brian provided his initial perceptions of the study in a through a questionnaire.	**PERSONAL CAPABILITIES** Brian viewed the PCs as a means through which students could develop better problem solving skills. He felt that if these skills developed they would enable students to succeed better within school and thus be better equipped for the future. **STUDENTS' NEEDS** He considered that students required support in defining the purpose of tasks and establishing goals. Brian felt that these types of skills were inadequately met within secondary schools, because of the curriculum's emphasis on developing a broad knowledge base which *primarily* targeted facts over process skills. As a result he felt that school leavers were poorly equipped for the workplace. **PROVISION** Brian considered the situation to have improved, because of the wider breadth of experiences which students were being offered, particularly ICT skills. **MONITORING & SELF ASSESSMENT** Brian expressed caution towards the monitoring and assessment of personal skills of this kind, suggesting that an over emphasis negate the efforts of assimilating the skills in the first place. He suggested that too much monitoring would adversely effect the outcome. **SCIENCE** Science was viewed as a means for integrating PCs, linking process skills with subject content. Brian was however unsure whether the PCs should become truly integrated into subjects.	[Initial Perceptions Questionnaire: Brain: 22.5.00]
3	**Planning** **11.4.00:** ***Preliminary Plans*** Initial plans to research students' PC development proved to be too ambitious, with Brian wishing to: - initiate the research with approximately		[Researcher's Log 11.4.00]

<table>
<tr><td></td><td>300 Year 7 students and their teachers, from September 2000
- track the students' academic and PCs development over a period of three-year period
- introduce a target setting, monitoring and tracking system into the new KS3 scheme of work for science

These plans were not realised because Brian's absence from school for a three-month period delayed the start of the research.

21.9.00: Amended plans
On Brian's return, new KS3 science scheme was in place, which was the main teaching resource across the department.

This commercially bought scheme emphasised students' involvement in self-monitoring and self-assessment of their science knowledge and understanding.

Integrating the PCs into the scheme of work focused solely on the development of verbal communication and teamwork PCs. Adaptation of the research interventions was made, maintaining the common features of:
- making PC objectives explicit and reviewing them during science lessons
- displaying objectives prominently within the laboratory using A3 PC objective posters
- involving students in the self-assessment and monitoring of their personal development

Ref. Appendix A29</td><td>TEACHER COMMITMENT
Brian appreciated that if the research was to be undertaken efficiently, the teachers would need to easily integrate the activities into their current practices.</td><td></td></tr>
<tr><td colspan="4">ACTION: The researcher was asked to present this model to the school science department [13.1.01] for discussion. Brian aimed to initiate and encourage as many teachers as possible to adopt the system, which he and the researcher would monitor.</td></tr>
<tr><td>4</td><td>10.5.01: Brian's initial experiences
It proved difficult to meet with Brian for a number of months due to severe teacher shortages. Brian's time was heavily preoccupied with management and departmental responsibilities, leaving little opportunities for the proposed interventions.

Phil, was recruited in order to sustain the work. The researcher met to review the work already undertaken, and to plan future involvement.</td><td>TEACHER COMMITMENT/ INVOLVEMENT
Brian had focused some attention on the PCs and had been able to raise the profile of PCs within a Year 7 class, using the PC self-assessment and target setting activities. His approach encouraged the students to identify a communication and teamwork objective which required improvement.

Phil also had considered and planned for the use of the interventions and was keen to initiate the research with a Year 8 class.

PROGRESS: Explicitness & Self Assessment
Brian commented that he was initially sceptical of the benefits of making PCs explicit at the beginning of lessons, unsure how</td><td>[Interview 47: 10.5.01: 1] Brian: "… I was surprised how keen the students were to identify their targets and how keen they were to say that they were going to work on them …What I've struggled with… is that I've not followed it up very well, filling in the following up documents."</td></tr>
</table>

		the students would respond. However he was surprised to note positive responses from the students towards the target setting process, but found greater difficulty integrating review and self-assessment into lesson time. The main difficulty with incorporating review related mainly to his lesson planning and organisation. **INTEGRATING PCs INTO REGULAR SCIENCE TEACHING** The PC interventions had not been well established within the department because of the introduction of the new science scheme of work. Phil explained how the reorganisation had led to most teachers concentrating mainly on subject delivery. He suggested that as familiarity increased teachers would be more willing to consider the PC interventions. **ACTIVE TEACHING & LEARNING** Phil described that more opportunities where students could discuss their science understanding had been provided, moving away from didactic forms of delivery. Students had been encouraged to work collaboratively on tasks, as a means of encouraging the targeted PCs. **REFLECTION** Phil considered the integration of PCs to be a stimulus for his own reflection on teaching strategies. Both he and Brian viewed this as a fundamentally different, however important aspect of their learning, which had impacted on teaching styles. **CURRICULUM IMPROVEMENT** Phil considered the PCs to target an area of students' development which was not fully recognised within contemporary curriculum syllabuses. He suggested that the curriculum would require a review if students were to be given increased opportunities to develop a strong skills base alongside their knowledge development.	[Interview 47: 10.5.01: 30] Phil: "I think it concentrates your mind... before I would have been happy with the kids learning the groups of things, I wasn't particularly interested in the process. I was more bothered about the knowledge they'd retained. So going through this process with you has started to make me think about things we want them to be, the skills as well as the knowledge, and that's been beneficial to me

			because it's made me teach in a slightly different way."
ACTION: At this stage Brian passed his involvement in the study to Phil, in a bid to progress the research. The interventions taken forward were those which Phil already had begun to use: making PCs explicit and target setting and self-assessing PC development. Phil aimed to focus the interventions on a Year 8 mixed ability class. Phil aimed to openly review the PCs with the students and to maintain the targets for approximately one month.			
5	**Phase 2** **9.5.01: Initial Perceptions: Phil** Phil provided his initial perceptions of the work in a questionnaire response.	**TEACHER COMMITMENT** Phil was also keen to develop the work, viewing it as an opportunity to reflect on pedagogy and students' learning. He was keen to trial and improve strategies. **DESIRABILITY OF PCs** Phil valued the PCs in terms of their necessity beyond schooling. He considered that good communication skills was perhaps the most difficult to 'teach' and that improvement in this area was ongoing. **PROVISION IN SCHOOLS** Phil considered that some of the skills could be adequately developed in the secondary environment, however currently that may mainly be implicitly. He considered that although schools make considerable efforts to educate the 'whole individual', their success, overall is rather patchy. **PROFESSIONAL DEVELOPMENT** Phil valued the opportunity reflect on and improve science teaching provision. **SCIENCE** To be manageable and effective, the process and materials used for PC development would have to be well designed and brief given the time constraints. Many of the PCs were considered to be able to be embedded within the existing curriculum given a creative approach to teaching. **LOWER ABILITY** Phil highlighted the need for PC interventions to be made accessible to students with a low level of existing PCs (primarily Special Educational Needs students).	[Initial Perceptions Questionnaire: Phil: 9.5.01] 'All the PCs to a lesser or greater degree are without question the key skills one needs to succeed in one's personal or professional life.' 'Thinking about what one does and how effectively one does it is always a useful exercise. I think as teachers we sometimes get bogged down with day-to-day concerns and allow ourselves little time for metacognitive activities.'
6	**26.6.01: Phil's initial experiences** The researcher met with Phil after one month to log progress. Phil had already noted an impact on his students. Students had undertaken individual target	**AWARENESS & PC DEVELOPMENT** Phil commented on students' improved awareness of PCs. He described how the tailoring of teaching and learning strategies to	[Researcher's Log: 26.6.01]

	setting and Phil regularly made explicit the PC lesson objectives. Self-review was planned to take place at the end of the unit of work, however general class discussions had enabled review to take place on an informal basis.	provide enhanced opportunities for PC development, using more discussion and paired activities to stimulate communication and teamwork skills. Students were noted to ask which PC targets were being addressed within lessons, and were responsive to addressing their individual targets.	
ACTION: Phil wished to continue his efforts and was keen to incorporate written self-assessments. He aimed to achieve this prior to the end of the school year, and considered the use of the PC quiz (ref. Appendix 24).			
7	**19.7.01: Meeting – end of term** Late in the summer term the researcher met with Phil to review and round off the research activity. Phil's approach to the research had followed a different approach to that outlined by Brian, however had incorporated a series of short activities. Phil engaged the students in: 1) self-evaluating their performance using the core PCs in order to identify their PC target. 2) Identifying whether their PC targets related to teamwork or verbal communication skills. 3) focusing their attentions on the improvement of their targets during activities which were designed to encouraging them to do so.	**PC DEVELOPMENT** Phil found short activities, both accessible and useful to raise students' awareness and understanding of the PCs, through science teaching. **EXPLICITNESS** Phil's approaches focused on the regular and explicit sharing of PC targets along with self-review mainly achieved on a verbal basis. Phil endeavoured to cue the students into the suitability of the lesson for developing different skills and aimed to provide verbal feedback as regularly as possible. **REVIEW/ SELF ASSESSMENT** Towards the end of a unit of work Phil encouraged the students to think about how the activities had helped them develop their target, and how this had affected their science learning. He encouraged class discussion, questioning how activities assisted PC development. Phil generally noted a positive response from the students, however was concerned with the subjective nature of their reflections. Despite this he valued the opportunity for students to think about their learning, and the emphasis on metacognitive development. **STUDENTS' PC DEVELOPMENT** Phil considered students to be increasingly adept at discussing their personal skills and identifying the types of skills incorporated in their learning activities. **Behaviour/ Ability** Variable impact had been made on student behaviour, with lower ability students finding difficulty in sustaining their PC target for extended periods of time. Other students seemed more focused	[Researcher's Log 19.7.01] [Interview 56. 19.7.01: 7-8] [Interview 56. 19.7.01: 12] "They seemed to enjoy it as a challenge to add an extra layer to their learning. Some of them seemed to find it more interesting maybe because it was a personal goal instead of a class aim." [Interview 56: 19.7.01: 63]

		towards their work, with a reduction in behavioural problems in the classroom. **Student-Teacher relationships** Phil considered the emphasis on PCs to have positively influenced the student-teacher relations as students found him addressing aspects of their development, other than academic knowledge retention. **ADVANTAGES: Student Engagement** Phil considered the advantages of encouraging reflective thinking through the target setting and self-assessment activities. He suggested that his students seemed more engaged in tasks where PCs were incorporated, especially in written work. He associated this with his student-centred teaching style, resulting from the increased consideration of PCs. **TEACHING PCs** *Phil considered the teaching of* PCs to relate to the role of facilitation, rather than a direct teaching process. **PROFESSIONAL DEVELOPMENT** Phil valued the opportunity to reflect on pedagogy and appreciated the teacher-researcher liaison. He commented that he more frequently considered his teaching approaches and was more open to taking some risks with his teaching due to his involvement in the study.	[Interview 62: 1.10.01: 10] [Interview 56. 19.7.01: 1] "*Perhaps I'm a bit* more, what would you say? Peripatetic, I get in there a lot more, I'm not so didactic. Perhaps that's it... they *become more* needy, the more you ask them to do the more they want of you in a way. So the advantages I *consider are* improved performance from the pupils because they become more reflective."
8	**1.10.01: A new student group** With the start of the new academic year the researcher met with Phil to establish the format for research for a three-month period. Phil aimed to resume the research with a Year 7 class, incorporating the target setting of teamwork, verbal communication and problem solving PCs, and using weekly and monthly self-assessment activities. The emphasis on PC targets would continue regularly in his science lessons.	**TEACHER COMMITMENT** Phil continued to support the research, influenced strongly by his own philosophy and belief in the need for students to develop personal skills along with academic knowledge.	[Interview 62. 1.10.01: 25] Phil "I'm not just teaching them facts I'm teaching them methods of learning if you like. If those that they take away from my classroom are not just science skills but greater skills, that's what I'm after giving them. So if the government are after that by getting teachers to look at personal capabilities, that's fine with me, and I

			wish a few more of my colleagues could see it that way."
9	**12.10.01: Classroom Observation 1** The researcher was invited to observe a science lesson with the Year 7 group, approximately 25 students.	**TEACHING PCs** Students were asked to remember their PC targets at the beginning of the lesson. In setting the task Phil highlighted and discussed how students could achieve their PCs target. He encouraged them to organise themselves so that they were in a learning situation/group that would assist their PC development. The integration of science and PCs was clear. PC development was not disjointed, but fully integrated, with students being asked about their development as Phil moved around the class. Phil also had provided written comments about students' PC development in his marking, however class review through plenary discussion was not actively built into the session.	[Researcher's Log 12.10.01]
10	**5.11.01: Monitoring progress** Phil provided his opinions on the next month's research in an evaluative questionnaire and interview.	• The PCs have been addressed 'a great deal', using visual cues to remind students of their PC target. [A1] • The PCs build student confidence and encourages them to be more verbal in lessons and increasing their use of questioning. [A2] • Lower ability students find more difficulty to initially grasp the concepts. Some have poor verbal communication skills [A3]. • A wide range of teaching and learning styles – visual, kinaesthetic, auditory, practical etc. were useful for developing PCs [A4]. - the use concrete examples and setting up scenarios - learning techniques, phrases and key words [A9] • Higher ability students improved in their chosen PC, with some noting increased enjoyment in the lesson [A6]. More effect has been noted with these students who illustrate better verbal communication skills through more relevant questioning [A10]. • Students were willing to discuss their PCs beyond the classroom, involving parents in their work. • Students were willing to work in pairs. • Students' behaviour is better than expected, and better than that experienced in the past from	[Interim Staff Evaluation Questionnaire: 5.11.01] [Interview 68. 3.11.01: 21] [Interview 68. 3.11.01: 7] [Interview 68. 3.11.01: 15, 36]

		equivalent groups. This is attributed to increased cognitive engagement with little spare time for misbehaviour [A7,8]. They become more confident and expressive [A9]. • The study was considered to impact on the teacher, making them more reflective, and encouraging the use of more informal teaching styles. • It has encouraged more trust and a better rapport with the students.	 [Interview 69. 3.11.01: 56]
11	**23.11.01: Classroom Observation 2** The researcher conducted a second classroom observation.	**TEACHING PCs** On this occasion there was no discussion about 'how' students could improve their communication skills, however specific activities had previously been used to 'teach' communication skills through modelling effective questioning techniques. **SELF ASSESSMENT** Students seem to cope variably well with this where some wanting to ensure they had the 'right' answers when providing evidence of improvement.	[Researcher's Log 23.11.01]
12	**10.12.01: Final Review** A final review meeting was organised with Phil towards the end of the research period. It was evident from this visit the difficulties posed from highly challenging students with poor social skills, and perceived low self-image.	**IMPACT** Phil felt the interventions had made an impact on both sample groups, and related this mainly to the improved classroom relationships and better sense of purpose within his classroom. The impact was considered to result from about 40% PCs and 60% teaching and learning style, because obviously the teaching was considered to have more of a direct effect all the time. Students have: - improved their co-operative and teamwork abilities, due to the influence of a positive classroom ethos - PC targets have encouraged students to take a proactive approach to learning - students exhibit a more mature attitude to learning - students have maintained an enquiring attitude towards learning - Teacher-student relationships have improved. **Self Awareness** Students were considered generally more self-aware, resulting from the explicit emphasis of PCs. Students had	[Interview 73. 10.12.01] [Interview 73. 10.12.01: 43] [Interview 73. 10.12.01: 79] [Interview 73. 10.12.01: 39] [Interview 73. 10.12.01: 105-107] [Interview 73. 10.12.01: 109] [Interview 73. 10.12.01: 113]

		been given more autonomy in their work, in the social classroom environment and in their choice of learning styles. **CURRICULUM CONSTRAINTS** The time constraints imposed by the delivery of the scheme of work resulted in PC interventions being compromised. **PROFESSIONAL DEVLEOPMENT** This was viewed as a strength of the study.	 [Interview 73. 10.12.01: 1] [Interview 73. 10.12.01: 115] Phil "I think it's made me more reflective over all. I used to worry enough, now I think I worry even more now (laugh)."

Outcomes of these discussions are presented in Appendix A8.

Appendix A7: CASE STUDY REPORT - SCHOOL G

Period of study: 19 months (May 2000 – December 2001).

0.1 General School Description

- voluntary aided secondary comprehensive
- catering for over 1100 mixed gender, 11-16 year old students
- situated in an inner-city catchment area, the economic status is below average
- student intake represents a wide range of religious traditions with a third of the students from ethnic minorities

0.2 Academic intake & qualifications

Students start with an overall level of attainment which matches the national average, and by the time students leave the school attainment is above the national average at GCSE level.

0.3 Chris

Chris, aged 42, is the Head of Science with specialisms in Biology and Chemistry. Following the completion of a BSc (Hons) in Biochemistry he worked for a period of time as a Biomedical Scientist for the National Health Service. He entered the teaching profession in 1989 since which time he has maintained a full time post at the school. He also maintains responsibility for co-ordinating KS4 science, Health Education and Beacon School status.

0.4 Vicky

Vicky, aged 24, is a recently qualified teacher with a specialism in Biology. After completing a BSc in Neuroscience and Psychology she trained as a teacher through a one-year PGCE course. She joined the staff at School G in 1999 maintaining a full-time position, with additional responsibility as Year 8 tutor and GNVQ course development. She was asked by the Head of Department to become involved in the study in its second year.

0.5 The student sample

Two groups of Year 7 students, approximately 60 in total, were involved in the study. Students were mixed-ability, mixed-gender groups.

Phase 1: September 2000 – September 2001 – Chris
Phase 2: September 2001 – December 2001 – Vicky

	Event	Issue	Evidence
1	**Phase 1** Chris became involved in the study on recommendation from the LEA Science Advisor due to the schools' commitment to developing students' thinking skills, through an 'Enquiry Skills' programme for KS3 students. This course, delivered in curriculum time aims to 'develop the skills of task and time management', encouraging the use of research and ICT skills.		
2	**3.5.01: Initial Perceptions: Chris** Chris's initial perceptions were gained through an interview which aimed to elicit his impression of the relevance and provision of PC development. Chris aimed to encourage his students to become less teacher-dependent and to move towards autonomy in learning through the development of PCs. He viewed this as a means of gaining a balance between curriculum demands and students' personal development and self-management.	**TEACHER PHILOSOPHY** Chris's interest in the study stemmed from a concern that the nature of schooling will be undergoing a dramatic change within the next ten years. He considered that the teacher's role would become increasingly facilitatory, more typical of that of a college or university tutor. He considered that students would increasingly rely on skills similar to those outlined in the PCs framework. **Constraints** He considered the PCs to link with the school's own initiatives, and was concerned to the extent to which the science department promoted personal skill development, being influenced heavily by pressures imposed by standardised assessment. **Curriculum Differentiation** Ian's concerns also related to whether the curriculum catered adequately for students with different abilities, styles and motivations towards learning. Ian considered the science curriculum to lack 'real-life' relevance for youngsters, which subsequently resulted in poor personal skill development. **Educational Reform** Chris considered radical change to be necessary if PCs were to be integrated into the science curriculum on a large scale. He considered curriculum change to require an appreciation of schools' individuality and teachers' professionalism, in order that PCs be addressed in more explicit and purposeful ways. **Ethnic minority students** Chris particularly viewed the relevance of positive self-image and self-motivation PCs to apply to the large proportion of Afro-Caribbean	[Interview 4: 3.5.01: 9] Chris: "As a department I'm not sure how much we are actually promoting these things, we have shifted far too much over to the teacher-centred model of teaching where we've got the responsibility of getting these kids through their exams, so it's all from us. That's all from pressures of results." [Interview 4: 3.5.01: 25] Chris: "... Because the curriculum is so content orientated I think in many ways we're failing kids who academically aren't able. We are actually force-feeding them stuff which they really don't need." [Interview 4: 3.5.01: 59] Chris: "A lot of these thing can't be taught by what the government has been saying we should be doing... You can't teach someone a positive self-image by getting them to work in silence."

		and Asian male students (40%), who exhibited a lack of self-confidence and motivation towards their work. The influence of peer pressure amongst these student was considered to negatively influence their learning.	[Interview 4: 3.5.01: 63]
3	**29.9.00: Planning** The researcher met with Ian at the beginning of the school year to outline how he would aim to develop students' PCs through his science teaching. Specific attention was to be paid to verbal communication, teamwork, self-management and positive self-image PCs as these were viewed as most relevant for the high proportion of Afro-Caribbean male students. Chris aimed to integrate opportunities for: • short team projects in each unit of work, encouraging the use of different student groupings on these occasions. • Student self-assessment of PCs, at the beginning and end of each unit of work (every 6 weeks). • using GRASP, as a means of improving students' self-management skills in science investigations. • displaying A3 objective laminates in the laboratory as a means of identifying, targeting and reviewing the PC objectives in science sessions.		
ACTION: Chris proposed to commence the research following the half-term break with a Year 7 group. Self-assessment formats to be provided by the researcher.			
4	**28.11.00: Classroom Observation 1** The researcher was invited to observe the introductory lesson for PCs with the Year 7, mixed ability, mixed gender group. The aim of this session was to make students aware of the types of behaviours that they would be striving to improve. A large proportion of the science lesson was dedicated to discussing the PCs. A series of science activities were organised which required the students to plan and share out a series of activities within a team.	Students' behaviour was jovial yet respectful. **PERSONAL CAPABILITIES/ AWARENESS** The PCs were introduced by making clear to students that they would be involved in teamwork to a greater extent, for the specific purpose of developing the skills of communication, problem solving and working together. Chris explained that this would help them in the long term when entering and sustaining jobs. Students were asked about various characteristics they would associate with communication and teamwork. Their responses were linked to the PC behavioural targets and displayed in the laboratory. Review of these targets was undertaken during the subsequent science activities. **TEAMWORK** Allocation of jobs within a team posed some disruption as students were less used to structuring their own work. Although mainly on task,	[Researcher's Log. 28.11.00] Students suggested that: 'I rushed ahead' 'We didn't work well because someone tried to take over' 'We did well because we talked about what we had to do.'

		some students found difficulty working with more assertive members of their teams, with more able students coping better in these activities. Students were aware of the difficulties they faced with these activities when asked to reflect on their behaviours. **Time** Chris stressed that the pace of the lesson was not as quick when using teamwork, feeling that greater co-operation would help improve the speed as well as being more aware of what actually needed to be done.	
5	**14.12.00: Monitoring progress** A meeting was held with Ian to monitor progress and for the researcher to observe the class again. Chris's efforts to develop students' PCs focused mainly on the encouraging teamwork skills through the introduction of 'triad' groups. This required teams of three students to allocate specific roles between the group (questioner, writer and speaker/explainer). This was designed to assist the students in structuring and organising work within a small group. **Classroom Observation 2** The class were observed for a second time, during which time Chris revisited the notion of PCs and encouraged students to focus on developing a PC behavioural target. Students were asked to reflect on their targets following the activity, and to record how they had felt they achieved them. Verbally and written self-evaluations were undertaken.	**PC DEVELOPMENT** Chris expressed concern that progress was slow as students seemingly were only able to deal with one area of development at a time- either science work or PCs. The efforts to get students to develop scientific understanding as well as being aware of how they behave was leading to poor practice and a slower pace to the lesson, thus restricting the amount of science work achieved. Students' target setting and self-assessments were of a varied quality and required a great deal of teacher input to complete. **ABILITY** Chris commented that whilst working in groups the ability level of the students seemed to be much more evident, with higher ability students coping better and progressing at a faster pace than the less able students. **SELF ASSESSMENT** Although initial unfamiliar with self-assessment students worked well to produce their self-evaluations and to provide evidence of their PC development. An emphasis was placed on each student producing their own self-assessment, even where they were evaluating team performance. This experience raised questions as to whether: - individual self-assessments were necessary, or whether a collaborative team evaluations would serve the same purpose. - the proportion of lesson time would reduce as students became more familiar with the notion of PCs and the process of self-assessment. - student groups needed review in order to deal with disruptive	[Researcher's Log. 14.12.00]

		behaviours. - teams needed assistance in planning in order to assist the allocation of jobs and action planning process. - the review and self-assessment activities could be better structured and timed such that key questions were asked, such as What went well? What did you struggle with? What is your area of development for next time? - it was necessary to make the PCs visually explicit in order that they are a directly available source of reference.	
6	**7.2.01: Difficulty maintaining research interventions** A meeting was held to review the progress of the research following a series of telephone conversations in which Chris expressed concern over implementing the research interventions in his school. Where possible PCs had been made explicit, target set and self-assess, however these opportunities had become less frequent. Specific activities, such as class presentations, had been undertaken which lent themselves to targeting PCs.	**TEACHER COMMITMENT** Departmental, management and school pressures were considered to limit the opportunities for PC development, due to lack of planning time for lessons. The incorporation of PCs was considered to limit the pace of the lesson, and as such Chris was less inclined to use the interventions, which focused mainly on including teamwork. Chris perceived PC to be useful if set within an appropriate context and viewed them as a means by which he could reflect and evaluate the choice and relevance of his teaching approaches. **PC DEVELOPEMNT** Concern that students struggled to associate the PCs with their science work, where their interest was directed mainly towards science, with PCs seemingly too intangible for them to 'see' results. Short reminders of PC targets were continued with self-evaluation being undertaken less frequently. **PC BEHAVIOURS** Chris considered some PC objectives to be too similar in nature and at times viewed them as repetitive. He suggested that identifying the key areas of focus should improve the students' understanding of PCs. **TEACHING AND LEARNING STYLES/ PROFESSIONAL DEVELOPMENT** Chris considered PC development to relate mainly to the adaptation of teaching and learning styles, which focused his reflection on the teaching process.	[Interview 42: 7.2.01: 38] [Interview 42. 7.2.01: 1] Chris: "What I've found difficult is to maintain the link with the kids thinking about PCs and the science. They don't think of the two things running together and when we talk about or even use the words 'personal capabilities' their eyes glaze over and they seem more interested in what they're learning – in the science." [Interview 42. 7.2.01: 32] Chris: "So in so much that it makes the teacher, me, think about how the lesson is developing and whether they are

		ACADEMIC ACHIEVEMENT Chris did not feel able to definitively say an impact had been made on academic achievement in science, however he noted students' increased awareness and a more willing attitude to talk about different behaviours and their impact on learning. **TEACHING AND LEARNING PCs** Chris considered that PCs could be taught, dependent on the capability being addressed. He considered that verbal communication and teamwork could be taught.	actually learning through this process and it actually makes my lesson better, then I think that's the use of it." [Interview 42. 7.2.01: 55]
ACTION: Despite the continued pressures from school-life Chris identified a range of group work strategies, such as jigsaw or colour groups that he wished to trial.			
7	**9.3.01: Use of co-operative group work** The researcher met to observe another of Chris's lessons. The difficulties in addressing the research continued, however he was able to trial occasional lessons with different student groupings. The lesson focused on the use of the jigsaw approach to research the topic of energy resources. *(This approach involves students forming 'home' and 'expert' groups. Experts from each group collaborate to find and provide information for their home groups, to which they return to provide a comprehensive overview of different aspects of the topic.)* PC objectives mainly remained implicit. Review time during the session was minimal, which hampered the opportunity to reflect on the students' use and development of PCs during the activity.	**TEAMWORK** Team working posed challenges for these students. Some students found difficulty understanding how they may find information out and struggled to allocate jobs within the team. Few groups actively worked as a team, many working independently and not discussing work with others. Chris's facilitation eventually enabled them to contribute and share ideas however students found it difficult to self-initiate discussions. **TEACHER COMMITMENT** Discussing further progress with Chris met with the difficulties of time and managerial pressures. He continued to value the purpose and ideals of PCs and strongly believes that students of this age should be engaged to develop such skills and characteristics. He endeavoured to maintain PC focus where possible.	[Researcher's Log. 9.3.01]
8	**14. 6.01: Transferring involvement** Due to inherent difficulties which Chris experienced during the year he was keen to enlist the help of one of his younger teachers, Vicky, to take the research into the new academic year. This meeting identified how the research would be taken forward by Vicky's involvement, as well as reflecting on the key issues which Chris had identified.	**PC BEHAVIOURS** Chris considered there to be too many individual PC objectives for the students to cope with, often resulting in overlap or similarity of purpose. **TEACHING AND LEARNING STYLES** Chris viewed the PC initiative to strongly relate to the development and use of a range of teaching and learning strategies. He viewed this as a useful means of providing an improved experience in science for the students, and for making good teaching structures more explicit. Chris considered some of the work could result in teachers feeling a sense of 'loosing control' within their lessons, especially when students were encouraged to manage their own work. He did however value	[Researcher's Log 14.6.01]

		this and considered it beneficial in order to move away didactic styles of teaching. **SELF ASSESSMENT** Chris felt the students responded well to the PCs and were able to self-assess effectively when given the opportunity.	
9	**7.9.01: Chris's final evaluation** Chris completed a written final evaluation questionnaire.	**ACTION RESEARCH** The research was considered to follow its own course and adapted to the needs of different schools and the expectations of teachers and students. The materials and methodology has had an impact to different extents across different schools. Chris considered that the research started well but was interrupted by other priorities. **EFFETIVE STRATEGIES** Group work and teamwork, e.g. colour groups, triads and getting students to reflect and think about their own learning process. **CONSTRUCTIVISM** Chris considered that a strong point of the research to be its focus on constructivist thinking, where teachers work with the students to construct their understanding of concepts. He considered that many interventions were developed with this in mind. **DIFFICULTIES** Difficulties related to the pace of the lesson, ensuring that enough content was covered and maintaining students' interest. Target setting also posed problems where students found it difficult to identify areas for improvement. **AWARENESS/ IMPACT ON STUDENTS** A gradual improvement in the students' awareness and working relationships of some groups was noted during the period of research. Some groups of boys were less inclined to plan teamwork, being more interested to progress with practical work. Other groups were considered to have improved co-operative skills, particularly in the use of 'triads' and role sharing. **TEACHER PROFESSIONAL DEVELOPMENT** Chris considered himself to be more	[Chris' Final Evaluation: 7.9.01] 'In the early stages I seemed to spend a lot of time going over the particular strategy and this led to some students drifting – especially the boys, the most able, who got bored and the least able who struggled to get the point.'

		aware of how the students responded to the lesson. More time was spent ensuring a positive atmosphere was created in the classroom. He aimed to incorporate some of the theory from Gardner's ideas of multiple intelligences and accelerated learning.	
10	**Phase 2: Vicky**		
ACTION: The researcher provided Vicky with a range of PC resources – teacher's materials, student portfolios, A3 laminates etc. so that she could familiarize herself with the research.			
	5.7. 01/7.9.01: Planning The researcher met with Vicky to plan the second phase of the research. Vicky was keen incorporate the PCs into her science teaching from September-December 2001, with a class of Year 7 students. The researcher exemplified how some of the materials had been used within regular subject teaching. A further meeting with Vicky clarified these issues and illustrated her positive view towards making the PCs explicit during sessions and using A3 objective laminates. <u>Aims:</u> - to focus on the PCs as often as possible - students' written self-assessments to be undertaken every 2-weeks - use of the A-D scaled discussion document Vicky was confident that her usual teaching approaches, based on the science scheme of work, would suit the PC emphasis focusing strongly on discussion and practical work where possible.	**TEACHER COMMITMENT** Vicky was positive about the use of the target setting structures and keen to focus attention on self-management and core PC behaviours, as she considered this to be an area which most young students struggled with. Vicky's motivation towards the research stems strongly from a professional interest in diversifying her approaches.	[Researcher's Log: 5.7.01 and 7.9.01]
11	**17.9.01: Initial Perceptions: Vicky** Vicky's initial perceptions were established in a short questionnaire.	**DESIRABILITY OF PCs** PCs were considered desirable for youngsters' development, particularly self-management capabilities as students are considered to be 'spoon-fed'. Vicky considered them to provide an ideal opportunity to get students thinking, problem-solving and working on their own or in groups. **SIGNIFICANCE OF PCs** Vicky hoped that the benefits of this work would relate to: • students becoming more self-reliant and being able to think for themselves • being encouraged to work on their own initiative • students improving socially, by working with people they might not normally work with • students learning to be more tolerant	[Initial Perceptions Questionnaire Vicky: 17.9.01]

		DEVELOPMENT IN SCHOOL Vicky considered these skills to be inadequately addressed. As a result students learning was mainly teacher-dependent. This was considered to be influenced by the huge demands of the curriculum and the ensuing time constraints. **SCHOOL IMPACT** Vicky considered that the school engendered an environment which encouraged tolerance, and students' involvement in extra-curricular activities, which focus on the development of these skills. On a classroom level, some of the capabilities were considered to be tested. **SCIENCE** Science was considered to provide opportunities for working in groups, problem solving, practical work and individual work.	
12	**5.10.01: Initial experiences** The researcher met with Vicky to discuss her perceptions and experiences of progress. A3 laminates had been displayed in the laboratory and students' had undertaken self-assessments of their PCs using the A-D discussion document.	**INTEGRATING PCs** Vicky considered the explicit recognition of PC objectives to be easily integrated into her teaching style, and had found herself adopting a more assertive approach with the students, such that they were encouraged to take increased ownership of their learning. By this Vicky described limiting the number of simple organisational issues she attended to for the students, and encouraged them to manage their own work, the organisation of groups and equipment. **RESPONSIBILITY** Vicky considered the students to be working more independently, with less need for simple organisational issues, such as organising groups, equipment and the layout of work to be addressed by the teacher. Vicky found it difficult to provide specific exemplars however commented generally on her perceptions of the class. **TIME** Vicky endeavoured to review the PC objectives during the lesson, as a class-discussion and in writing, however found this difficult to incorporate into one or two hour lesson-slots. **SELF ASSESSMENT** Self-assessment strategies have proved difficult to initiate due to time pressures. Where possible, the A-D scaled discussion document	

		assisted students in identifying progress, although lower ability students tended to over-rate their abilities. Teacher, peer and class discussion was considered to encourage increased objectivity of personal judgements.	
ACTION: Vicky aimed to provide more opportunities for team-based science investigations, which she hoped would encourage students to exhibit and practice self-management skills.			
13	**31.10.01: Interim Evaluation Questionnaire** Vicky completed an evaluative questionnaire approximately two months into the research.	• PCs have been addressed 'a great deal' within regular subject teaching, 'mostly by making the core PCs explicit when explaining tasks' and 'concentrating on working in teams during investigation work'. [A1] • Advantages of focusing on PCs have been: - 'much more time in lessons' for the teacher as 'students work more independently' - less disagreement within groups as 'individuals take on particular roles within a group.' [A2] • Difficulties of focusing attention on the PCs has stemmed from the 'time for form filling' which is 'virtually abandoned now'. [A3] • Integrating PCs into the science scheme was considered harder than originally thought. [A5] • The impact of focusing attention on PCs has resulted in 'calmer groups' which are 'more hardworking' and students seem 'more able to work independently within the class'. [A6] • Behaviourally the students seem 'calmer' and 'more motivated'. [A7] • The differences are attributed mainly to: - 'the group, although other members of staff find the class quite noisy' - 'making instructions clearer' - 'increased self-motivation and self-esteem' [A8] • Teaching of PCs is 'easy to incorporate verbally, but not with paperwork'. The students are 'more aware that there are many other things apart from knowledge that they have to learn'. [A9] • Some impact on academic achievement, as 'many of the students (more than in previous Year 7 groups) appear to be more motivated to do well' this is 'reflected in test results' [A10]. • The effect of the research on the teacher stemmed from being 'more organised' and lessons	[Interim Staff Evaluation Questionnaire: Vicky: 31.10.01: A1-13]

		being 'less stressful' as more time is available for the teacher in lessons because students are working more independently. [A13]	
14	**2.11.01/3.12.01: Continuing Insights** The researcher had opportunity to talk with some students about their experience of PCs and to discuss with Vicky some issues raised in the previous evaluation. The following review reflects the issues raised during two interviews. During this time Vicky had continued to making PCs explicit at the start of lessons and reviewing them verbally at the end. Written self-assessments were mainly completed as monthly homework activities, once every six weeks. The researcher had opportunity to look through the students' PC folders.	**TEACHING PCs** Verbal discussions had lent themselves most favourably to making students' aware of the PCs. On most occasions review of PCs was undertaken after lengthier science activities. **SELF ASSESSMENT** The researcher's observation of students' PC folders indicated: 1) An overemphasis on paperwork – specific focus on two PCs may have been enough. 2) Only one self-assessment Weekly Review had been completed and students' comments were quite sparse and general. 3) The Monthly Review sheets were more encouraging. Average and higher ability students had made a good effort to identify their target, comment on how they had developed it, and related it to events or occasions where they felt they were using it more. **STUDENTS' PERCEPTIONS** Students found the process of self-assessment unfamiliar, considering it to be the teacher's role to assess their abilities. **ADVANTAGES** Some students considered the process of self-reflection useful, assisting them in recognising their achievements and areas for further development. **Confidence** Two girls commented that their confidence had increased as a result of setting targets, being aware of them and trying to do better in them. **Collaboration** Students mentioned that they would like to work with others more often, especially close friends. They thought that a partner may help them to track progress and recognise their personal development. **TEACHER PERCEPTIONS** **TIME** Although Vicky continued to focus on the difficulties and time	[Interview 67: 2.11.01] [Interview 72: 3.12.01] [Researcher's Log 2.11.01] [Interview 67: 2.11.01: 10]

		implications of doing the paperwork during lesson time, within her written evaluations, when reviewed verbally Vicky did not reiterate that the emphasis on PCs impinged on teaching time. **ACTIVE TEACHING & LEARNING STRATEGIES** The range of active learning opportunities provided in the science scheme were viewed as key opportunities for PC development. The visual reminders of PC objectives acted as a stimulus on these occasions, encouraging discussion about 'how' students' behaviour could affect their learning. Vicky viewed this as fundamentally different from the usual lesson aims which focused mainly on 'what' the students were learning. **RESPONSIBILITY** Improvement was noted in the way the students' worked, taking increased ownership of their learning. Vicky considered this change to occur within a number of weeks, noting a reduction in questions directed at simple organisation. Vicky suggested that this could result from an increased use of explanation which she had begun to use at the start of lessons. As a result she found she had more time to work within the class and to learn more about students' individual needs. **SELF ASSESSMENTS/ ABILITY** Vicky noted a definite difference in the quality of self-assessments from higher ability and less-able students whose literacy abilities influenced their effectiveness in written self-assessments. Less able students struggled in this area, thus the reflective process became a challenge and possibly demotivating experience. In general, Vicky felt that higher ability students were better able to cope with the reflective tasks, although some over-estimated their abilities.	
15	**19.12.01: Student Questionnaires** Students were asked to complete an evaluative questionnaire to gain their opinions on the PCs and their perceived influence on their development and science learning. Responses from 17 students illustrated varied views of PCs and their impact.	Students related PCs to: • helping people mange themselves • what you are good and not so good at • how well people work in groups or individually • getting more intelligent • self improvement	[Student Questionnaires: 19.12.01]

		They viewed the PC targets to: • encourage development if remembered • improve self-management and organising skills • provide an aim to work towards • help them work with other people One student felt the targets did not help at all as he was 'already organised'. Students felt the PCs had influenced their science work by: • finishing work on time • finishing more work • encouraging them to try harder • encouraging them to work better • organising work better Three students felt the PCs had not influenced their science work at all. **USE OF PCs** There were some indications that PCs were not used as regularly as the teacher commented. **SELF ASSESSMENT** Other students notably disliked the written self-assessment exercises. **CONSISTENCY** Lastly one student considered the difficulties to stem from the lack of continuity between lessons. [Student D]	[Student A] 'The teacher does not change because of the PCs, and hardly mentions it, only when we are filling in the sheets and title pages.' [Student B] 'This has helped me quite a lot but also gets on my nerves filling them in.' [Student C] 'I think that a lot of the evaluation sheets and monthly targets etc. are a waste of education time and it doesn't help much.'
16	**29.1.02: Final Evaluation** Vicky completed a final evaluation, following three months involvement in the research.	**PERSONAL CAPABILIITIES** - Raising standards in teaching and learning. - Increasing student responsibility and independence in learning **TEACHER'S ROLE** • Making the aims of the lesson/task more explicit • Helping students set relevant targets and coaxing them to achieve these targets using a variety of methods Vicky considered herself to have achieved this role to some extent. **INTERVENTIONS** • Posters on wall were considered useful for making reference to PCs. ***Most effective interventions:*** The use of teamwork and cooperative	[Final Evaluation 29.1.02] A: 'Putting the onus on the students to think around producing better work and being able to work more independently on tasks.' C: 'I think I have gone some way to fulfilling this, although this is a very subjective view, as I didn't know what the students I was trying it out on were like before.'

		group work, with the focus on time management and organisation. ***Least effective interventions:*** The self-assessment paper work. **ADVANTAGES** - more independent learners - more teacher time within lessons - better cooperation between students **DISADVANTAGES** Finding time for regular evaluation and self-assessment.	
		IMPACT - general improvement in standard of work - test results are on average higher than previous similar groups - increased motivation towards learning - more time in lessons spent with the less able students - improved understanding of group work and problem solving - increased ownership of work by students	E: 'I have been able to get the students to work more independently, and this has given me more time for myself in lessons and more time to spend on the less able students. Students were making use of others in their group rather than using me as their first point of reference.'
		IMPACT OF PCs ON TEACHING - more careful planning of lessons - less 'stressful' and more enjoyable lessons	[I] 'It has forced me to plan lessons more carefully and think about how I explain things. This has led to lessons being much less stressful and much more enjoyable.' [J] 'By thinking about Personal Capabilities, in particular, the core and self-management, the students have gained a greater understanding of working together in groups and being able to work problems out together, rather than using the teacher as their first point of reference. Working independently benefits both the students and the

			teachers, giving students more ownership of their work and leaving teachers more time to spend with students who are less able.'
Outcomes of these discussions are presented in Appendix A8.			

Appendix A8: CASE STUDY FINDINGS AND DISCUSSION

TRILOGY: CONSOLIDATION & REINFORCEMENT

This is a summary of three additional case studies which consolidate and summarise pertinent outcomes from all the cases.

A8.0 INTRODUCTION

Three case studies (Schools E, F and G) consolidate and expand on the emergent themes from other cases (Schools A, B, C & D) and are discussed together, with individual chronological events are presented in Appendix A5-A7.

Teachers in these cases, despite being committed to the research for up to two years, found difficulty in sustaining continued emphasis on the PCs interventions. School activities, assessment and curriculum pressures, as well as management responsibilities, hampered progress, although all teachers maintained an on-going involvement with the researcher.

The impact of the interventions in these cases describe their influence on improving students' self-awareness and understanding of PCs, their effect on teaching and learning, and the importance of reflective practice. The influence of academic ability and self-motivation, the challenges of maintaining emphasis on the research interventions, and the link to constructivist teaching approaches also emerge from these cases, and are discussed and related to previous cases being referenced accordingly. .

A8.1 OVERVIEW OF SCHOOL ACTIVITY

School E (ref. Appendix A5): The generic research interventions led to two teachers adopting a strong self-reflective attitude towards their teaching and students' learning in Science. The use of independent research activities, with Year 8 students, formed the main strategy for developing positive self-image and self-motivation, along with regular reflection on PC targets. Classroom ethos and teacher-student relationships improved, as well as increased choice within learning. The teachers viewed the study as a stimulus for personal reflection on pedagogy and a tool for professional development.

School F (ref. Appendix A6): In using the generic research interventions, the case focused on the development of verbal communication and teamwork PCs, through Year 7 and 8 Science. The research stimulated teacher and student reflection on practice, resulting in a review of the teaching and learning approaches used in Science. Increasing emphasis on peripatetic and group-work strategies led to improved teacher-student relationships and an increased sense of students' personal responsibility.

School G (ref. Appendix A7): The first phase of research developed students' teamwork and verbal communication, with the second phase directed towards the core and self-management PCs. The generic research interventions were used sparingly with Year 7 students in the first year of the study, followed by a period of three months in the second phase with a new cohort. The research encouraged reflection on teaching and learning approaches, resulting in an increased use of active and co-operative learning. The students seemed more self-aware with a better understanding of lesson expectations and desirable behaviour. Teachers noted improved co-operative working relationships and self-management behaviours.

A8.2 KEY POINTS

1. Raising students' self-awareness of the influence of their PCs, and their impact on classroom activities and Science learning, promoted students' understanding of the PC terms, and the associated characteristic behaviours, raising personal and lesson expectations.
2. PC development through subject teaching stimulated a change in practice, moving to process-orientated and student-centred learning, and improved the degree of focus within lessons.
3. The study led to an increased emphasis on teacher's reflection on pedagogy.
4. Academic ability and self-motivation influenced students' ability to understand and react to PC development. Lower ability students were

considered by teachers to suffer from poorer self-image found difficulty in affecting their PC development and it was suggested that PC development is best facilitated when students' exhibit self-motivation stemming from a positive self-belief and self-image.

5. A link between PC development and constructivist teaching approaches was considered.
6. The teachers described the challenges of conducting the research within limited curriculum time, especially where management responsibilities hampered their personal interests and commitment.

A8.3 Key Point 1: Raising students' self-awareness & promoting understanding of PCs

Raising students' self-awareness of the influence of their personal skills, and their impact on classroom activities and Science learning.

[Ref. sections 10.2.4, 10.2.7, 10.3.6; and CSE: 12; CSF: 6, 7, 12; CSG: 4, 9].

Promoting students' understanding of generic PC terms, and the associated characteristic behaviours.

[Ref section 9.3.5; and CSF: 4, 7; CSG: 6, 12, 14].

Raising personal and lesson expectations leading to increased effort investment and self-motivation.

[Ref. sections 10.3.6; and CSF: 7, 12; CSC: 6.1; CSE: 6, 7, 8, 13]

Within all three cases the generic interventions of making PCs explicit, target setting and self-assessing were undertaken. Interventions differed, depending on the level of integration into regular teaching practices. The researcher facilitated reflection on pedagogy and provided materials to assist the students' target setting and self-assessment of PCs.

Explicit recognition of PC behaviours, drawn from the behavioural framework, was encouraged in many lessons through target-setting, focused discussions, classroom displays and verbal review. PC objectives were identified at the beginning of lessons, with review and feedback given during, and in, plenary class-discussions. Students were encouraged to discuss their perceptions of

PCs, and to identify their development in Science learning, for which targets were set on a class and individual basis. The researcher designed a range of materials and worksheets, to assist in the processes of target setting and self-assessment, however teachers were encouraged to tailor their use to the students' needs and abilities. Improvement in students' PCs was tracked using personal portfolios, and teachers provided verbal formative feedback with some also recognising students' effort in the marking of work. Monitored self-assessment structures were used, which are discussed in more detail in section 7.3.2, with the involvement of parents and peers.

Teachers valued the opportunity to show interest in students' personal development beyond their Science learning, and explained how the recognition and appreciation of non-subject related objectives positively impacted on teacher-student relationships [CSE: 8, 10; CSF: 7].

> [School E - Interview 45. 13.02.01]
> 9. Sue ...[A strength of the research is the effect on] the children really, how strong this has built the team feeling in the group. That is just incredible... [The difference is] massive, I still think that. I think it's because you've stepped outside the classroom, if you like, outside the science and you've said to them something I've always believed anyway, and that's, 'I'm teaching you as a person', and if this is where you feel less secure we're going to try and work on that. There's something special in the classrooms... [I was doing that anyway] but not as overtly. That's the thing, it becomes more overt with the PCs and you're saying to the children that the school values these as well as the science. Then they see what they're capable of doing and it happens from there really... The whole thing has just helped the group relationship improve, because we're talking about different things, personal things instead of just the science.

Valuing PCs alongside subject knowledge illustrated that learning in Science spread beyond the subject and was influenced by their personal skills and characteristics. Students reacted positively to the teacher's interest in their personal development, illustrating motivation and enthusiasm towards achieving identified targets. They became increasingly aware and adept at identifying the types of behaviours that would encourage improvement in PCs.

Students of lower academic ability seemed to struggle to understand the purpose and processes of PC development and required more guidance and opportunity to develop understanding of terminology and its purpose. Students' ability to self-assess PCs was influenced by their academic ability and self-motivation, as described in section 9.3.7.

The use of explicit target-setting and assessment, monitored by teachers, peers and parents, proved effective in focusing teachers' and students' attention, and discussions, on PC development. The integration of these strategies within subject teaching indicated a parity of importance with academic development, although self-assessment tasks posed time management difficulties in most cases.

A8.4 Key Point 2: The influence on teaching and learning styles

Influencing the choice of students' work, the teaching strategies to deliver it, and the degree of focus within lessons.

[Ref. sections 10.3.4; and CSE: 6, 7, 10, 13; CSF: 4, 9; CSG: 6, 8, 9].

As in other cases, PC development through subject teaching stimulated a change in practice, moving from strongly product-orientated and teacher-centred approaches to increasingly process-orientated and student-centred learning. Encouraging PCs through Science resulted in the increased use of active, co-operative and investigative teaching and learning strategies [ref. sections 9.3.6, 10.2.6, 10.3.4].

Teachers, in this trilogy, veered towards strategies which promoted students' active involvement in learning. School E focused their PC development around one-off research-presentation activities; School F focused on the use of regular lesson activities with a stronger emphasis on paired and teamwork discussion and research activities; School G encouraged a greater variety of teamwork experiences during investigative work. These strategies resulted from teachers' reflection on practice, although they were not considered 'new' or 'novel'. However, staff felt that curriculum pressures, resulting mainly from assessment had steered them away from their more regular use. Although viewed as more time consuming, and possibly more 'risky', the teachers valued the students' active involvement in the construction of knowledge and understanding, and PC development.

[School E – Interview 63: 26.9.01]

50. David:	The kids are motivated to deliver, in the way they approach the work as they come at it from lots of different angles, because you've given more time, and you're not just getting through stuff, they get more out of it in terms of the actual subject they're doing. Overall the class cover a lot more as well, and if they all contribute something, everybody benefits. It's a trade off in a way... you've given them ownership but then when you take back the ownership in a way, later on, they're more motivated still, I've found.
51. Sue:	I'd agree with all of that.
52. David:	The knock on effect is that they're not as....
53. Sue:	....as pudding-like.

Co-operative, team-based and investigative tasks provided such opportunities for reflection on PC development, and encouraged more flexible approaches to learning from these and other cases. It is suggested that where teachers aim to encourage students' PC development through the subject, that a reassessment of practice, and an investment in active learning styles, would be of benefit. This finding links to McCarthy & Anderson's (2000: 279) view of active learning experiences, as those 'in which students are thinking about their learning and the subject matter'.

Despite the use of active teaching and learning strategies in these cases being limited to selected opportunities, the teachers report similar outcomes of increased engagement, better behaviour, increased confidence, more independent learning and improved team and group work skills.

A8.5 Key Point 3: The influence of teacher reflection

The increased emphasis on teacher's reflection on pedagogy. [Ref. sections 9.3.4, 10.2.11; and CSE: 8, 10, 12; CSF: 4,5, 7, 12; CSG: 9].

The research methodology focused on the involvement and continued support of teachers, who played a key role in the development and trialing of research interventions. These issues are discussed in detail in Chapter 11 and section 12.0, and shall not be repeated here.

A8.6 Key Point 4: Academic ability and self-motivation

The influence of academic ability and self-motivation [For further analysis re. section 9.3.7, 10.2.5]

Students' academic ability seemed to be heavily influenced by their aptitude to:

- understand the concept of PCs
- exhibit ability in PCs
- complete self-assessments
- view the link between PCs and their science learning
- action plan methods or strategies for personal improvement.

Teachers appreciated the difference students' academic ability on PC development, which if not recognised and differentiated for, resulted in disaffection towards the work. PC improvement was considered to be a long-term process, which if initiated from a young age, could mature and develop in line with academic ability. Encouraging PC development with lower ability students was considered to take a longer period of time [CSE: 12], which would link with the notion of a continuum of PC development, where confidence and understanding is the basis for further improvement.

> [David: Final Evaluation]
> I feel that the PCs could still be used for most ages and abilities but there is an intellectual demand on top of what is being studied in the classroom. Students of lower ability or motivation may have difficulty dealing with this.

> [Interview 69: 14.11.01]
> 82. David: I think it is a long term thing this, I really do.
> 83. Sue: There's no doubt about that. It's a long-term building, bit by bit. But what the students found really hard is when they've got to do things like saying what they were good at and then give the evidence. They're 13 years old these children, and they were saying 'What do you mean?' So I had to sit with a small group and say, for example, 'When I was... I did.... Therefore....' 'Oh right' they said, and the extra time I spent with them, that pulls the group in, and I had to disband the science, forget the science, forget it. So I spent a lesson on that and then I said 'Take them home to your parents and see what they can contribute.'

So it's actually teaching them, because it's a high level skill that you're starting early with the children, which is a very good thing, and it will impact on the evaluation techniques in the science investigations.

[Interview 68: 3.11.01]

15. Phil: PC work builds confidence, even building confidence in some of the lower ability students, but it's especially worked with some of the higher ability ones… It [is accessible to lower ability students] just takes longer I believe… I'd say if you gave them 6 months of it in their first year, they'd be perfectly 'au fait' with it. I think it's just a time thing. In terms of usefulness – if they can see if they're improving in certain skills, they'll see it as useful. But I have said once that it might take them a long time to improve to get where they want to be. Kids of this generation seem to need immediate gratification.

The students' poorer verbal communication and literacy skills influenced their ability to target-set and compile written self-assessments, and also restricted their ability to identify strategies for self-improvement. Teachers described how lower ability students required more guidance, teaching, and time for improvement, to show improved performance. Development was facilitated by the use of role-play, where students' understanding of PC behaviours could be illustrated using actions and scenario activities. Their integration into regular classroom activities provided an accessible means for demonstrating the influence of PCs on learning.

[Interview 68. 3.11.01]

21. Phil: Basically, lower ability students find it quite difficult initially… They want concrete examples of the skill – so we'd almost have to stage a little soap opera and say 'If you want to know this, you have to ask them what you want. How are you going to ask them?' … I try and get them to explain to each other how they're going to do it, so in a way they think about how they explain things as well. [Problem solving] is one of the most difficult to handle with low ability students.

The difficulties posed by literacy ability generally resulted in lower ability students lacking confidence in their own ability towards PC development. This affected their motivation towards tasks. Better-motivated students, often of average to high ability, were considered better able to choose, organise and concentrate on their science learning and PC development, whilst lower-ability students found increased difficulty in taking personal responsibility for their PC development. Teachers found that where students experienced enough difficulty achieving Science objectives, further aspects of learning were considered overloading. In many cases, PC development with lower ability students was less evident within the time available, whilst higher ability students, exhibiting better literacy, communication and organisational skills, were considered to be more self-motivated and better able to cope with the self-assessment exercises. It should also be recognised that a less sustained emphasis on PC interventions in these cases may also have negatively affected the students' ability to maintain commitment to and understanding of the work.

> [David, Final Evaluation]
> There was some impact with better-motivated students who were keen to set targets and try to follow them through, but others lacked skills of organisation and concentration, to cope with the demands. Lower ability groups do not benefit greatly from choices – some choose to do as little as possible.

> [Phil, 5.11.01- A6, A10]
> Higher ability students have improved in their chosen PC and some have noted an increased enjoyment in the lesson. More effect has been noted with these students who illustrate better verbal communication skills through more relevant questioning.

These findings suggest a link between self-motivation, self-image and PC development, as described in section 9.4.2. Lower ability students were considered by teachers to suffer from poorer self-image found difficulty in affecting their PC development and it was suggested that PC development is best facilitated when students' exhibit self-motivation stemming from a positive self-belief and self-image. Further research would establish whether a causal link exists between self-motivation, self-image and PC development as indicated in these findings.

A8.7 Key Point 5: The link to constructivist teaching approaches

One teacher, Chris, considered the link between the development of PCs and the theory of constructivism. He suggested that the development of PCs focused teaching on students' individual needs, with the teacher facilitating and structuring the learning process [CSG: 9]. Although not expanding to any great extent on this issue, the association is of possible relevance.

Constructivist teaching takes into account that people hold and construct their own meanings for experiences, phenomena or information. As such, it takes into account that learners bring to learning a personal construction of ideas, meanings and understandings. The constructed meanings depend on the person's existing knowledge and previous experience, and is therefore, personal to them (Fensham *et al.* 1994). It is assumed, therefore, that they will already have preconceptions about PCs such as, teamwork, verbal communication, creativity, critical thinking, social intelligence.

Chris highlighted that the teaching of PCs must therefore begin with eliciting students' preconceptions of the terms, and the behaviours they associate with them. In order to enhance success, he suggested that teachers must attend to these understandings prior to further work being undertaken. This issue was pertinently described by one of Ruth's experiences (School D), who commented that setting students the objective of 'sharing one's opinions and ideas with others' may well, for some, be interpreted as 'shouting your ideas across the room to another student'. Although possibly extreme, this suggestion typifies the relevance of constructivist teaching for PCs and teachers in the study could be considered to have been using such approaches whilst encouraging students' PC development.

Chris' short reference indicates that in order for students to be encouraged to learn and react positively to PC targets, their initial conceptions must be recognised and built on, in a similar way to Science knowledge being acquired on the basis of preconceived understandings. Through eliciting what students perceive to be 'good' teamwork, 'good' communication or 'good' self-management, it is increasingly likely that teachers will succeed in moulding, adapting and developing students' understandings, hence influencing their performance.

This is an area of development which requires further exploration with teachers. The cataloguing of students' preconceptions of PCs at various stages in development will better enable teachers to differentiate PC interventions for particular needs.

A8.8 Key Point 6: The challenges of maintaining emphasis on development

[Ref. Interview 47: 10.5.01: 45/ Interview 4: 3.5.01: 63]

Maintaining regular emphasis on the PC interventions was a particular issue for teachers within these cases, who shared the difficulties of fulfilling curriculum requirements, managing departmental issues, and trialing the PC interventions. The teachers described the challenges of conducting the research within limited curriculum time, especially where management responsibilities hampered their personal interests and commitment. The structure of the Science curriculum and schemes of work were found to strongly influence the integration of PCs, with teachers expressing concern over increasingly teacher-centred and fact-heavy lessons. These issues reflect the concerns described by Jenkins (2000a, b) and Donnelly (2000a, b, c) in relation to contemporary Science teaching, discussed in Chapter 2.

> [Interview 47: 10.5.01]
> 45. Phil: If I look at the 2003 document or the syllabuses, they are so knowledge based, but in what ways do you use that knowledge after you leave school? Whereas these types of things, these skills, are applicable to such a wide range, so why not try and teach the other way round, try and get them to acquire the knowledge having got the skills. It's easier to absorb the knowledge if you've got good skills so in a way you're going back to where we should have started off, in equipping kids for life instead of throwing knowledge at them. So I'm trying to do that and do it the other way round, so maybe that's what we should be doing instead of looking at what the syllabus should contain.

> [Interview 4: 3.5.01]
> 63. Chris: I think that any teacher, or most teachers who are fairly forward looking would say these PCs are very, very valid criteria to pursue. But I think it would be resisted when there are certain things that have not been addressed at the most fundamental level, such as the overload of the curriculum… I think teachers would be happy to run with this if they were given a little bit of leeway and allowed to exercise a little bit of professionalism.

Progress in these cases was slow and often interrupted, despite the teachers evident willingness to progress. The trilogy of cases illustrate the inconsistent emphasis that was given to PCs, with teachers resorting to target-setting and assessing PCs in relation to particular activities, such as twice annual independent student investigations, or specifically organised group work approaches. Mostly the difficulties arose where Head of Department's were involved, whose responsibility for school and management issues, as well as the organisation of initiatives, staffing and resources across the department, limited the time available to invest in reflection and adaptation of classroom practice. In these cases, additional teachers was enlisted at a later stage, and although this proved successful in integrating the PC interventions more frequently, the impact on the students was limited due to lack of research time and researcher-teacher collaboration that was available.

It is of significance, as noted previously (ref. sections 9.3.3), that teacher philosophy and motivation towards students' PC development is strong, especially where initial insights into its enhancement are being gained. It is unfortunate that teachers in management positions evidently struggled to implement the interventions which they considered of importance.

The implication of this finding is of general concern for teachers who initiate curriculum development. It has been recognised that time is required for reflection on pedagogy prior to, during, and after the use of interventions. Where this time is limited, inconsistent, or compromised, the effects of their impact will be accordingly. Although of concern, this occurrence is increasingly evident, and was an issue with all teachers in the study. For those in positions of management, these effects seem only to be compounded.

A8.9 SUMMARY

This discussion highlights the key outcomes and issues from three cases, which relate to other case study reports. The use of explicit target setting and self-assessment interventions, along with the increased emphasis on active teaching and learning strategies, enabled some progress to be noted in students' PC development. Increased engagement, better behaviour, increased confidence, more independent learning and better team and group work skills were areas of improvement, stemming from an increased awareness and understanding of PCs. Academic ability proved to be of influence to student development. The regular use of reflection, both by teachers and staff, influenced the effectiveness of PC development, although was influenced significantly by curriculum, managerial and time pressures. The association of PC development with constructivist teaching and learning models has been identified and is proposed as an area for further research.

A8.9.1 Areas for further consideration

- Further research would establish whether a causal link exists between self-motivation, self-image and PC development as indicated in these findings.
- The research suggests a link between PC development and theories of constructivist learning. This is an area which would be of interest to explore further, in order that if considered significant the cataloguing of students' preconceptions of PCs at various stages in development will enable teachers understand and differentiate PC interventions accordingly.

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considered by teachers to suffer from poorer self-image found difficulty in affecting their PC development and it was suggested that PC development is best facilitated when students' exhibit self-motivation stemming from a positive self-belief and self-image.

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Raising personal and lesson expectations leading to increased effort investment and self-motivation.

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Teachers valued the opportunity to show interest in students' personal development beyond their Science learning, and explained how the recognition and appreciation of non-subject related objectives positively impacted on teacher-student relationships [CSE: 8, 10; CSF: 7].

> [School E - Interview 45. 13.02.01]
> 9. Sue ...[A strength of the research is the effect on] the children really, how strong this has built the team feeling in the group. That is just incredible... [The difference is] massive, I still think that. I think it's because you've stepped outside the classroom, if you like, outside the science and you've said to them something I've always believed anyway, and that's, 'I'm teaching you as a person', and if this is where you feel less secure we're going to try and work on that. There's something special in the classrooms... [I was doing that anyway] but not as overtly. That's the thing, it becomes more overt with the PCs and you're saying to the children that the school values these as well as the science. Then they see what they're capable of doing and it happens from there really... The whole thing has just helped the group relationship improve, because we're talking about different things, personal things instead of just the science.

Valuing PCs alongside subject knowledge illustrated that learning in Science spread beyond the subject and was influenced by their personal skills and characteristics. Students reacted positively to the teacher's interest in their personal development, illustrating motivation and enthusiasm towards achieving identified targets. They became increasingly aware and adept at identifying the types of behaviours that would encourage improvement in PCs.

Students of lower academic ability seemed to struggle to understand the purpose and processes of PC development and required more guidance and opportunity to develop understanding of terminology and its purpose. Students' ability to self-assess PCs was influenced by their academic ability and self-motivation, as described in section 9.3.7.

The use of explicit target-setting and assessment, monitored by teachers, peers and parents, proved effective in focusing teachers' and students' attention, and discussions, on PC development. The integration of these strategies within subject teaching indicated a parity of importance with academic development, although self-assessment tasks posed time management difficulties in most cases.

A8.4 Key Point 2: The influence on teaching and learning styles

Influencing the choice of students' work, the teaching strategies to deliver it, and the degree of focus within lessons.

[Ref. sections 10.3.4; and CSE: 6, 7, 10, 13; CSF: 4, 9; CSG: 6, 8, 9].

As in other cases, PC development through subject teaching stimulated a change in practice, moving from strongly product-orientated and teacher-centred approaches to increasingly process-orientated and student-centred learning. Encouraging PCs through Science resulted in the increased use of active, co-operative and investigative teaching and learning strategies [ref. sections 9.3.6, 10.2.6, 10.3.4].

Teachers, in this trilogy, veered towards strategies which promoted students' active involvement in learning. School E focused their PC development around one-off research-presentation activities; School F focused on the use of regular lesson activities with a stronger emphasis on paired and teamwork discussion and research activities; School G encouraged a greater variety of teamwork experiences during investigative work. These strategies resulted from teachers' reflection on practice, although they were not considered 'new' or 'novel'. However, staff felt that curriculum pressures, resulting mainly from assessment had steered them away from their more regular use. Although viewed as more time consuming, and possibly more 'risky', the teachers valued the students' active involvement in the construction of knowledge and understanding, and PC development.

[School E – Interview 63: 26.9.01]

50. David:	The kids are motivated to deliver, in the way they approach the work as they come at it from lots of different angles, because you've given more time, and you're not just getting through stuff, they get more out of it in terms of the actual subject they're doing. Overall the class cover a lot more as well, and if they all contribute something, everybody benefits. It's a trade off in a way... you've given them ownership but then when you take back the ownership in a way, later on, they're more motivated still, I've found.
51. Sue:	I'd agree with all of that.
52. David:	The knock on effect is that they're not as....
53. Sue:	....as pudding-like.

Co-operative, team-based and investigative tasks provided such opportunities for reflection on PC development, and encouraged more flexible approaches to learning from these and other cases. It is suggested that where teachers aim to encourage students' PC development through the subject, that a reassessment of practice, and an investment in active learning styles, would be of benefit. This finding links to McCarthy & Anderson's (2000: 279) view of active learning experiences, as those 'in which students are thinking about their learning and the subject matter'.

Despite the use of active teaching and learning strategies in these cases being limited to selected opportunities, the teachers report similar outcomes of increased engagement, better behaviour, increased confidence, more independent learning and improved team and group work skills.

A8.5 Key Point 3: The influence of teacher reflection

The increased emphasis on teacher's reflection on pedagogy.

[Ref. sections 9.3.4, 10.2.11; and CSE: 8, 10, 12; CSF: 4,5, 7, 12; CSG: 9].

The research methodology focused on the involvement and continued support of teachers, who played a key role in the development and trialing of research interventions. These issues are discussed in detail in Chapter 11 and section 12.0, and shall not be repeated here.

A8.6 Key Point 4: Academic ability and self-motivation

The influence of academic ability and self-motivation [For further analysis re. section 9.3.7, 10.2.5]

Students' academic ability seemed to be heavily influenced by their aptitude to:

- understand the concept of PCs
- exhibit ability in PCs
- complete self-assessments
- view the link between PCs and their science learning
- action plan methods or strategies for personal improvement.

Teachers appreciated the difference students' academic ability on PC development, which if not recognised and differentiated for, resulted in disaffection towards the work. PC improvement was considered to be a long-term process, which if initiated from a young age, could mature and develop in line with academic ability. Encouraging PC development with lower ability students was considered to take a longer period of time [CSE: 12], which would link with the notion of a continuum of PC development, where confidence and understanding is the basis for further improvement.

> [David: Final Evaluation]
> I feel that the PCs could still be used for most ages and abilities but there is an intellectual demand on top of what is being studied in the classroom. Students of lower ability or motivation may have difficulty dealing with this.

> [Interview 69: 14.11.01]
> 82. David: I think it is a long term thing this, I really do.
> 83. Sue: There's no doubt about that. It's a long-term building, bit by bit. But what the students found really hard is when they've got to do things like saying what they were good at and then give the evidence. They're 13 years old these children, and they were saying 'What do you mean?' So I had to sit with a small group and say, for example, 'When I was... I did.... Therefore....' 'Oh right' they said, and the extra time I spent with them, that pulls the group in, and I had to disband the science, forget the science, forget it. So I spent a lesson on that and then I said 'Take them home to your parents and see what they can contribute.'

So it's actually teaching them, because it's a high level skill that you're starting early with the children, which is a very good thing, and it will impact on the evaluation techniques in the science investigations.

[Interview 68: 3.11.01]

15. Phil: PC work builds confidence, even building confidence in some of the lower ability students, but it's especially worked with some of the higher ability ones... It [is accessible to lower ability students] just takes longer I believe... I'd say if you gave them 6 months of it in their first year, they'd be perfectly 'au fait' with it. I think it's just a time thing. In terms of usefulness – if they can see if they're improving in certain skills, they'll see it as useful. But I have said once that it might take them a long time to improve to get where they want to be. Kids of this generation seem to need immediate gratification.

The students' poorer verbal communication and literacy skills influenced their ability to target-set and compile written self-assessments, and also restricted their ability to identify strategies for self-improvement. Teachers described how lower ability students required more guidance, teaching, and time for improvement, to show improved performance. Development was facilitated by the use of role-play, where students' understanding of PC behaviours could be illustrated using actions and scenario activities. Their integration into regular classroom activities provided an accessible means for demonstrating the influence of PCs on learning.

[Interview 68. 3.11.01]

21. Phil: Basically, lower ability students find it quite difficult initially... They want concrete examples of the skill – so we'd almost have to stage a little soap opera and say 'If you want to know this, you have to ask them what you want. How are you going to ask them?' ... I try and get them to explain to each other how they're going to do it, so in a way they think about how they explain things as well. [Problem solving] is one of the most difficult to handle with low ability students.

The difficulties posed by literacy ability generally resulted in lower ability students lacking confidence in their own ability towards PC development. This affected their motivation towards tasks. Better-motivated students, often of average to high ability, were considered better able to choose, organise and concentrate on their science learning and PC development, whilst lower-ability students found increased difficulty in taking personal responsibility for their PC development. Teachers found that where students experienced enough difficulty achieving Science objectives, further aspects of learning were considered overloading. In many cases, PC development with lower ability students was less evident within the time available, whilst higher ability students, exhibiting better literacy, communication and organisational skills, were considered to be more self-motivated and better able to cope with the self-assessment exercises. It should also be recognised that a less sustained emphasis on PC interventions in these cases may also have negatively affected the students' ability to maintain commitment to and understanding of the work.

> [David, Final Evaluation]
> There was some impact with better-motivated students who were keen to set targets and try to follow them through, but others lacked skills of organisation and concentration, to cope with the demands. Lower ability groups do not benefit greatly from choices – some choose to do as little as possible.

> [Phil, 5.11.01- A6, A10]
> Higher ability students have improved in their chosen PC and some have noted an increased enjoyment in the lesson. More effect has been noted with these students who illustrate better verbal communication skills through more relevant questioning.

These findings suggest a link between self-motivation, self-image and PC development, as described in section 9.4.2. Lower ability students were considered by teachers to suffer from poorer self-image found difficulty in affecting their PC development and it was suggested that PC development is best facilitated when students' exhibit self-motivation stemming from a positive self-belief and self-image. Further research would establish whether a causal link exists between self-motivation, self-image and PC development as indicated in these findings.

A8.7 Key Point 5: The link to constructivist teaching approaches

One teacher, Chris, considered the link between the development of PCs and the theory of constructivism. He suggested that the development of PCs focused teaching on students' individual needs, with the teacher facilitating and structuring the learning process [CSG: 9]. Although not expanding to any great extent on this issue, the association is of possible relevance.

Constructivist teaching takes into account that people hold and construct their own meanings for experiences, phenomena or information. As such, it takes into account that learners bring to learning a personal construction of ideas, meanings and understandings. The constructed meanings depend on the person's existing knowledge and previous experience, and is therefore, personal to them (Fensham *et al.* 1994). It is assumed, therefore, that they will already have preconceptions about PCs such as, teamwork, verbal communication, creativity, critical thinking, social intelligence.

Chris highlighted that the teaching of PCs must therefore begin with eliciting students' preconceptions of the terms, and the behaviours they associate with them. In order to enhance success, he suggested that teachers must attend to these understandings prior to further work being undertaken. This issue was pertinently described by one of Ruth's experiences (School D), who commented that setting students the objective of 'sharing one's opinions and ideas with others' may well, for some, be interpreted as 'shouting your ideas across the room to another student'. Although possibly extreme, this suggestion typifies the relevance of constructivist teaching for PCs and teachers in the study could be considered to have been using such approaches whilst encouraging students' PC development.

Chris' short reference indicates that in order for students to be encouraged to learn and react positively to PC targets, their initial conceptions must be recognised and built on, in a similar way to Science knowledge being acquired on the basis of preconceived understandings. Through eliciting what students perceive to be 'good' teamwork, 'good' communication or 'good' self-management, it is increasingly likely that teachers will succeed in moulding, adapting and developing students' understandings, hence influencing their performance.

This is an area of development which requires further exploration with teachers. The cataloguing of students' preconceptions of PCs at various stages in development will better enable teachers to differentiate PC interventions for particular needs.

A8.8 Key Point 6: The challenges of maintaining emphasis on development

[Ref. Interview 47: 10.5.01: 45/ Interview 4: 3.5.01: 63]

Maintaining regular emphasis on the PC interventions was a particular issue for teachers within these cases, who shared the difficulties of fulfilling curriculum requirements, managing departmental issues, and trialing the PC interventions. The teachers described the challenges of conducting the research within limited curriculum time, especially where management responsibilities hampered their personal interests and commitment. The structure of the Science curriculum and schemes of work were found to strongly influence the integration of PCs, with teachers expressing concern over increasingly teacher-centred and fact-heavy lessons. These issues reflect the concerns described by Jenkins (2000a, b) and Donnelly (2000a, b, c) in relation to contemporary Science teaching, discussed in Chapter 2.

> [Interview 47: 10.5.01]
> 45. Phil: If I look at the 2003 document or the syllabuses, they are so knowledge based, but in what ways do you use that knowledge after you leave school? Whereas these types of things, these skills, are applicable to such a wide range, so why not try and teach the other way round, try and get them to acquire the knowledge having got the skills. It's easier to absorb the knowledge if you've got good skills so in a way you're going back to where we should have started off, in equipping kids for life instead of throwing knowledge at them. So I'm trying to do that and do it the other way round, so maybe that's what we should be doing instead of looking at what the syllabus should contain.

> [Interview 4: 3.5.01]
> 63. Chris: I think that any teacher, or most teachers who are fairly forward looking would say these PCs are very, very valid criteria to pursue. But I think it would be resisted when there are certain things that have not been addressed at the most fundamental level, such as the overload of the curriculum... I think teachers would be happy to run with this if they were given a little bit of leeway and allowed to exercise a little bit of professionalism.

Progress in these cases was slow and often interrupted, despite the teachers evident willingness to progress. The trilogy of cases illustrate the inconsistent emphasis that was given to PCs, with teachers resorting to target-setting and assessing PCs in relation to particular activities, such as twice annual independent student investigations, or specifically organised group work approaches. Mostly the difficulties arose where Head of Department's were involved, whose responsibility for school and management issues, as well as the organisation of initiatives, staffing and resources across the department, limited the time available to invest in reflection and adaptation of classroom practice. In these cases, additional teachers was enlisted at a later stage, and although this proved successful in integrating the PC interventions more frequently, the impact on the students was limited due to lack of research time and researcher-teacher collaboration that was available.

It is of significance, as noted previously (ref. sections 9.3.3), that teacher philosophy and motivation towards students' PC development is strong, especially where initial insights into its enhancement are being gained. It is unfortunate that teachers in management positions evidently struggled to implement the interventions which they considered of importance.

The implication of this finding is of general concern for teachers who initiate curriculum development. It has been recognised that time is required for reflection on pedagogy prior to, during, and after the use of interventions. Where this time is limited, inconsistent, or compromised, the effects of their impact will be accordingly. Although of concern, this occurrence is increasingly evident, and was an issue with all teachers in the study. For those in positions of management, these effects seem only to be compounded.

A8.9 SUMMARY

This discussion highlights the key outcomes and issues from three cases, which relate to other case study reports. The use of explicit target setting and self-assessment interventions, along with the increased emphasis on active teaching and learning strategies, enabled some progress to be noted in students' PC development. Increased engagement, better behaviour, increased confidence, more independent learning and better team and group work skills were areas of improvement, stemming from an increased awareness and understanding of PCs. Academic ability proved to be of influence to student development. The regular use of reflection, both by teachers and staff, influenced the effectiveness of PC development, although was influenced significantly by curriculum, managerial and time pressures. The association of PC development with constructivist teaching and learning models has been identified and is proposed as an area for further research.

A8.9.1 Areas for further consideration

- Further research would establish whether a causal link exists between self-motivation, self-image and PC development as indicated in these findings.
- The research suggests a link between PC development and theories of constructivist learning. This is an area which would be of interest to explore further, in order that if considered significant the cataloguing of students' preconceptions of PCs at various stages in development will enable teachers understand and differentiate PC interventions accordingly.

APPENDIX A9: Schools H and I

A9.1 School H

A business-funded education centre providing out-of-school Science learning opportunities for primary and secondary school students, formed the context for PC development. The centre delivered short courses, promoting understanding in investigative Science, Chemistry and Biology.

A group of ten, disaffected Year 10 students were selected to take part in a 12-week programme focused on developing Key Skills and PCs, encouraging their re-engagement with learning. The planned activities were designed to actively engage students physically, mentally and socially, with no specific link to NC learning. The main focus of all the tasks was to raise students' self-image and motivation, encouraging them to work in a pro-social manner.

In the early stages of the work the Foot and Mouth Crisis (2000) lead to the closure of the education centre for a significant period of time. Progress in PC development was halted and proved difficult to integrate on re-commencement of the courses, due to restricted time.

A9.2 School I

The school was a mixed comprehensive secondary school, situated in an inner-city area, catering for over 500 11-16 year old students. The research involved one KS3 Science teacher with a specialism in Chemistry, and commenced with a group of Year 8 students of average to low ability. During the course of the research the students were regrouped, altering the make up of the focus group.

Progress in this case was minimal, although the teacher received significant support from the researcher. The adaptation of schemes of work, the provision of classroom display material, regular vistis and classroom support, were unable to facilitate the integration of PCs in this case. Unfortunately, the teacher's lack of commitment to the research led the researcher to suspending involvement after 7 months trialling and one-year's liasion with the school.

Appendix A10

The relationship between Hay McBer's findings and Personal Capabilities.

Hay McBer (2000) *Characteristics of Teacher Expertise*		Personal Capabilities *Proposed capabilities of effective learners*	
Professionalism	▪ respect for others	▪ to understand other peoples' feelings ▪ to consider and respect other people's thoughts	***Social Intelligence***
	▪ challenge and support		
	▪ confidence	▪ to know what I do well in ▪ to feel confident in myself and in what I do ▪ to feel worthy of positive feedback	***Positive Self Image***
	▪ creating trust		
Leading	▪ managing pupils		
	▪ passion for learning	▪ to show enthusiasm for my work ▪ to be willing to make an effort in my work ▪ to find good reasons to do my work well ▪ to get a 'buzz' from my work	***Self Motivation***
	▪ flexibility	▪ to be willing to change if necessary	***Teamwork***
	▪ holding people accountable	▪ to take personal responsibility for making sure deadlines are met ▪ to take personal responsibility for work when in teams	***Tenacity*** ***Teamwork***
Thinking	▪ analytical thinking ▪ conceptual thinking	▪ to make sense of information ▪ to pick out the positive things or advantages ▪ to use what is known or found out to move on ▪ to relate the problem to what is already known	***Critical thinking & Problem solving***
Relating to others	▪ understanding others	▪ to change the way I speak depending on the people around ▪ to consider other peoples' views ▪ to discuss topics with other people ▪ to understand other peoples' feelings	***Verbal Communication & Social intelligence***
	▪ impact and influence		
	▪ team working	▪ to help decide on what needs to be done in teams ▪ to help decide who will do what in teams ▪ to be willing to critically evaluate my ideas and contributions	***Teamwork***
Planning and Setting Expectations	▪ drive for improvement	▪ to stay committed to activities I have started ▪ to be confident in managing my own time ▪ to decide what are the most important things to do	***Tenacity*** ***Self-management***
	▪ initiative	▪ to think of new or original ideas ▪ to use many experiences to help stimulate new ideas	***Creativity***
	▪ information seeking	▪ to investigate a problem to find a feasible solution ▪ to draw understanding from what has been found	***Problem Solving***

CORE PERSONAL CAPABILITIES

1. to share opinions and ideas with others
2. to listen and respond to other people
3. to seek advice when necessary
4. to co-operate with others
5. to help reach agreements with others
6. to keep track and monitor what I am and others are doing
7. to avoid giving up easily
8. to organise and plan how to go about a task

POSITIVE SELF IMAGE

a) to know what I do well in
b) to understand what other people think of me
c) to feel confident in myself and in what I do
d) to have respect for myself
e) to feel worthy of positive feedback

SELF MANAGEMENT

a) to manage my own time well
b) to decide what are the most important things to do
c) to set realistic targets and deadlines for myself
d) to work well on my own when necessary

CREATIVITY

a) to think of new or original ideas
b) to use many experiences to help stimulate new ideas
c) to take time to be imaginative
d) to try to make ideas real
e) to avoid copying or repeating other peoples' ideas
f) to learn from other peoples' ideas
g) to be willing to take appropriate risks

VERBAL COMMUNICATION

a) to change the way I speak depending on the people I am with
b) to consider other peoples' views
c) to justify why I hold certain opinions
d) to discuss topics with other people
e) to sometimes plan what to say so that my ideas can be understood by others
f) to ask questions to clarify or gain more information

TEAMWORK

a) to help decide what needs to be done in teams
b) to help decide who will do what in teams
c) to take personal responsibility for work when in teams
d) to be willing to critically evaluate my ideas and contributions

SELF MOTIVATION

a) to show enthusiasm for my work
b) to be willing to make an effort with my work
c) to find good reasons to do my work well
d) to get a 'buzz' from my work
e) to take responsibility for my work

SOCIAL INTELLIGENCE

a) to understand other peoples' feelings
b) to adapt my behaviour to suit different people and situations
c) to consider and respect other peoples' thoughts
d) to act on what other people say where appropriate

CRITICAL THINKING

a) to make sense of information
b) to find out what are the real issues of a problem or area of work
c) to pick out the positive things or things that went well
d) to suggest ways of improving
e) to pick out the negative things or things that went badly
f) to know the differences between fact and opinion
g) to notice when arguments are biased
h) to show my reasoning
i) to review work regularly

PROBLEM SOLVING

a) to find out what the problem is really about
b) to use what is known or found out to move on
c) to predict strategies that might work
d) to investigate a problem to find a reasonable solution
e) to consider other interpretations of a problem
f) to avoid jumping to conclusions
g) to draw understanding from what has been found
h) to use feedback to move on
i) to apply knowledge and understanding to other areas

TENACITY

a) to meet deadlines
b) to take responsibility for making sure deadlines are met
c) to stay motivated in order to complete an activity
d) to concentrate on what needs to be done
e) to persevere with what I am doing

A

- I decide on what needs to be done with most teams
- I help decide who will do what in most teams I am in
- I like to be personally responsible for some of the work when working with most teams
- I critically evaluate my ideas and contributions in most teams
- I am willing to change my approach if necessary on most occasions when in a team

B

- I decide on what needs to be done with many teams
- I help decide who will do what in many teams I am in
- I like to be personally responsible for some of the work in many teams
- I critically evaluate my ideas and contributions in many teams
- I am willing to change my approach if necessary on many occasions when in a team

C

- I decide on what needs to be done in some teams
- I help decide who will do what in some teams I am in
- I like to be personally responsible for some of the work when in some teams
- I critically evaluate my ideas and contributions in some teams
- I am sometimes willing to change my approach if necessary when in a team

Being able to work well in teams

Teamwork

D

- I find it difficult to decide what needs to be done in teams
- I find it difficult to decide who will do what in teams
- I find it difficult to take personal responsibility for work when in teams
- I find it difficult to critically evaluate my ideas and contributions
- I am often unwilling to change my approach if necessary

Refer to the GRASP® framework – Getting Results and Solving

Ke Skill –

Appendix A13

Teacher Focus Group Meeting Outcomes

14th May 2001, 4pm

Nine teachers were invited to meet to discuss the PC behavioural framework. Inclusive in these were 4 teachers not associated with the project (1 primary, 3 secondary), 2 teachers interested in taking the project on board, 3 teachers involved in the project and the researcher.

A
The first activity was to debate as a group whether the behaviours were appropriate. To do this the coloured document was used which highlighted the behaviours previously incorporated into schemes. The blue highlighted behaviours were considered for inclusion, amendment or disposal.

B
The second activity was to look at the Key Skills match and to consider whether PCs should be promoted as covering the Key Skills of Communication, Working with others, Improving One's Own Learning and Performance and Problem Solving. Although these are currently only in place at Key Stage 4 it was considered that the PCs covered these skills and a larger set of others. It was the overall consensus that the PCs should not be lead by the Key Skills, however the PCs did incorporate all the required behaviours for the Key Skills apart from those referring to directly to writing skills. More tenuous links could be made here.

It was considered that the PCs were an ideal forerunner for Key Skills and would place students in a good position for developing them at KS4. For the purposes of KS1, 2 and 3, where the Key Skills are not in use yet, the PCs provide a useful and comprehensive developmental framework.

It was decided to complete the match in order that during promotion this could form a stronger case for schools needing to address the issues of personal development.

C
The third activity was to look at the A-D scale and to debate whether alterations in range statements need to be made.
Teachers considered the levelling system to be fine, however would prefer to see the 4 scaled boxes colour-coded (bronze, silver, gold, platinum) or given another form of grading which does not match with standard NC level statements i.e. Level 1-4, A-D etc.

The 'boxed' element was considered helpful, however questions were raised as to what to do if pupils' behaviours differed widely across the boxes, i.e. if a child was an A in one objective, B in two of them, and D in the fourth. It was emphasised that the levelled system is currently used as a discussion document from which to draw up targets and not a teacher-levelling system. The 4 point profiling tool may prove more beneficial or it may be an option that PCs in general may be given levelled range statements, a little like the level descriptors for the NC subject areas.

Appendix A14: Teacher Postal Questionnaire

Name: ____
(If you do not wish to disclose your name please leave blank but complete the remaining parts of this page)

School Name: ____

School type: Primary Secondary
(Please include address)

Position/Post: ____

Subject &/or Key Stage specialism: ____________________________

Years of experience: ____________________________________

Are you willing to contribute to at least one other surveys within the study:
(Please tick or highlight in bold as appropriate)

YES NO

The information contained on this questionnaire will remain strictly confidential. At no time will the respondent's name be published.

Thank you for your participation.

PERSONAL CAPABILITIES

1. **POSITIVE SELF-IMAGE**: Valuing oneself and one's achievements
2. **SELF-MANAGEMENT**: Being able to take charge of one's own learning
3. **CREATIVITY**: Being able to think of and share new or novel ideas
4. **VERBAL COMMUNICATION**: Being able to communicate one's opinions and feelings appropriately
5. **CRITICAL THINKING**: Being able to critically review and evaluate practice in order to improve
6. **SELF-MOTIVATION**: Being able to motivate oneself to do what needs to be done
7. **PROBLEM SOLVING**: Being able to analyse a problem and form strategies to work towards a solution
8. **TENACITY:** Being able to stick at a task in order to meet deadlines
9. **TEAMWORK**: Being able to work well in teams
10. **SOCIAL INTELLIGENCE**: Being able to respond appropriately to different situations and people

<u>Please tick or highlight in bold the relevant responses for questions 1-4.</u>

1. **How desirable do you feel the Personal Capabilities are for youngsters' future success in the workplace?**

of great desirability	of some desirability	of little desirability	of no desirability

2. **How much do you feel these capabilities directly contribute to success in the workplace?**

a great deal	to some extent	a little	not at all

3. **When recruiting what demand do you feel employers place on the Personal Capabilities?**

of great demand	of some demand	of little demand	of no demand

4. **Who do you feel has the <u>most</u> responsibility to develop these capabilities in youngsters or new employees?** *Tick or highlight in bold the TWO most responsible.*

Schools	Universities/ Training Colleges	Employers	Outside agencies i.e. via training courses	Family/ parents	Personal

5. **To what extent do you feel schools have a responsibility to develop the Personal Capabilities?**

a great deal	to some extent	a little	not at all

6. **To what extent do you feel your school currently addresses the development of Personal Capabilities?**

well addressed	adequately addressed	poorly addressed	Not addressed at all

7. **To what extent do you feel youngsters leaving school have developed the Personal Capabilities?**

well developed	adequately developed	poorly developed	not developed at all

8. **What level of responsibility do you feel all teachers have to contribute to the development of these capabilities through their <u>subject</u> teaching?**

Highly responsible	of some responsibility	of little responsibility	of no responsibility

9. To what extent do you feel you are currently addressing the development of Personal Capabilities through your <u>subject</u> teaching?

Well addressed	adequately addressed	poorly addressed	Not addressed at all

Identify any issues that you feel are relevant:

10. Are you aware of the current emphasis being placed on the development of these capabilities in the National Curriculum?

Yes	A little	No

Please identify which initiatives assist this process:

Are these currently in place in your school? YES NO

11. Which of the Personal Capabilities do you feel is most important for youngsters? Please explain your answer.

12. Which of the Personal Capabilities do you feel youngsters need most assistance in developing?
Please explain your answer.

13. What types or level of support does your school provide to enhance the Personal Capabilities in your students?

14. To what extent do you feel it is important for youngsters (8-16 years) to develop the Personal Capabilities to meet the demands of the 21st century workplace?

Very significant	of importance	of little relevance	of no relevance

Please explain your choice

Many thanks for your co-operation.

Appendix A15: Employer Postal Questionnaire

Name: ____
(If you do not wish to disclose your name please leave blank but complete the remaining parts of this page)

Business/Company: ____________________________________
(Please include address)

Position/Post: ____

Years of experience: ___________________________________

Are you willing to contribute to at least one other surveys within the study:
(Please tick or highlight in bold as appropriate)

YES NO

The information contained on this questionnaire will remain strictly confidential. At no time will the respondent's name be published.

Thank you for your participation.

The questions relate to the ten Personal Capabilities listed below.

PERSONAL CAPABILITIES

1. **POSITIVE SELF-IMAGE**: Valuing oneself and one's achievements
2. **SELF-MANAGEMENT**: Being able to take charge of one's own learning
3. **CREATIVITY**: Being able to think of and share new or novel ideas
4. **VERBAL COMMUNICATION**: Being able to communicate one's opinions and feelings appropriately
5. **CRITICAL THINKING**: Being able to critically review and evaluate practice in order to improve
6. **SELF-MOTIVATION**: Being able to motivate oneself to do what needs to be done
7. **PROBLEM SOLVING**: Being able to analyse a problem and form strategies to work towards a solution
8. **TENACITY:** Being able to stick at a task in order to meet deadlines
9. **TEAMWORK**: Being able to work well in teams
10. **SOCIAL INTELLIGENCE**: Being able to respond appropriately to different situations and people

Please tick or highlight in bold the relevant responses for questions 1-4.

1. **How desirable are the Personal Capabilities within your company/business?**

of great desirability	of some desirability	of little desirability	of no desirability

2. **How much do you feel these capabilities directly contribute to success in your company/business?**

a great deal	to some extent	a little	not at all

3. **When recruiting what demand does your business/company place on the Personal Capabilities?**

of great demand	of some demand	of little demand	of no demand

4. **To what extent do you feel new employees have developed the Personal Capabilities when entering your business/company?**

well developed	adequately developed	poorly developed	not developed at all

5. **To what extent do you feel new employees meet the demands of your workplace in terms of their Personal Capabilities?**

well met	adequately met	poorly met	Not met at all

6. **What level of responsibility do you feel all employers have to contribute to the development of these capabilities through their practice?**

highly responsible	of some responsibility	of little responsibility	of no responsibility

7. **Who do you feel has the <u>most</u> responsibility to develop these capabilities in youngsters or new employees?** *Tick or highlight in bold the TWO most responsible.*

Schools	Universities/ Training Colleges	Employers	Outside agencies i.e. via training courses	Family/ parents	Personal

8. **Are you aware of the current emphasis being placed on the development of these types of skills in the National Curriculum?**

Yes	A little	No

Please write your opinions in the boxes provided

9. Which of the Personal Capabilities do you feel is most important for new employees? Please explain your answer.

10. Which of the Personal Capabilities do you feel new employees need most assistance in developing?

11. What types or level of support does your business/company provide to enhance the Personal Capabilities in new employees?

12. To what extent do you feel it is important for youngsters (8-16 years) to develop the Personal Capabilities to meet the demands of the 21st century workplace?

Very significant	of importance	of little relevance	of no relevance

Please explain your choice

Appendix A16:
Interview Schedule for employers and teachers

The purpose of this interview is to establish your views, as a Science teacher, on the relevance of Personal Capabilities (PCs) in a youngster's development. So far the National Curriculum has placed more emphasis on the development of subject knowledge, with personal and social development being the focus of tutorials, extra curricular activities or specific course programs. This part of the research aims to elicit teachers' views on the improved use and development of these skills within the subject curriculum, namely science.

(Please reflect on the PCs before answering the questions below)

1. Why do you feel that these skills are desirable for the enhancement of youngsters' personal capabilities? *Please explain your answer*

2. What significance do you feel these skills will have on youngsters' social and professional success?

3. Do you feel any are of more relevance or would you consider them to be equally relevant?

4. From your experience would you consider these skills to be adequately developed within the secondary school environment?
   If no – why not?
   If some – in what way?
   If yes – what specific efforts are made?

5. Do you feel that youngsters, leaving school at 16 or 18 years of age, are adequately equipped with the skills they need to work efficiently and effectively with others?

6. At present, are satisfactory efforts made to monitor or evaluate the development of these skills within your school?

7. Of what benefit do you think the emphasis and evaluation of these capabilities could be?

8. To what extent do you think the evaluation of these capabilities would be valuable, manageable and effective?

9. Do you feel that these skills can be effectively enhanced through a Science teaching program? If yes, in what ways do you feel Science can facilitate this development? If no, what specifically hinders their implementation?

10. How do you envisage the level of interest in PCs to continue in the future?
    - of increasing importance?
    - of similar importance?
    - of diminished importance?

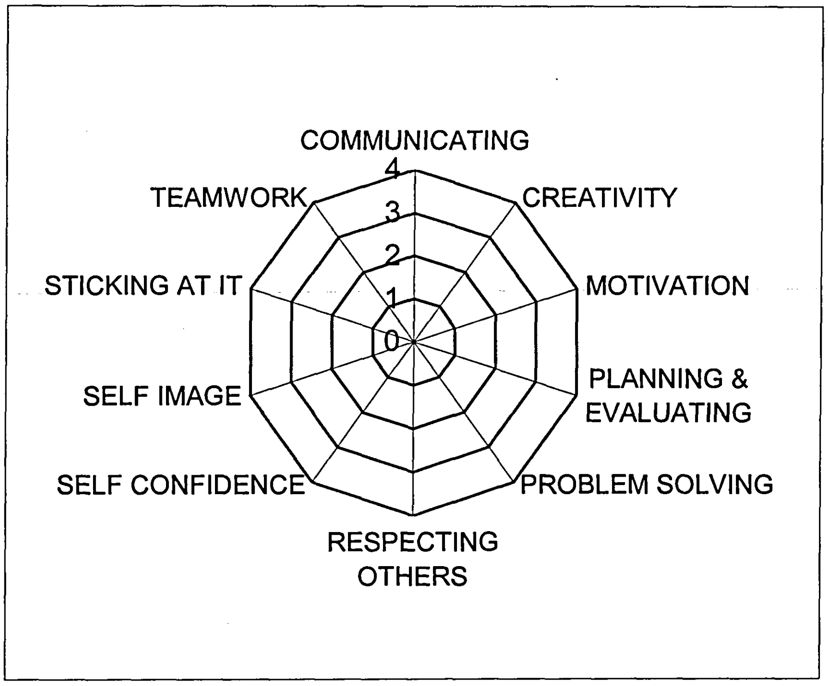
11. Are you aware of any government led initiatives which focus on the use and development of these types of skills? If yes, have you been provided with the support and training to effectively implement these programs? If no, do you feel that these skills are of enough relevance to initiate specific project development?

12. To what extent would you encourage yourself and your colleagues to focus on the development of these skills if they are
    (1) a non-statutory requirement of the National Curriculum?
    (2) a statutory requirement of the National Curriculum?

13. How much priority do you think teachers ought to attach to the development of these skills in their subject teaching?

14. Have you any other consideration and thoughts that you would like to express.

Appendix 17: Radar Graph



AT THE START OF PROJECT

Score yourself on each of the ten areas using the sheets to help you decide where you are.

Be honest about yourself.
Top score for each area is 4.

You can mark your score for each area on the radar chart then work out your total score (out of 40)
If you want you also can join the points up.

TOTAL SCORE =

Appendix A18

Personal Capability Skills Assessment Framework

Evaluation Questionnaire

Kingshurst City Technology College
Project Week

18-25 May 2000

Personal Capability Skills

This questionnaire aims to evaluate the effectiveness of the Personal Capability Assessment Framework. It aims to elicit your opinions on the use and manageability of the framework.

Name (*optional*): ______________________________

Please identify the year group that you used the framework with:

☐ Year 7 ☐ Year 8 ☐ Year 9

Please explain you answers as fully as possible as this will generate more valuable data for the improvement of the framework. Feel at liberty to comment critically on the framework incorporating both positive and negative opinions where appropriate.

1. In principle do you agree with the skills the framework is promoting?

☐ strongly agree ☐ agree ☐ indifferent ☐ disagree ☐ strongly disagree

Please explain your answer.

2. Did you feel that the framework was accessible to the majority of students in your group?

☐ strongly agree ☐ agree ☐ indifferent ☐ disagree ☐ strongly disagree

Please explain your answer, commenting specifically on how high, average and low ability groups coped with its use.

3.Were there any specific areas which were of particular difficulty for you or the students to address?

! Positive Self Image
! Self Confidence
! Motivation
! Planning and Evaluating
! Problem Solving
! Respecting Others
! Creativity
! Teamwork
! Communication
! Sticking at it

Please explain the main areas of difficulty and how this may possibly be improved.

4. To what extent was the radar and score based assessment chart manageable for the formal assessment of the personal capability skills?

5. Were the students encouraged to set informal targets? And to what extent did they perceive improvement in these areas?

6. Do you feel that this is an effective framework for the assessment of these skills and were you given enough guidance to conduct it?

7. What alterations would you view as necessary before the framework is disseminated more widely?

8. Please identify how effective the framework was in terms of:

Time	☐ good	☐ average	☐ poor
Resources	☐ good	☐ average	☐ poor
Ease of use for teachers	☐ good	☐ average	☐ poor
Ease of use for students	☐ good	☐ average	☐ poor
Assisting target setting	☐ good	☐ average	☐ poor
Assessing personal effectiveness	☐ good	☐ average	☐ poor

Please attach a copy of the assessment framework annotated with notes or highlighted areas of concern or difficulty. This may identify particular words or phrases which caused concern for the pupils.

Please use this space for any additional comments you wish to make.

Any information provided in this questionnaire will remain confidential and your name shall not be published in any formal documentation.

Many thanks for your time and co-operation within the pilot study – Your comments are valued and appreciated.

For further information please contact:
Lynne Bianchi
Researcher
The Centre of Science Education
Sheffield Hallam University
Howard Street
Sheffield
S1 1WB

Appendix A19: Semi-structured observation schedules

Holistic Observation Comment Form

Date:

Class/Group:

Topic/Theme:

Personal Capabilities

- ☐ Positive Self Image
- ☐ Motivation
- ☐ Analytic and Strategic Planning
- ☐ Creativity
- ☐ Verbal Communication
- ☐ Self development Orientation
- ☐ Critical Thinking
- ☐ Social Intelligence
- ☐ Teamwork
- ☐ Tenacity

1) Teaching Strategies used

Introduction

Main body

Evaluation

2) Pupil response and involvement

3) Pupils' learning (Did they achieve the objectives?)

4) Did the pupils use and develop the PCs identified in the objectives?

Generally

High

Average

Low

5) Areas for development/ areas of concern or difficulty?

ISSUES

EVALUATION

Personal Capabilities:

1 2 3 4

Science content knowledge:

1 2 3 4

1. Successful/to be used again as is	3. Poor/to be rethought but kept
2. Satisfactory/to be adapted slightly	4. Unsatisfactory/not to be used again

Personal Capabilities	Frequency	Activity	Notes/ GRASP
1) to share my opinions and ideas with others.			
2) to listen and respond to other people			
3) to seek advice when necessary			
4) to co-operate with others			
5) to help reach agreements with others			
6) to keep track and monitor what I am and others are doing			
7) to avoid giving up easily			
8) to organise and plan how to go about a task			
Non specific behaviour			

Observer: ________________ Date: ____________ Group: ___________ School: __________________

Controlled Observation Schedule

Appendix A21: Minutes of larger group meeting

MINUTES

20 JANUARY 2001
WYTHENSHAW

1. General introduction and review of progress was given by XX

2. Introductions by XX, XX, XX, XX

3. Teachers Review

- School C – Going very well. Working using a cross-curricular approach with Mths, D&T and Sci, teachers working collaboratively as a team. Not enough meetings held it is very important that communication is on-going, very difficult making sure that the National Curriculum is covered. Trying to introduce Personal Capabilities (PCs) to mixed ability groups. Students have grasped PCs very well. They are good at setting targets. Transfer of skills is evident and needs to be developed as an ongoing process. Initial results from Maths is disappointing. Science lessons – not noticed too much difference. Time is a very big factor but overall very positive.
- School F – Using a new scheme of work Eureka and initiatives to develop target setting. Tried to make aware of what they are doing. Trying to fit PCs and tailor it to become seamless with Eureka. Trying to build on the PCs to raise self esteem at KS3. The problem is time, needs a lot of adapting. Three teachers using PCs this year and come up with a scheme to use it fully next year. Need to make students aware of PCs and show them they can do it. Need to assist students in setting realistic targets.
- School E – Working with Yr8 as they felt there was a dip in their self motivation. Trial first then show the rest of the staff the evidence. The teachers believe it will work, very positive. Found children's feeling changed. Working in groups motivated the students, individuals felt they could not let down the others. Atmosphere in class more productive. Evaluation and language skills is the biggest change. Has made students question their teaching methods. There is a gender issue – different skills for boys and girls they appreciate differences.
- School I – using QCA at KS3 PCs started in November. Integrated PCs into schemes of work. GRASP up around the room. New things being done. Really pleased – it focuses and settles them down – peer pressure is an issue however they enjoy what they are doing. Assessment is very basic need to bring assessment to lessons.
- School D – Very excited needs to develop more. Need to slim down PCs to core things. Very difficult children to work with as many would not sit down

let alone fill in forms. As a result of the PC they will now sit down in a lesson which is a very big achievement.

- School H – Students like it, they are more motivated and enthused it is welcomed by students. PCs to be made more explicit and evaluation completed.
- School B – Need to use core targets due to the maturity of the students. Introduced GRASP have taken a few PCs from each area. Children given objective and PC now across the NC. Children very enthusiastic. No formal assessment. The low ability achieved PC rather than academic achievement. Self motivated. The problems are assessment because of lack of maturity.
- School G – Struggling with time. Devised a method with YR7 group. Girls more diligent. Teacher held a long discussion and came out with a structure for introducing PCs and engaging the pupils. More motivated.
- School A - Work being undertaken in Yr 8, 9 and 11. Most positive results with Year 8 and 9. (non attending)

XX gave an update on behalf of the schools who could not attend.

4. Questions

Evaluation
XX – In terms of evaluation - who does the evaluation? For whose benefit is the evaluation? Do buddies evaluate? – is this done as regularly as self assessment? Buddies are there all the time. Does the teachers' perception of the pupils development matter and how is this recorded? Possible strategy he would like to see each group using a different PC to see which ones work.

XX – Is there guidance we are teaching students about how to work in teams? – group seemed to think this was done automatically. Is it unethical to assess what we are not teaching/influencing? LF advised that the biggest impact on the class is peer pressure – went on to describe one example in her class.

What are we doing differently?
Need to look at things people are doing differently how is it changing. What was the nature of the intervention in particular schools? How has it been modified (XX to do) what are the rules?

The question "What are we doing differently" was asked and needs to be addressed within the research.

School B advised that teaching and learning has not changed – PCs now put in but they are not sure of the impact – keen to try different things. There has been an awareness raising – chance to make mistakes. Need to evaluate and suggest roles for them.

Teaching PCs? Are we or aren't we?
A further discussion took place on whether they are teaching or not. Group advised they are providing a framework to raise awareness. Would be nice to come out with a booklet providing activities which specifically address each of the PCs however this is not part of this work. Need to allow experiences to develop PCs. PC skills identified create situation of good practice.

Group did not accept you need PCs all the time. Certain ones are needed at different times in life.

Assessment will start – pupils need positive feedback.

5. Review

Generic Interventions
XX conscious of development of three interventions. Would like to see themes running though all schools. How can we start to use all three in all schools?

6. Assessment and Monitoring

ISSUES ARISING
Recording PC development– what do you record to see progression? – when? how often?
Is a base line needed?
Self Assessment – what is the reliability of this? Who is doing the assessment and who to?
What about the comparability between groups? Different judgements?
What evidence do we collect? In what forms? Who is it for?
How do we know what we are assessing? – What are we assessing? Process or product?
Can we effectively assess team working and how?
Are we assessing against a set of standards?
What is the reliability of the judgements and assessment we make?
Is it done explicitly?
What is the purpose of assessment?
Teamwork v Group work? What are the distinctions between the PCs?
Who Does it?

Split into three groups to address 3 key areas:

a) Who does the assessment?
Some sort of student self assessment and peer assessment keeping positive ground rules
Struggling on teacher assessment because size of group and immediate.
Difficult to verbalise
Important to reflect internally and soon after the event
Limitation on peers to assess only on safe issues.
The point of feedback is to help make own judgement and to progress

b) Are the assessments valid and reliable?
Improved by working in pairs/groups one making judgement then the others consolidating/validating
Teachers undertaking the assessment would make it very difficult
Once or twice a year teacher assessment
Use a proforma to encourage consistency
Records could show where a particular peer is being unfair

c) Recording
Assess at end of lesson (self) teacher review eg ½ term or group exercise
Use of Class target/personal target
Continual log built into end of lesson habit forming. Give suggested targets per PC area.
How will peer/teacher feedback go in? Need to record and build in where appropriate
What is the validity of this data?

Areas of interest
Development of pupils – knowledge and understanding of PCs. What do the pupils understand by them?
Possibly have scenarios that determine if the pupils know what types of behaviours are effective – indicate through written communication
Clarify what is a PC.
Teachers need skills to assess a good lesson. Kids to identify good/bad performance i.e. through evaluating video presentations etc.

Appendix A22: Colour coding

CODING

RED: Positive self image and motivation
PINK: Self development orientation
BLUE: Problem solving and creativity
DARK BLUE: Tenacity
DEEP RED: Critical Thinking
GREY: Preparing pupils for life
PURPLE: Monitoring and assessing
BOLD: Adapting the current curriculum

INTERVIEW with XXX, 25.1.00.

....
T – The first one, positive self-image and motivation, I got hung up on, because when you see so much paper work you have a conception of what it's about and I thought this is about PSE type things, and then when I got to think about all the rest, I thought hang on these [the other PCs] won't really fall into place if number one [positive self image and motivation], the pupils haven't got a positive self image, aren't motivated. Erm, I said that if they've got a positive self-image and they are motivated then really all these start to click into place. And pupils don't have a positive self-image of themselves, mainly because teachers still tend to focus on the negatives. You haven't done this, you haven't done that.

....
T- That's it, you're not going to problem solve, because quite honestly you're going to think what's the point.
I- You haven't got the spark or drive
T- That's right, and the tenacity, I started thinking to myself, is it tenacity or is it patience, no it probably is the right word tenacity, er because it's a more of an aggressive word.
I – Yeah, I'm trying to do a grading chart of how the pupils could grade themselves at various points throughout the research, and I thought I can't use this word because it's not pupil friendly. Then I thought, what other word could I use, commitment or perseverance
T – Yeah
I - But commitment and perseverance are both tenacity, so maybe to use it would be a good thing.
T – It's almost like stickability, you know how well are you going to stick at this, whereas patience is much more of a passive thing isn't it, patience.

...
T – As we go down the list, I mean the problem solving, we are always talking about with Science 1. Innovativeness, em, there isn't a lot of scope in the national curriculum to be creative, em, which is a shame. Trying to give them open-ended experiments is really contrived... The only thing that I have started, this will be the third year, is in the summer we take a week out of the Year 9 curriculum, where we join with an initiative I'm dealing with one of the advisors in Oldham, where we have a science week. So what we do is after SATs, but that week, is when we ....

APPENDIX A23
PC Quiz (primary)

How are you doing?

Name: ______________________________
Date: ______________________________
Class/Form: ____________ Age: _______

Part A

How good do you think you are at these personal capabilities?

	No good 1	OK 2	Good 3	Very good 4	Peer review	Teacher review
Sharing your opinions and ideas with others	1	2	3	4		
Listening and responding to other people	1	2	3	4		
Seeking advice when necessary	1	2	3	4		
Co-operating with other people	1	2	3	4		
Helping reach agreements with others	1	2	3	4		
Keeping track and monitoring what I am and others are doing	1	2	3	4		
Avoiding giving up easily	1	2	3	4		
Organising and planning how to go about a task	1	2	3	4		

TOTAL SCORE			

What are your two best PCs? ______________________________

____

Which PCs do you think you should target next? (Choose 1 or 2 at most!)

____

____

What things can you do to help you meet your target?

- ______________________________
- ______________________________
- ______________________________

Peer review

Teacher review

Part B

Can you help others?

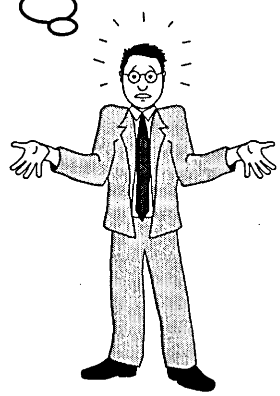
James is finding it difficult to co-operate with other people. What can he do to help himself?

1. ______________________________

4 marks

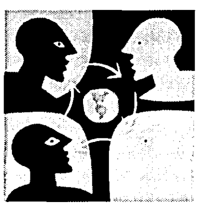
2. ______________________________

I'm finding it hard to organise and plan my work. What can I do?



4 marks

3.



"I really enjoy sharing my opinions with other people, but sometimes I am told that I am not communicating well. I don't understand why – how could I be a good communicator?" (Diana, aged 11)

4 marks

4.

I've just started a new job and need to work in a team. How can I be a good team member?

4 marks

Secondary

Personal Profiling 1

Part 1: (26 marks)

Part 2: (22 marks)

Name: ______________________________

Date: ______________________________

Year:_____ Age: __________

1) **Rate yourself on the following scale.**

Personal Capabilities (PCs)	No good **1**	OK **2**	Good **3**	Very good **4**	Peer review	Teacher review
Sharing your opinions and ideas with others	1	2	3	4		
Listening and responding to other people	1	2	3	4		
Seeking advice when necessary	1	2	3	4		
Co-operating with other people	1	2	3	4		
Helping reach agreements with others	1	2	3	4		
Keeping track and monitoring what you and others are doing	1	2	3	4		
Avoiding giving up easily	1	2	3	4		
Organising and planning how to go about a task	1	2	3	4		
TOTAL SCORE						

2. **What are your two best PCs?** ______________________________

____

3. **Which PCs do you think you target next? (Choose 1 or 2 at most!)**

____

4. **What can you do to help you meet your target?**

❖ ______________________________

❖ ______________________________

❖ ______________________________

Peer Review

Teacher Review

Steve finds it difficult to solve problems effectively. What advice would you give him to improve?

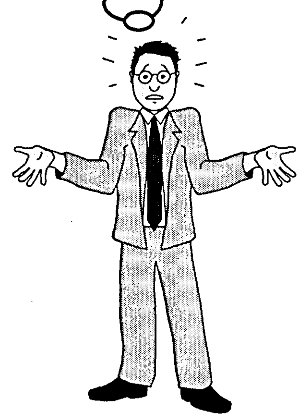
5.

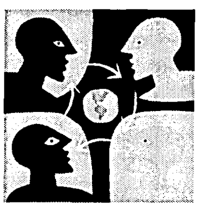
3 marks

6.

3 marks

I'm finding it hard to manage myself and my time. What can I do to be more manage myself better?



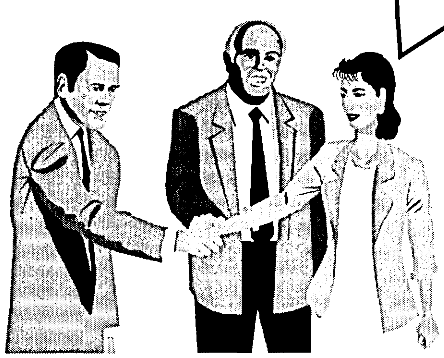


"I really enjoy sharing my opinions with other people, but sometimes I am told that I am not communicating well. I don't understand why - what things do I need to do to be a better communicator?" (Diana, aged 16)

7.

3 marks

I've just started a new job and need to work in a team. How can I be an effective team member?



8.

3 marks

9) Colour code 2 key words or phrases with the personal capability that you associate with them. The first one has been done for you. 12 marks

PERSONAL CAPABILITY		BEHAVIOURS
Creativity		Adapting to different situations
		Making an effort
Social Intelligence		Having respect for myself
		Evaluating & reviewing
Positive self image		Imagination
		Meeting deadlines
Critical thinking		Looking for positive & negative
		Confidence
Tenacity		Concentrating
		Understanding others feelings
Self motivation		Avoiding copying
		Inspiration

10) Why do you think good personal skills and capabilities are important for you? 2 marks

____

____

____

____

THIS IS THE END OF PART 1 – read over your work and take note of the mark allocation for each question.

Read through the Storyboard Carefully.

Part 2

Storyboard




Mary Joseph Jayne David

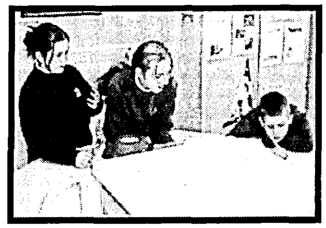
1

A group of three students were working on a science activity. They were asked to plan and carry out an investigation to find out the fat content of various foods.

2

Mary decided the best thing to do would be to gather up a range of apparatus and food types and to try out a method she had used when at another school.

3

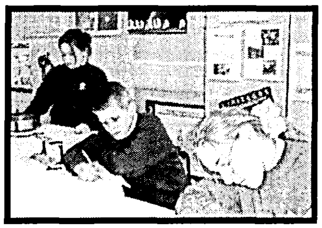


Joseph and Jayne suggested that they should talk about this and also consider what other groups were doing first. Mary said they should not worry about what other groups were doing and just get on.

4

Joseph asked Mary to explain why she thought they should do it her way but Mary said she was sure her method would work. Joseph and Jayne followed Mary's instructions to collect certain things whilst Mary got on with her tasks.

5



They also talked between themselves about other ways to do the investigation and whilst setting up Mary's experiment they also began to set up another experiment which was more like what the rest of the class were doing.

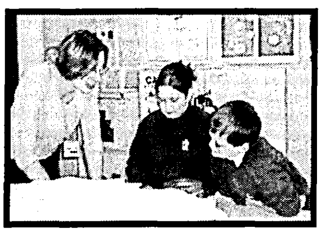
6

... As time went on Joseph and Jayne took charge of the second experiment and Mary was happy to work alone on her idea. Joseph and Jayne shared out the work and talked between themselves about what they needed to do next and how to make it a fair test.

7

Mary pointed out why their experiment wasn't a fair test, because of different amounts of food being tested, but Joseph and Jayne did not discuss this between themselves, nor did they question Mary about her views.

8

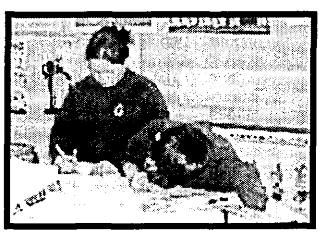


... Later in the lesson a member of another group, David, asked what Mary was doing and she showed her work to David and the teacher. They talked about what was happening and Mary explained how similar experiments at her previous school had helped.

9

The teacher asked David and Mary to suggest alternative ways of tackling the investigation based on what they had found out so far. They worked together and gathered results for these other investigations.

10



David and Mary took another look at their results and drew up conclusions from what had happened.

11

Joseph and Jayne finished their experiment but struggled to write up what their results meant.

Part 2

Having read through the story think about what we can learn from it.

Evaluating the story

Look at these capabilities, you may refer to them in the following section.

Verbal Communication
a) changing the way you speak depending on the people you are with
b) considering other people's views
c) justify why you hold certain opinions
d) discussing topics with other people
e) planning what you say so that their ideas can be understood by others
f) asking questions to clarify or gain more information

Problem Solving
a) looking carefully at a problem
b) finding what the problem is really about
c) relating the problem to what is already known
d) predicting strategies that might work
e) investigating the problem to find a solution
f) avoiding jumping to conclusions
g) drawing understanding from what has been found
h) asking for and feedback to help solve a problem
i) applying knowledge and understanding to other areas

Teamwork
a) helping decide what needs to be done in a team
b) helping decide who will do what in a team
c) taking personal responsibility for work when in a team
d) being willing to critically evaluate ideas and contributions
e) being willing to change if necessary

10. Look at parts 3 – 5. What do you consider to be the favourable or good points about this part of the story? 2 marks

____

____

____

____

11. Look at parts 5 – 7. What do you consider are the areas of concern or difficulty about the way the students worked together ? 2 marks

____

____

____

____

12. Look at parts 8 – 10. What do you think you have learnt about Mary in this part of the story? 2 marks

____

____

____

____

13. How well do you feel that Mary, Joseph and Jayne worked as a whole team? 2 marks

____

____

14. How do you think this team could have improved or worked better together? 4 marks

What personal capability targets would you suggest for these students?

15. Mary 6 marks

-
-

16. Joseph

-
-

17. Jayne

-
-

18. Remember an occasion where you displayed team capabilities. 4 marks

- What was the activity?
- How well did your team work together?
- How did you contribute to the team?
- How could the team have improved?

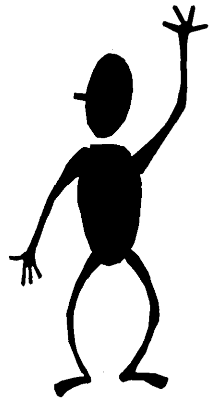
THIS IS THE END OF PART 2 – read over your work and take note of the mark allocation for each question.

esented below are a selection of the questionnaires used in the study.

Interim Staff Evaluation Questionnaire

PERSONAL CAPABILITIES

Curriculum Infusion Study



o be returned to:
nne Bianchi
entre for Science Education
heffield Hallam University
ond Street
heffield
1 1WB

ame: ______________________________

eriod of: ______________________________ **Date:** __________

chool: ______________________________ **Year Group:** __________

o. of students involved: __________

All the information provided in this questionnaire

Please tick appropriate responses and be as detailed and concise as possible in longer statements.

) In what ways have you been able to address the PC objectives within your regular subject delivery?

O *a great deal* O *a little bit* O *not at all*

riefly explain how this has been possible.

____

____

____

____

____

____

capabilities in your general teaching and through one-off interventions?

What have been the difficulties in focusing attention on the capabilities in your general teaching and through one-off interventions?

Were there any opportunities/events/teaching strategies which particularly assisted the development of the PCs?

Were there any experiences/teaching strategies that you feel particularly inhibited the infusion of the PCs?

) How aware are the students of the PCs?

O *a great deal* O *a little bit* O *not at all*

What makes you think this?

) How much do you think their awareness of PCs has directly affected their behaviour?

O *a great deal* O *a little bit* O *not at all*

plain

a) the PCs

b) adapted teaching and learning strategies

To what extent do you feel that you have 'taught' the PCs? Do you consider that the pupils 'learnt' them?

0) Do you feel that the PCs development is the same as that which would occur during regular subject teaching or is it enhanced or improved?

O *same* O *slightly improved* O *improved*

What evidence have you for this?

1) In your opinion, has there been any direct effect on academic development or technical skill development as a result of the infusion of the PCs?

has?

) Do the students evaluate the PC targets? What effect do you think this has?

) Have there been difficulties when target setting or evaluating the PCs?

) GRASP: If you use this intervention, of what benefit do you think it is to the development of PCs?

6) To what extent have the pupils benefited from the use of this reflective process?

O *a great deal* O *a little bit* O *not at all*

What evidence have you for this?

7) What improvements/changes/additions would you make to your current use of the interventions in the study?

8) What effect has the involvement in this study had on you as a professional?

Student Evaluation Questionnaire

PERSONAL CAPABILITIES

Self Management

ame (optional): ______________________________

ate: __________ School:____________________________ Year Group: __________

) What do you think the Personal Capabilities are all about?

____

____

____

) How much to you think the Personal Capabilities have helped you develop your skills and your ability to manage yourself and your work?

o a lot o quite a lot o a little o not at all

ease explain your choice

____

____

____

) How much do you think that setting yourself targets has helped you develop your Personal Capabilities?

o a lot o quite a lot o a little o not at all

ease explain your choice

____

____

____

4) How much do you think the Personal Capabilities have helped improve you science work?

o a lot o quite a lot o a little o not at all

lease explain your choice

____

____

____

o very different o some difference o a little difference o not different at all

ase explain your choice

____

____

____

) How differently do you work in your science lesson because of the Personal Capabilities?

o very differently o some difference o a little difference o not different at all

ase explain your choice

____

____

____

) Does the teacher work differently in science because of the Personal Capabilities?

o very different o some difference o a little difference o not different at all

ease explain your choice

____

____

____

8) Would you recommend using Personal Capabilities to other teachers or students?

o Yes o No

ease explain your choice

____

____

____

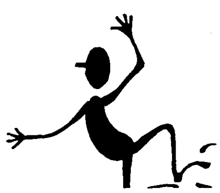
ny other comments:

____

____

____

hanks for completing the questionnaire! Now hand it back to your teacher



'ersonal Targets

Name

arget	Date	Subject or Activity

Well Done Well Done Well Done Well Done Well Done Well Done Well Done Well Done Well Done Well Done Well Done Well Done

APPENDIX A27: School B Controlled observation 1: Emergent themes

Project/Non-project Observation: **Jan 01**

Emergent themes: *Italics = teacher/observer reviews,* standard text = students review

Project	Non project
Planning ▪ concerns over time taken to formulate plan (influenced by the lack of materials required) ▪ lack of suffifient planning/detail ▪ awareness that an action plan would have kept certain members occupied ▪ would have helped to have learnt more about the area of work ▪ often use of trail and error • *specific identification of equipment required* • *more informed planning/organising/ foresight – knowing what to take with them and where to acquire it* • *planning could be improved to limit trial and error*	**Planning** ▪ lack of a clear plan ▪ trail and error techniques ▪ students unaware of what others were doing ▪ more reliance on teaching staff for support • *less confident to choose tools, find and use them independently* • *lack of sequencing/allocation of jobs, not knowing what others were doing, waiting for others to finish*
Teamwork +ve's: ▪ overcoming disagreements quickly ▪ compromising to complete task on deadline ▪ allocated jobs so that members got on with doing the task ▪ conscious of meeting task deadline -ve's: ▪ lack of discussion on the specifics of the task, i.e. measurements • *leaders emerging* *thinker (driving force/those with whom the others checked things with)* *doer (gofer, takes directions and does the task, checks with thinker, thinker uses doer as a sounding board)* *non-doer (day dreamer, sitting alone, disinterested, only takes on task if approached by others)* • *more autonomous work as a team – little reliance on teaching staff* • *conscious to meet deadlines* • *little influence from friendship groupings*	**Teamwork** ▪ lack of awareness of what 'good' teamwork was – stressing the concept that it was a queue-like process whereby one person waited for another to do their job before starting. ▪ Linked teamwork to helping, waiting, sharing ideas, holding things ▪ discussion that team working guidelines had never been taught apart from not making noise • *leaders emerging at start but broke down after first 30 mins* *thinker (driving force/those with whom the others checked things with)* *doer (gofer, takes directions and does the task, checks with thinker, thinker uses doer as a sounding board)* *non-doer (day dreamer, sitting alone, disinterested, only takes on task if approached by others)* • *lack of clear understanding of how to work as a team* • *little awareness of tenacity – needing to meet a deadline, group disbanded before end of session due to lack of communication and argument* • *students pursuing own agendas – lack of co-operation* • *splinter groups formed working against each other* • *lack of interest/confidence to do certain jobs*
Communication +ve's: ▪ talking to reach final agreements ▪ awareness of how to improve communication skills, i.e. informing others, stopping and reviewing together -ve's: ▪ not listening/sticking to individual points of view • *review strategies incorporated* • *arguments about the 'quality' of the task and not the job allocation* • *non-doer hindered progress at start*	**Communication** – Argumentative ▪ strong emphasis on the amount of disagreement within the groups due to not wanting to do certain jobs ▪ aware that arguments lead to a lot of time being wasted • *argumentative* • *no review*
PCs ▪ specific identification of areas of strength and improvement. ▪ increased awareness of objectives, PC groupings and the links between them • *greater awareness of PCs to discuss/reflect on progress*	**PCs** ▪ lack of awareness contributing to students not being able to respond well ▪ needed clarification ▪ once shown a list of personal skills (PCs) they reacted well to these and used them as a basis for discussion
General ▪ awareness that 'project' helped as they were more used to team working, aware of the pitfalls and how to overcome them, how to handle problems, need for tenacity and not to give up, knowing 'what to expect', developing skills to know how to make ideas real.	**General** ▪ much more negatively driven interview ▪ students commented more on the technical/content driven aspects of the work, i.e. measuring, cutting, as opposed to the ways in which they worked as a team or together.

Appendix A28: School B Controlled observation 2: Emergent themes

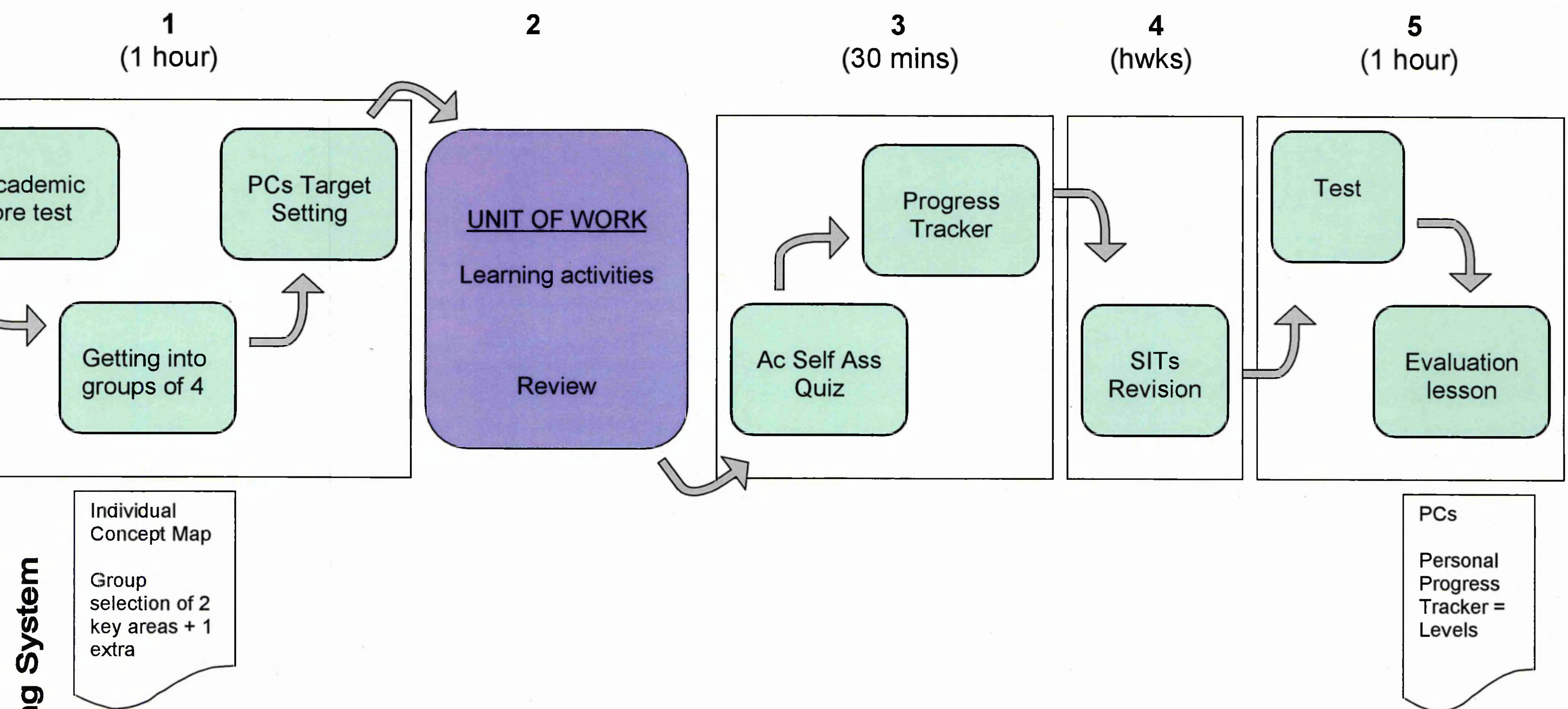
Project/Non-project Observation 2: May 01

Emergent themes: *Italics = teacher/observer reviews,* standard text = students review

Project	Non-project
Teamwork • Enjoyed the independent work within the team, viewing this as good form of teamwork • Students comment that they are happy to work with roles as they can capitalise on others' strengths • Considered focusing on what need to be done is important • *Main leader emerges early in the activity, being the main source of guidance* • *Regular advice sought from each other* • *Students work mainly on own jobs towards a final target* • *Little direct cooperation when working independently on tasks* • *One member dissociating from the group a little and maintains disinterest, teacher intervention needed to integrate this member* • *Although all ideas voiced, students happy to decide on one* • *Planning mainly by two 'strongest' members of the team* • *Agreement often results from who can talk the loudest* • *Persevere until the end of the task with rushed completion*	Teamwork • students recognise negative impact of arguments • difficulties overcome in the end • some students considered they worked well in a team, others considered themselves to have been more competitive than cooperative • *One girl identified that the task involved teamwork but did not work as a team effectively* • *Lack of sharing of ideas within the boys group at start due to him not being the 'strongest' member of the group* • *Lack of cooperation and difficulty reaching agreements* • *Lack of co-operation* • *Competitive behaviour from boys* • *Girls sitting about expecting others to take control*
Problem Solving • Considered lack of time to influence their final outcome • Would have changed to organise work more • *Discussion related to planning at start of activity* • *Reviewing occurring regularly with immediate short responses* • *Off task behaviour by groups*	Problem Solving • Considered themselves to have many ideas, selecting the 'right' one posed difficulty • *No plans made* • *General trial and error*
PCs • Considered to help them consider their areas of improvement • Focuses them on considering how to do the activity as well as the product • *Considered to be better due to agreements and general better outcome*	PCs • *Considered to be poorer in this group due to arguments and lack of team work*
Communication • Students note that they were talking to each other • Considered communication to decline throughout the activity • *Questioning about how to tackle the activity* • *Often light-hearted between girls, more focused with boys* • *Listening and responding mainly by the supplementary members of the team as opposed to the leader* • *Leader expresses assertive direction which is taken by others in the group*	Communication • Students recognised poor listening skills, however valued the sharing of ideas • *Arguments arise and continue throughout activity* • *Not much listening done*
General • Considered final product to be important • Considered previous experience of project to help • *Direction taken by teacher but not sought* • *Little disagreement* • *Dominating nature of the 'leader'*	General • *Lack of organisation* • *Quite a lot of teacher assistance sought over use of apparatus and equipment* • *Boys more active than girls and sort activity out to successful completion, confidence gained from success* • *Girls do not complete the task, became demoralised* • *Student want to know the 'answer'*

chool F: Tracking System

Individual Tracking System



Personal Capabilities

Discussion Document

The Centre for Science Education

Lifework Capabilities

A
- I share my opinions and ideas with others on most occasions
- I listen and respond to other people on most occasions
- I seek advice on most occasions
- I co-operate with most people
- I keep track and monitor what I am and others are doing on most occasions
- I avoid giving up easily on most occasions
- I organise and plan how to go about a task on most occasions

B
- I share my opinions and ideas with others on many occasions
- I listen and respond to other people on many occasions
- I seek advice on many occasions
- I co-operate with many people
- I keep track and monitor what I am and others are doing on many occasions
- I avoid giving up easily on many occasions
- I organise and plan how to go about a task on many occasions

C
- I share my opinions and ideas with others on some occasions
- I listen and respond to other people on some occasions
- I seek advice on some occasions
- I co-operate with some people
- I keep track and monitor what I am and others are doing on some occasions
- I avoid giving up easily on some occasions
- I organise and plan how to go about a task on some occasions

D
- I find it difficult to share my opinions and ideas with others
- I find it difficult to listen and respond to other people
- I find it difficult to seek advice when necessary
- I find it difficult to co-operate with others
- I find it difficult to keep track and monitor what I am and others are doing
- I give up easily
- I find it difficult to organise and plan how to go about a task

The Core PCs

most teams

- I help decide who will do what in most teams I am in
- I like to be personally responsible for some of the work when working with most teams
- I critically evaluate my ideas and contributions in most teams
- I am willing to change my approach if necessary on most occasions when in a team

B

- I decide on what needs to be done with many teams
- I help decide who will do what in many teams I am in
- I like to be personally responsible for some of the work in many teams
- I critically evaluate my ideas and contributions in many teams
- I am willing to change my approach if necessary on many occasions when in a team

C

- I decide on what needs to be done in some teams
- I help decide who will do what in some teams I am in
- I like to be personally responsible for some of the work when in some teams
- I critically evaluate my ideas and contributions in some teams
- I am sometimes willing to change my approach if necessary when in a team

Being able to work well in teams

Teamwork

D

- I find it difficult to decide what needs to be done in teams
- I find it difficult to decide who will do what in teams
- I find it difficult to take personal responsibility for work when in teams
- I find it difficult to critically evaluate my ideas and contributions
- I am often unwilling to change my approach if necessary

Refer to the GRASP® framework – Getting Results and Solving Problems

Key Skill – Working with Others

Being able to think of and share new or original ideas

Creativity

A

- I think of new or original ideas on most activities
- I use many experiences to help stimulate new ideas
- I am imaginative in most activities
- I try to make my ideas real on most occasions
- I am able learn from other peoples' ideas without copying or repeating their ideas, on many occasions
- I am willing to take risks with most of my work

B

- I think of new or original ideas on many activities
- I use a lot of experiences to help stimulate new ideas
- I am imaginative in many activities
- I try to make my ideas real on many occasions
- I am able learn from other peoples' ideas without copying or repeating their ideas, on many occasions
- I am willing to take risks with a lot of my work

C

- I think of new or original ideas on some activities
- I use some experiences to help stimulate new ideas
- I am imaginative in some activities
- I try to make my ideas real on some occasions
- I am able learn from other peoples' ideas without copying or repeating their ideas on some occasions
- I am willing to take risks with my some of my work

D

- I don't think of many new or original ideas
- I find it difficult to use different experiences to help stimulate new ideas
- I find it difficult to be imaginative
- I find it difficult to make my ideas real
- I find it difficult to learn from other peoples' ideas without copying or repeating their ideas
- I am often unwilling to take risks

opinions and feelings appropriately

Verbal Communication

A

- I plan what I say so that my ideas and thoughts can be understood easily in most activities
- I help decide who will do what in teams in most activities
- I take personal responsibility for work when in teams in most activities
- I critically evaluate my ideas and contributions on most activities
- I change my approach if necessary, much of the time

B

- I plan what I say so that my ideas and thoughts can be understood easily in many activities
- I help decide who will do what in teams in many activities
- I take personal responsibility for work when in teams in many activities
- I critically evaluate my ideas and contributions on many activities
- I change my approach if necessary, much of the time

C

- I plan what I say so that my ideas and thoughts can be understood easily in some activities
- I help decide who will do what in teams in some activities
- I take personal responsibility for work when in teams in some activities
- I critically evaluate my ideas and contributions on some activities
- I sometimes change my approach if necessary

D

- I find it difficult to plan what I say so that my ideas and thoughts can be understood easily
- I find it difficult to decide who will do what in teams
- I find it difficult to take personal responsibility for work when in teams
- I find it difficult to critically evaluate my ideas and contributions
- I find it difficult to change my approach if necessary

Key Skill - Communication

Being able to critically review and evaluate practice in order to improve

Critical Thinking

A

- I make sense of the information I am given on most tasks
- I pick out things that went well or badly on most tasks
- I suggest ways of improving in most tasks
- I can tell the difference between fact and opinion on most occasions
- I review my progress on most tasks

B

- I make sense of the information I am given on many tasks
- I pick out things that went well or badly on many tasks
- I suggest ways of improving in many tasks
- I can tell the difference between fact and opinion on many occasions
- I review my progress on many tasks

C

- I make sense of the information I am given on some tasks
- I pick out things that went well or badly in some tasks
- I suggest ways of improving in some tasks
- I can tell the difference between fact and opinion on some occasions
- I review my progress on some tasks

D

- I find it difficult to make sense of the information I am given
- I find it difficult to pick out the things that went well or badly in a task
- I find it difficult to suggest ways of improving
- I find it difficult to know the difference between fact and opinion
- I find it difficult to review my progress on a task

Key Skill – Improving own Learning and Performance

A
- I meet deadlines on most tasks
- I take responsibility for meeting deadlines on most tasks
- I stay motivated to complete most tasks
- I concentrate on what needs to be done on most tasks
- I persevere with my what I am doing on most tasks

B
- I meet deadlines on many tasks
- I take responsibility for meeting deadlines on many tasks
- I stay motivated to complete many tasks
- I concentrate on what needs to be done on many tasks
- I persevere with my what I am doing on many tasks

C
- I meet deadlines on some tasks
- I take responsibility for meeting deadlines on some tasks
- I stay motivated to complete some tasks
- I concentrate on what needs to be done on some tasks
- I persevere with my what I am doing on some tasks

D
- I find it difficult to meet deadlines
- I find it difficult to take responsibility for meeting a deadline
- I often loose motivation and leave tasks unfinished
- I find it difficult to concentrate on what needs to be done
- I find it difficult to persevere with my what I am doing

Tenacity

Being able to stick at a task in order to meet deadlines.

Self Motivation

Being able to motivate yourself to do what needs to be done

A
- I am enthusiastic in most activities
- I am willing to make an effort with most activities
- I get a buzz from most activities
- I take responsibility for my work and try to do well in most tasks

B
- I am enthusiastic in many activities
- I am willing to make an effort with many tasks
- I get a buzz from many activities
- I take responsibility for my work and try to do well on many tasks

C
- I am enthusiastic in some activities
- I am willing to make an effort with some activities
- I get a buzz from some activities
- I take responsibility for my work and try to do well on some tasks

D
- I find it difficult to be enthusiastic about many activities
- I am unwilling to make an effort on many activities
- I don't get a buzz from many activities
- I find it difficult to take responsibility for my work and try to do well

Postive Self Image

Valuing yourself and your achievements

A

- I know where I do well in most of my work
- I understand what most people think of me
- I am confident in most of the things I do
- I have respect for myself most of the time
- I feel worthy of positive feedback in most activities

B

- I know where I do well in much of my work
- I understand what many people think of me
- I am confident in many things I do
- I have respect for myself a lot of the time
- I feel worthy of positive feedback in many activities

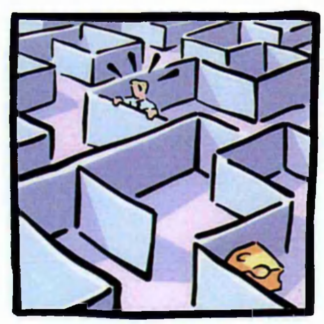
C

- I know that I do well in some things
- I understand what some people think of me
- I am confident in some things I do
- I have respect for myself some of the time

D

- I don't know what I do well in
- I find it difficult to understand what other people think of me
- I find it difficult to be confident in myself or in what I do
- I find it difficult to respect myself
- I don't feel worthy of positive feedback

Problem Solving



Being able to analyse a problem and form strategies to work towards a solution.

A

- I work out what the problem really is about in most activities
- I predict strategies that might work on most problems
- I investigate problems to find a reasonable solution on most occasions
- I consider other interpretations of a problem on most occasions
- I draw understanding from what has been found on most occasions

B

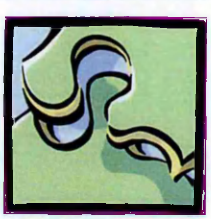
- I work out what the problem is really about in many activities
- I predict strategies that might work on many problems
- I investigate problems to find a reasonable solution on many occasions
- I consider other interpretations of a problem on many occasions
- I draw understanding from what has been found on many occasions

C

- I work out what the problem is really about in some activities
- I predict strategies that might work on some problems
- I investigate problems to find a reasonable solution on some occasions
- I consider other interpretations of a problem on some occasions
- I draw understanding from what has been found on some occasions

D

- I find it difficult to work out what the problem is really about
- I find it difficult to predict strategies that might work
- I find it difficult to investigate a problem to find a reasonable solution
- I find it difficult to consider other interpretations of a problem
- I find it difficult to draw understanding from what has been found



A
- I understand other people's feelings in most situations
- I adapt my behaviour to suit most people and situations
- I consider and respect other peoples' thoughts on most occasions
- I act on what other people say in most situations

B
- I understand other people's feelings in many situations
- I adapt my behaviour to suit most people and situations many of the time
- I consider and respect other peoples' thoughts on many occasions
- I act on what other people say in many situations

Social Intelligence

Being able to respond appropriately to different situations and people

C
- I understand other people's feelings in some situations
- I adapt my behaviour to suit some people and situations
- I consider and respect other peoples' thoughts on some occasions
- I act on what other people say in some situations

D
- I find it difficult to understand other people's feelings
- I find it difficult to adapt my behaviour to suit different people and situations
- I find it difficult to consider and respect other peoples' thoughts
- I find it difficult to act on what other people say

Key Skill – Working with others

A
- I can manage my own time in most things
- I decide what are the most important things to do in most things
- I set realistic targets and deadlines for myself in most things
- I work well on my own on most things

B
- I can manage my own time in many things
- I decide what are the most important things to do in many things
- I set realistic targets and deadlines for myself in many things
- I work well on my own on many things

Being able to take charge of your own learning

Self Management

C
- I can manage my own time in some things
- I decide what are the most important things to do in some things
- I set realistic targets and deadlines for myself on some occasions
- I work well on my own on some things

Key Skill – Improving own Learning and Performance

D
- I find it difficult to manage my own time
- I find it difficult to decide what are the most important things to do
- I find it difficult to set realistic targets and deadlines for myself
- I find it difficult to work well on my own