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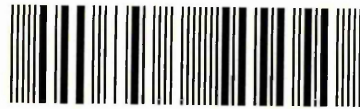
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Online Distance Learning

Exploring the Interaction Between Trust and Performance

Sónia Sousa

Thesis submitted in partial fulfilment of the
requirements for the award of the degree of
Doctor of Philosophy of Sheffield Hallam University

March 2006

Abstract

The research reported in this thesis makes a contribution towards a comprehensive understanding of the online distance learning process. This research specifically addresses the effects of learners' trust in relation to particular trust factors in their academic performance when studying at a distance.

An initial theoretical framework is outlined, which encompasses investigated areas such as *distance education, online distance learning, trust, performance, assessment, online communities, co-operation and collaboration*. Subsequently, a two stage empirical research process is described. Firstly, a survey is outlined to enable the construction of a set of trust factors characterising learners' beliefs in relation to online distance learning issues as well as to provide the student group profile. Secondly, a study which accounts for both a quantitative and qualitative data collection is presented. Quantitative data was used to test an hypothesis which explored the relation between trust and performance under different conditions. Qualitative data was gathered to better understand and explain the results from the first stage.

Results identified the importance of fostering trust in a distance learning community and in providing trustful online distance learning environments and reflects on the understanding of the concept of trust and possible implications for the online distance learning design and its pedagogy. Implications for online distance learners' needs and support are also identified.

Results also confirmed the interaction between trust and performance although some results were unexpected. For instance, under certain conditions a negative correlation between trust and academic performance was identified. These results might, somehow, be related to Cape Verde's specific characteristics such as limited broadband access to the Internet and access to ICT facilities, serious water and electricity shortages, limited agricultural possibilities and shortage of higher education opportunities.

Within this context, this work's major contributions are at the intersection of areas such as trust, online distance learning and learners' academic performance. Which offers an increased understanding of the effects of learners' trust beliefs over their academic performance in online distance learning processes.

An additional contribution was the development of an **Information and Communication Technologies Online** distance learning module for every initial year of the Universidade Jean Piaget de Cabo Verde undergraduate programme, thus contributing to reducing the existing gap between developed and developing countries.

A complementary contribution is the identification of a number of consequent research questions which pave the way for future research work.

Abstract

The research reported in this thesis makes a contribution towards a comprehensive understanding of the process of online distance learning. This research specifically addresses the effects of learners' trust in relation to particular trust factors in their academic performance when studying at a distance. In order to attain these goals, the areas investigated included *distance education, online distance learning, trust, performance, assessment, online communities, co-operation and collaboration*.

An initial theoretical framework is outlined, which encompasses trust, online distance learning and academic performance. Subsequently, the two stage empirical research process is described. Firstly, a survey is outlined followed by the presentation of a study which accounts for both a quantitative and qualitative data collection. The survey's goal was to construct a set of trust factors characterising learners' beliefs in relation to online distance learning issues as well as to provide the student group profile. Quantitative data was used to test an hypothesis which explored the relation between trust and performance under different conditions. Qualitative data was gathered to better understand and explain the results from the first stage.

Within this context, this work's major contributions are at the intersection of areas such as trust, online distance learning and learners' academic performance and offer an increased understanding of the effects of learners' trust beliefs over their academic performance in online distance learning processes. Results confirm the relevance of trust in online distance learning and its relation to academic performance. They also stress the importance of fostering trust in a distance learning community and in providing trustful online distance learning environments. Implications for online distance learners' needs and support are also identified. An additional contribution provided by this research work was the development of an **Information and Communication Technologies Online** distance learning module for every initial year of the Universidade Jean Piaget de Cabo Verde undergraduate programme, thus contributing to reducing the existing gap between developed and developing countries. Furthermore, a number of consequent research questions are presented which pave the way for future research work.

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Preface

In Praia, Cape Verde, 2001, *Universidade Jean Piaget de Cape Verde*¹ felt the need to integrate its Capeverdian students into the *Instituto Piaget*² community. To support such requirement, the university invested strongly in a higher distance education program.

Among other start-up initiatives, this university, included an online distance education module (*disciplina*³) on basic information and communication technologies (ICT) skills (**Information and Communication Technologies Online** or **ICT Online** for short) into every graduation curricula's first year to foster the use of ICT.

The university adopted the Portuguese learning management system *Formare* to deliver their online distance learning modules.

The research work herein described is mostly a product of this environment and was conceived having this environment as a background.

¹Higher education institution base in Cape Verde.

²A Portuguese cooperative institution spread over Portugal, Brazil, Cape Verde, Angola and Mozambique which charters autonomous higher education institutions in developing areas or countries.

³The Portuguese word for “subject” or “module” such as used in Britain.

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Author's declaration

I declare that, apart from work whose authors are clearly acknowledge, this document is the result of my own and original work.

This thesis has not and is not being submitted for any other comparable academic award.

Glossary

Achievement Relative performance in relation to identified learning outcomes based on collected evidence and judged against established criteria. *See* assessment.

Assessment Assessment is the process of collecting information on students' achievements and performance. A balanced assessment includes a variety of assessment tasks. (Consortium, 2003). *See* achievement and performance.

Asynchronous communication

Communication which occurs intermittently, not in "real time". E-mail is an asynchronous means of communication. *See* synchronous communication.

Basic trust Children who have secure attachments with their parents have a general sense that the world is predictable and reliable. This is basic trust. *See* trust.

Classroom assessment

Classroom assessment is the evaluation of the quality of students' performance, and the proficiency of their learning (National Academy of Sciences, 2003). *See* assessment and performance.

Cognitive level of trust

People's cognitive level of trust represents the peoples' trust who is assumed at the beginning of the relationship.

Collaboration

Literally, consists of working together with one or more partners. *See* collaborative learning and collaborative learning environment.

Collaborative learning

Is an umbrella term for a variety of approaches in education that involve joint intellectual effort by students or students and teachers. Groups of students work together searching for understanding, meaning or solutions or creating a product. *See* co-operative learning and constructive learning.

Collaborative learning environment

Represents an integration of collaborative learning methods and virtual learning environments. A collaborative learning environment represents a learning structure where students work in groups, mutually searching for understandings, solutions, meanings or creating a product. *See also* constructivism and co-operation.

Constructivism

Is a theory of learning based on the idea that knowledge is constructed by the knower based on mental activity. Learners are considered to be active organisms seeking meaning. Is a "view of learning" in which learners use their own experiences to construct understandings that make sense to them. *See* constructive learning and constructive learning environment.

Constructive learning

It is based on students' active participation in problem-solving and critical thinking regarding a learning activity which they find relevant and engaging. They are "constructing" their own knowledge by testing ideas and approaches based on their prior knowledge and experience, applying these to a new situation, and integrating the new knowledge gained with pre-existing intellectual constructs. *See* co-operative learning and collaborative learning.

Constructive learning environment

Represents an integration of constructive learning methods and virtual learning environments. Learning activities based on constructivism put learners in the context of what they already know, and apply their understanding to authentic

situations. *See also* collaboration and co-operation.

Co-operation

Refers to the practice of people working in common with commonly agreed-upon goals and possibly methods. *See* co-operative learning and co-operative learning environment.

Co-operative learning

A set of processes which help people interact together in order to accomplish a specific goal or develop an end product which is usually content specific. *See* co-operation and Co-operative learning environment. *See* constructive learning and collaborative learning.

Co-operative learning environment

Represents an integration of co-operative learning methods and virtual learning environments. Represents the learner and teacher act to work together, to join efforts towards one common end. Learning activities focus on the process of working together. In co-operative learning environments students work with their peers to accomplish a shared or common goal. *See also* collaboration and constructivism.

Criterion-referenced assessment

Generally involves determining whether the student can perform, to a pre-set minimum standard, a specific set of tasks or activities within a particular situation or context. *See* assessment.

Distance Education

is a general term used to cover the broad range of teaching and learning events in which the student is separated (at a distance) from the instructor, or other fellow learners. Distance education brings together both teaching and learning at a distance element and because such relationship occurs at a distance *i.e.*, it occurs when the teacher and the learner are physically separated and sometimes separated in time, such relationship must be mediated by some kind of technology or medium. *See* distance learning and distance teaching.

Distance Learning

Distance learning means acquisition of knowledge at a distance. It includes the process of transforming experience into knowledge, skills, attitudes, values, sense and emotions (Holmberg, 1995). *See* distance teaching.

Distance Teaching

Teaching at a distance is an effort, sometimes successful, to simplify learning towards some goal (Otto, 1994). It is the process transferring the knowledge from one to another; the process to facilitate learning and shape or mould learning. *See* distance learning.

Distributed teaching and learning

Represents the uses of various electronic technologies to provide distinct teaching and learning approaches. It also can be used as a complement to face-to-face education or distance education. The use of different information and technology tools to teach and learn at a distance. *See* Learning management system and virtual learning environment.

Distrust

Feelings of distrust inside of a relationship, either implicit or explicit, implies that the **trustee** is not willing to trust the **trustor**. Those feelings can lead or motivate thoughts and emotions of revenge and become very difficult to be repaired (Tyler and Degoey, 1996). *See* trust, trustee, trustor.

Electronic learning

Covers a wide set of electronic applications and processes, providing computer instruction (courseware) online over the Internet, private distance learning networks or via an intranet/extranet (LAN/WAN). This is also known as *e-Learning*.

Emotional level of trust

People's emotional level of trust is assumed afterwards, when the relation becomes stronger.

Expectation A belief about (or mental picture of) the future, the feeling that something is about to happen.

Extrinsic motivation

Extrinsic motivation is motivation to engage in an activity as a means to an end. Individuals who are extrinsically motivated work on tasks because they believe that participation will result in desirable outcomes or avoidance of punishment (Pintrich and Schunk, 2002). *See* motivation and intrinsic motivation.

Feedback assessment

Provides indicators regarding learners' progress. *See* assessment.

Formative assessment

Includes all activities that teachers and students undertake to get information that can be used diagnostically to alter teaching and learning (Boston, 2002).

Ipsative assessment

Type of assessment whereby the norm against which assessment is measured is based on prior performance of the person being assessed - the comparison of the student's performance with their own earlier performance. *See* assessment.

Intrinsic motivation

Intrinsic motivation causes people to engage in an activity for its own sake. An intrinsically motivated student, is the student who enjoys the challenge of learning. *See* motivation and extrinsic motivation.

Instructor One who instructs; a teacher. *See* teacher.

Instruction The act, process, or art of imparting knowledge and skill *teaching*.

Instructional designer

One who performs the analysis of learning needs and systematic development of instruction often using information and communication technology as a method for developing instruction (Wilson, 1996b).

Knowledge Information combined with experience, context, interpretation, and reflection. It is a high-value form of information that is ready to apply to decisions and actions.

Learning management system

The whole range of information systems and processes that contribute directly, or indirectly, to learning and the management of that learning. A learning management system integrates the online mediums available into one school environment place, where learners and teachers and administrators can interact with each other and form a virtual learning environment community (Holyfield, 2003). *See* virtual learning environment.

Learner *See* student.

Lesson Something to be learned.

Motivation A complex concept, closely aligned with the will of learn, and encompassing feeling of self-esteem, self efficacy, effort, self regulation, locus of control and goal orientation. The psychological feature that provides incentive to a person to act, to believe or expect. Motivation is the driving force (desire) behind all actions of an organism, is the reason for the action. *See* Extrinsic, intrinsic motivation and trust.

Norm-referenced assessment

Norm-referenced assessment is generally used to sort students rather than to measure individual performance against a standard or criterion. *See* assessment.

Online community

An online community is a group whose members are connected by means of the Internet. These communities share the same norms, core values and goals (Wilson, 1997b).

Online Distance Education

The process of extending the teaching and learning process to locations away from a classroom by using online technology or the Internet. *See* online distance teaching and learning.

Online Distance Teaching

Represents the teaching process mediated by the online technology.

Online Distance Learning

A learning activity where students work on their own at home or at the office and communicate with faculty and other students via e-mail, electronic forums, videoconferencing, chat rooms, bulletin boards, instant messaging and other forms of computer-based communication.

Performance Student's performance regards a list of students skills and cognitions that students should acquire throughout their learning process. Those enable him/her to do or act according to learning performance aims previously determined (Organization, 2002).

Student One who is enrolled or attends classes at a school, college, or university. *See* learner.

Summative assessments

Summative assessment is comprehensive in nature, provides accountability and is used to check the level of learning at the end of a course or module. (Organization, 2002). *See* formative assessment and assessment.

Synchronous communication

Communication which occurs in "real time". The most frequently used form of synchronous online communication is instant messaging or chat. Audio and video conferencing and white boards are other examples. *See* asynchronous communication.

Teacher A person who teaches. *See* instructor.

Teaching The educational process of instructing. *See* instruction.

Teaching and learning at a distance

See distance education.

Trustee One who trusts another person, organisation, tool, or process. *See* trust.

- Trust** A relationship between a person, organisation or process (a **trustor**) and another person, organisation, process or object (the **trustee**). Usually, the trustee is a person who is willing to ascribe an intention, a motivation, an interest or a goal to another person, or organisation, or process or object (website, a server, a group, a society, an institution). *See* trustee and trustor. It is a feeling that the community can be trusted. Trust represents the willingness to rely on other members of the community in whom one has confidence.
- Trustor** The person, organisation, tool or object who or which is trusted. *See* trust.
- Unit** Part of a module *See* module.
- Unmotivated** A person who is not willing to act. *See* motivation.
- Virtual learning environment** A virtual learning environment is a set of teaching and learning tools designed to enhance a student's learning experience by including computers and the Internet in the learning process. Represents the learning environment which uses learning management system together with learning methodologies, online collaboration, and instructor facilitation to achieve applied learning results not possible from face-to-face education in a truly flexible, anytime/anywhere fashion. *See* learning management system.

Part I

Introduction and overview

Overview

This first part provides a comprehensive introduction.

The first chapter, entitled *Trust, performance and ODL* provides an overall view of the work, establishing its context, highlighting its conceptual and technical contributions and pointing out the related areas of research. The chapter ends with a preliminary view of the results achieved.

The second chapter is a *reading plan* to which the reader can refer for a synopsis of each of the parts, chapters and appendices.

Chapter 1

Trust, performance and ODL

1.1 Introduction

High dropout rates are a common scenario in distance education, continuing to be one of the most relevant problems, together with students' low performance and lack of motivation. All these problems are also inherited by online distance education.

It is my belief that trust plays a crucial role in the success of online distance learning, hence this effort to investigate the interaction of trust with online distance learning specially regarding academic performance.

This first chapter begins by setting the context of the work herein depicted and ends highlighting its main contributions.

1.2 Context

Distance education involves the separation in space and time of teachers and learners.

In distance education all communication is mediated by technology, therefore rules naturally applied to our social relationships become different in a distance education environment. These rules must be adapted to this way of learning.

Contrary to early distance education, online distance education resources brings the characteristics of its communication process very close to face-to-face education. Close enough to promote a sense of deceiving familiarity which sooner or later threatens the distance teaching and learning processes.

This resemblance potentially leads to confusion and misleads those involved in an online distance education process as one tends to assume that the social rules and conduct are the same in face-to-face and online distance education environment. But they are not.

As an example, human non-verbal face-to-face cues easily perceived in traditional education settings are very hard to convey in online environments. Therefore, although familiar and close to face-to-face settings, online environments lack a number of less obvious or direct communication features which results in increased difficulty when trying to assess and understand needs and feelings of all concerned.

These worries are patent, nowadays, in online distance instruction design methodologies. These methodologies aim, more and more, to provide virtual learning environments which:

- Foster reliability;
- Facilitate interaction (both asynchronous and synchronous);
- Provide unobtrusive feedback mechanisms;
- Cater for users' needs; and
- Promote trustful learning communities.

Unfortunately, providing a trustful virtual learning environment is not as simple as it might seem, although efforts have been made. Take, for instance, the use of photographs in electronic commerce as a way to boost trust on the customer side (Steinbrück et al., 2002) or the study of the effects of presence on customer attitudes.

Still, it is difficult to picture what is a trustful virtual environment or further, what contributes towards a trustful virtual environment and how it relates to teaching and learning outcomes such as the academic performance of the students.

As attitudes are usually based on past experiences, one might propose that students' trust in online distance learning settings build on their relation with such an environment and are related with their performance.

The work herein presented addresses a subset of the issues raised in the previous paragraph as it only addresses the questions of:

- What kinds of trust are relevant in online distance learning; and
- How does trust relate to academic performance in online distance learning.

This is further justified by realising that, due to the now apparent identical face-to-face and online distance learning education settings, people form their online distance learning expectations from experiences gathered in their past face-to-face environment.

As one's learning needs and feeling are not ascertained in the same way in both environments, when both teachers and students realise that their initial expectations were not fulfilled they tend to be frustrated and insecure. These feelings of insecurity and frustration can lead to distrust and consequent negative attitudes.

The next section outlines the setting in which a study was conducted to make way towards providing answers to the above research questions.

1.2.1 Case study

In order to address the research questions identified above, the work was conducted on an **Information and Communication Technologies Online** module taught at a distance at *Universidade Jean Piaget de Cabo Verde*.

To help readers' better understanding of the context within which this work was carried out, a brief introduction will be provided about *Cape Verde*, about the university and about the module taught at a distance. Further and more complete information on these issues is provided by appendices at the back of this document.

Cape Verde is located in the North Atlantic Ocean, 500 km West of Senegal in Western Africa. The republic of Cape Verde consists of 10 islands of which one is uninhabited.

Cape Verde has a population of 418,224. The majority of Cape Verde population is young.

The national language is Creole (Krioulo) and Portuguese is the official language.

Cape Verde is a Least Developed Country (LDC). The Cape Verde economy is fragile because this country has few natural resources and limited agricultural possibilities, which makes it heavily dependent on foreign assistance and overseas resources.

This country has very unfavourable import/export rates as most of its resources are imported from neighboring countries such as Senegal and the Canaries and from those who share a common language such as Brazil and Portugal. Export figures are close to nil.

Nevertheless, Cape Verde has made a considerable effort to foster the development of its educational sector.

It has close to eighty per cent literacy rate but no concrete plan to supply all schools with personal computers or internet connections, one of the school problems' being its lack of technical know-how on a number of fields related to the overall education process.

Again, in the higher education area, Cape Verde suffers from a lack of opportunity as there are only seven higher education institutions including one of the newest, *Universidade Jean Piaget de Cabo Verde*.

Cape Verde's lack of opportunity in higher education implies that most students must go abroad in order to pursue their education. Over 2000 Cape-verdeans are pursuing tertiary education abroad, primarily in Brazil and Portugal and an estimated 1500 study in Cape Verde.

Cape Verde's information and communication development started relatively late. The country's mass media is underdeveloped, although Cape Verdean exposure to mass media is considerable.

Internet facilities are still in expansion in Cape Verde and unfortunately there is only one Internet Service Provider (ISP) and limited but costly broad band access. This obviously results in a very low Internet usage penetration rate although information and communication technologies have a considerable potential in this archipelago country in the education, government and health sectors.

The Internet could definitely play a key role in providing greater education opportunities to all but Cape Verde still needs to make a big effort to push itself into the information society alone, not to mention the knowledge society.

Within this general context, *Universidade Jean Piaget de Cabo Verde* is located in Praia. Praia is the capital city of Cape Verde and is situated in Santiago island.

Universidade Jean Piaget de Cabo Verde is one of *Instituto Piaget's* higher education institutions which are spread over Mozambique, Angola, Cape Verde and Portugal.

From its start, the university was willing to integrate this community into a broader community, the *Instituto Piaget* community. Therefore, this university invested on the development of a distance education program to cater for the needs of its students and teachers.

The **Information and Communication Technologies Online** module, taught at a distance, is a first year subject attended by every under-graduate student at the university. Its main goal is to foster students' interest and know-how in the day-to-day use of the Information and Communication Technology throughout their course and lives.

Although referred to as *taught at a distance*, the **ICT Online** module has two face to face moments, one in the beginning of the programme and another one at its end¹.

The next section addresses the research strategy devised in the above context to address this work's research questions.

1.2.2 Research strategy

As stated above, the questions driving this work are:

- What kinds of trust are relevant in online distance learning; and
- How does trust relate to academic performance in online distance learning.

Thus, this line of research aims to contribute to the understanding of the influence of trust in the online distance learning processes focusing its efforts on the understanding of students' trust beliefs and their influence on students' performance.

To achieve those above research goals a two stage study was designed.

First stage The first stage of the study catered for a factor analysis of a survey's results. This survey's questionnaire aimed to gather an overall detailed picture of the students' trust beliefs in online distance learning. Chapter 8 describes this first stage's methodology as well as the results achieved.

¹A more detailed information regarding this module design, development and implementation is provided in appendix B.

Second stage The goal of the second stage of the study was to test the hypothesis that trust and performance are related in online distance learning. It is this second research stage that uses **ICT Online** module as its testbed. Chapter 9 provides a detailed description of the methodology of this stage together with the results achieved. A parallel qualitative study was also conducted, at this time, to explore the eventual influence of the **ICT Online** module and its virtual learning environment on these specific learners' trust and academic performance. Chapter 10 discusses the methodology and results.

Figure 1.1 provides an integrated schematic overview of this work highlighting its two stages and depicting the parallel qualitative study together with the quantitative approach as they were conducted in the same lapse of time.

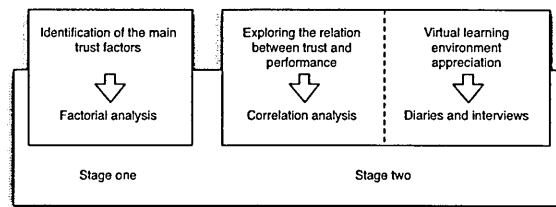


Figure 1.1: The overall research methodology

1.3 Contributions and results

This work's contributions and results were gathered from a two stage study conducted to explore the relation between trust and performance in online distance learning. The first stage provided insights on what kinds of trust are paramount in online distance learning whereas the second stage contributed towards the understanding of the interaction between trust and academic performance in online distance learning.

A related but also relevant result was the design, development and deployment of the **Information and Communication Technologies Online** module to be taught at a distance over the internet. Further details on this instructional design project can be found in appendix B.

1.3.1 Conceptual contributions

A first conceptual contribution is the definition of three main trust factors based on a wide survey of students feelings towards online distance learning.

These *trust factors* provide an insight on what to look for when trying to boost the students' trust.

A second contribution relates to the understanding of the interaction between trust and performance. The results of this study show that there is in fact a relation between trust and performance although was not positive correlation as it was expected. Instead results identified a negative correlation between students' trust and their performance, *i.e.*, when trust increases, academic performance decreases.

As a corollary, some guidelines for future research opportunities are presented which build on this work, as the feeling prevails that it is important and that there is a need for further investigation regarding trust in online distance learning environments.

1.3.2 Results achieved

One major result is the confirmation that trust is a key issue in online distance learning environments as shown by the results of the first stage of this study which highlighted three main trust factors:

Factor 1 – Students' trust towards the interaction between students and teachers;

Factor 2 – Students' trust towards the virtual learning environment; and

Factor 3 – Students' trust towards technology.

The same data collection tool – a questionnaire – used on the survey conducted as part of the first stage of this study also fostered the understanding of trust:

- Across the main three factors identified;
- Across age and gender;
- Among subjects' computer ownership condition;
- Across internet access condition; and

- Across previous experience in distance education and information, and communication technology knowledge and skills.

Further and detailed results of this part of the study are available in chapter 8.

The second stage of the study fostered the understanding of the relation between trust and academic performance identifying a statistically significant but not positive correlation between students' trust and their academic performance.

To achieve this goal a multi-method approach was used. It examined the relation between trust and performance from three different perspectives. The first two approaches were quantitative, whereas the third was a qualitative approach.

The first approach investigated and established the correlation between students' initial self trust beliefs and final theoretical and practical assessments grades².

The second approach examined the students' trust correlation with student's performance by analysing trust indicators and theoretical and practical marks gathered before and after the students attended the **ICT Online** module³.

Both approaches returned results, confirmed that there is a correlation between trust and performance although...

- Results from the first approaches show a negative correlation between trust marks of all three trust factors⁴ and the academic performance of the students; as well as
- Results achieved from the second approach, show a negative correlation between trust and students' academic performance over factors two (*trust towards virtual learning environment*) and three (*trust towards technology*).

According to the above results, students with an initial high level of trust will probably achieve worse academic performance. Especially those

²Also known in this work as summative assessment

³Also known in this work as added value performance.

⁴Students' trust towards the interaction between students and teachers, students' trust towards the virtual learning environment and students' trust towards technology.

students, who according to the second research approach, rank higher on *trust towards virtual learning environment* and *trust towards technology*.

Those students will probably achieve worse academic results when compared to their colleagues, who rank lower on *trust towards virtual learning environments* and *trust towards technology*.

Finally, a third approach – this one qualitative – showed that the majority of the students considered attending the **ICT Online** module a good experience. Generally students displayed motivation towards learning online although there were moments in time where students manifested anxiety and frustration, specially when a technical failure occurred near a summative assessment activity date or deadline.

The majority of students agreed that trust represents a key factor in an online distance learning environment. Also, most students agreed that in online relationships, a face-to-face opportunity could help foster trust.

1.4 Closing remarks

During this research work a **Information and Communication Technologies Online** module was design, developed and deployed. As a consequence, today, *Universidade Jean Piaget de Cabo Verde* students now learn how to use a computer and the internet mainly at a distance.

This setting diminishes possible technological phobia and contributes towards the integration of the use of information and communication technology in the students' daily lives.

For most students the **ICT Online** module represents their first contact with a computer and the internet as research results in chapter 8 indicated.

Starting on a very conceptual level and providing the reader with an overview of this work's main contributions and results, this chapter provides an entry point to this document's context and content.

Chapter 2

Reading plan

2.1 Document organisation

This document is organised as follows:

Front matter This includes the abstract, the table of contents, the lists of figures and tables, a preface, the acknowledgements, the author's declaration and a glossary of terms and expressions that will be used throughout the document.

Part I – *Introduction and overview* – This part provides a comprehensive introduction to this document's contents and provides this reading plan.

Part II – *Theoretical landmarks* – This set of chapters aims to provide both the rationale and the related work overview that set the context of the project resulting from this dissertation's research work.

Part III – *Empirical approach* – Following the scenario set in Part II, Part III provides the specification, implementation, methodology and presents the results of the empirical study undertaken to test the underlying hypothesis.

Part IV – *Closing remarks* – This provides both an overall discussion of the results gathered as well as a summary of the work presented in this document and future work proposals based on the content of the previous chapters.

Part V – Complements – Finally, this last part provides the appendixes, the bibliography and an index.

The Appendixes include a presentation of the online module developed to enable the undertaking of the empirical study. Also, briefly presents the Cape Verde environment context, including the country conditions and associated culture.

The appendixes also enable close examination of relevant online module, survey and empirical study materials, such as the student guide for the online module and all task protocols, consent forms, questionnaires, observation instruments, interview scripts and collected quantitative data.

2.2 Chapter contents

The titles of the various chapters should convey relatively clearly the subjects addressed in each case. In principle, most chapters can be read more or less independently and if necessary, pointers are given to where complementary information can be found either in other parts of this document or externally.

Chapter 1 – *Trust, performance and ODL* – This chapter provides an overall view of the work herein presented establishing its context, highlighting its contributions and pointing out the related areas of research. The chapter ends with a preliminary view of the results achieved.

Chapter 2 – *Reading plan* – It's this one and the reader can refer to this chapter for the synopsis of each of this documents' parts, chapters and appendixes.

Chapter 3 – *Teaching and learning at a distance* – This chapter addresses issues related with teaching and learning at a distance. It also, gives an overview of the influence of technology when teaching and learning at a distance, as well as providing a perspective of distance education evolution through time. This chapter ends providing some initial thoughts regarding the online distance education.

Chapter 4 – *Online distance learning* – In this chapter the goal is to provide the rationale behind the particular case of learning through the

Internet. It also discusses the online distance learning challenges.

Chapter 5 – *Trust and performance* – This chapter considers trust and performance. It drafts a relation between trust and online distance learning and briefly provides the rationale behind the trust and performance relation when in an online distance learning environment.

Chapter 6 – *Related work* – This provides an overview of the related research work regarding trust, performance and online distance learning. It explores more thoroughly the rationale behind the relation between trust and performance when studying and learning at a distance.

Chapter 7 – *Exploring the effects of trust on performance* – This chapter introduces the reader to the research work undertaken to understand and evaluate the interaction between trust and performance in online distance learning environments.

Chapter 8 – *Trust factors survey* – Presents and discusses the results achieved in the first research stage which aimed to study students' main trust beliefs and opinions regarding Online Distance Learning.

Chapter 9 – *Trust and performance study* – Presents and discusses the results achieved in the second research stage which aimed to explore the interaction between trust and performance.

Chapter 10 – *Online module usage appreciation* – Examines the students' Virtual Learning environment and provides a general overview on students' opinions, feelings and beliefs regarding the **ICT Online** distance learning module offered at Jean Piaget University of Cape Verde to all its first year undergraduate students.

Chapter 11 – *Overall discussion* – This chapter encompasses all results and aims for a comprehensive discussion bringing together both theoretical landmarks and findings presented throughout the document.

Chapter 12 – *Summary and future work* – Finally, this chapter recalls the path taken and evaluates the relevance of this work's contribution, underlining the significance of the undertaken research as well as the results of the empirical studies. The limitations of this work are also acknowledged, stressing what was proposed but was not addressed and

what might have been done to foster better and more self-sustainable results.

2.3 Appendix contents

As with chapters, appendix titles should convey the subjects covered.

Appendix A – *Cape Verde* – Provides a summary of the Capeverdean context, including its economics and technological indicators.

Appendix B – *The Information and Communication Technologies Online module* – This appendix presents and depicts the online module developed to enable the undertaking of the empirical study.

Appendix C – *ICT Online student guide* – This appendix provides an English translation (from the Portuguese original) of the **Information and Communication Technologies Online**’s student guide distributed to the students at the time the empirical study was undertaken.

Appendix D – *Empirical study materials* – Contains the empirical study’s materials such as task protocols, consent forms, data collection instruments and samples of collected quantitative data.

I hope that reading this document proves to be a good experience.

Part II

Theoretical landmarks

Overview

This set of chapters aims to provide both the rationale and the related work overview that set the context of the project resulting from this dissertation's research work.

In *Teaching and Learning at a distance*, a number of issues related with distance teaching and learning and online distance education are addressed. Topics cover a wide range of aspects providing a broad review of the three subjects and related research trends.

The *Online distance learning* chapter gives attention to the particular case of distance learning through the Internet *i.e.*, online distance learning case scenarios. The chapter also narrows down to the discussion of online distance learning challenges and the importance of online distance learning communities development within such process. At the end of the chapter, some hypotheses and ideas which lead to this research work are briefly presented.

Further the *Trust and performance* chapter, considers the necessary context for trust and assessment performance. It also establishes the connection between trust and performance in online distance learning settings.

The next chapter reviews *Related work* and provides an overall view of related research work, thus providing a general research space reference in relation to the work presented in this document.

Chapter 3

Education at a distance

3.1 Introduction

For most of us, distance education is characterised by the separation of the teacher and the learning group, where the interpersonal face-to-face communications has been replaced by a personal mode of communication mediated by technology (Holmberg, 1995).

Initially, until the 1970's, distance education was characterised by some terminology confusion. Those included terms like *home study*, *correspondence study*, *external studies*, *distance teaching*, *learning at a distance*, among others (Keegan, 1996).

Those terms define particular aspects of the process created to provide education – *any time, any place, anywhere*.

Nowadays, the main terms and concepts of distance education have been elucidated, although we continue to use and see a number of common words describing a specific distance education process, *i.e.*, words which illustrate specific aspects of the teachers' and students' interaction process.

This process most of the time refers to a distance education particular case, associated with the use of a specific communication technological media. For example *Online distance education* or *electronic learning*.

Today, with the development of information and communication technology, the Internet and the World Wide Web became a chosen medium of information distribution. It became an infrastructure on which society can rely on to enable distance education.

Technology has developed in the direction to provide online infrastruc-

tures which integrates different communications tools and enables simpler ways to provide an interactive and successful distance education environment.

With online technology, the distance teaching and learning processes became more flexible. The human interaction at a distance became more accessible and reachable. In this context, new educational models emerged together with changes and reorganisations of fundamental concepts which include the role of the teacher and the role of the learner within such online contexts.

Section 3.2 explores distance education conceptual framework. It addresses the definition of distance education, a description of the education elements, main education theories and communication process.

This section is followed by section 3.3, which considers the distance education evolution and trends up to the present time.

This chapter ends with section 3.4 where an overview of today's distance education process is provided.

3.2 Conceptual framework

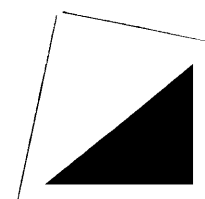
This conceptual framework section aims to present the main concepts of distance education. This includes a distance education definition and a description of the education environment and process.

3.2.1 Distance education

To better understand distance education and its process this section first explores the distance teaching and learning forms as part of a distance education process.

Distance Learning – Distance learning means acquisition of knowledge at a distance. It includes the process of transforming experience into knowledge, skills, attitudes, values, sense and emotions (Holmberg, 1995).

Distance Teaching – Teaching at a distance is an effort, sometimes successful, to simplify learning towards some goal (Otto, 1994). It is the process of transferring the knowledge from one to another; the process to facilitate learning and shape or mould learning.



Distance education brings together both teaching and learning elements at a distance (Keegan, 1996), as figure 3.1 illustrates.

Distance Education – Is a general term used to cover the broad range of teaching and learning events in which the student is separated (at a distance) from the instructor, or other fellow learners. According to Ljosa (1994), distance education is a common word to define and describe an interactive educational process between a student and her teacher, when physically and sometimes separated in time.

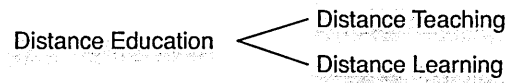


Figure 3.1: Distance education

A distance education scenario implies three main key features, according to Keegan (1996).

- Teacher and learner separation in space and/or in time;
- The learner assumes more control of his or her learning process;
- Technology is used as a distance teaching and learning process mediator.

Distance education process

A distance education process is characterised by:

Physical and time separation. Distance learners and teachers are physical and timely separated from each other. Most of their communication is achieved with the help of a technological medium, today's elected medium is the Internet.

In a face-to-face scenario both the student and the teacher must be physically and timely together, in the same place and at the same moment in time.

Technology as communication mediator – In distance education environment the technology is self imposed to mediate the teaching and learning process. In face-to-face education processes the technology is not the main communication mediator.

Interaction – In distance education process, the interaction established between teacher and learners is mediated by technology. The technology assumes here a main role and if it fails, people's lack of interaction could leads to anxiety and feelings of frustration.

This kind of lack of human contact is more difficult to find in a face-to-face environment as technology does not assume the main communication role. In this situation people's relation is easier to reach than in a distance education environment.

Learning environment – In distance education environment the learner controls his or her learning. In the face-to-face education the teacher tends to centre the learning methodology on him or her self.

Distance education and face to face characteristics

This distance education environment is better understood if distinguished from the face-to-face education process. Table 3.1 provides a brief overview of such environments characteristics.

Table 3.1: Face-to-face education and distance education (Brown et al., 1993)

	<i>Face-to-face education</i>	<i>Distance education</i>
Access	Students and teacher meet at a pre-determined location	Teachers and students are physically and sometimes in time separated
Communication	Allows a simultaneous dialogue between teachers and learners.	Allows a simultaneously or at distinguished moments in time dialogues between teachers and learners, but in this case those are always mediated by technology.

(continues next page...)

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	<i>Face-to-face education</i>	<i>Distance education</i>
Interaction	Students' and teachers' feedback is immediate. Uses mainly voice and facial expression to communicate.	Students' and teachers' feedback is achieved simultaneously or at distinguished moments in time, but always mediated by technology. Today it is mainly the used text, images, video and audio to communicate.
Technology	The technology is used simultaneously in time and at the same physical location by the teachers and learners. Technology here is not crucial for the education success.	Teacher and learners use the technology as their main communication medium. It is used at distinct time and physical locations. Technology adopted here is crucial for the education success.
Didactics	Resources used are mainly delivered by the teacher through text, or verbally.	Technology is the main medium of resource delivered through text with images, video, graphic and audio attachments.
Pedagogy	The verbal mode is the most common way to transfer knowledge. It is interchanged with assessment procedures and group tasks. Teacher centred pedagogical instruction is the most common pedagogy	The written mode is the most common way to transfer knowledge. It is interchanged with assessment procedures and group tasks. Learner centred pedagogical instruction is the elected pedagogy.

3.2.2 Education theories

Distance education is included within the education context. Within it we can find three main education theories.

The three main education theories include *Behaviourism*, *Cognitivism* and *Constructivism*.

Those theories represent different point of views on the nature of knowledge and the learning process.

Behaviourism – Behaviourism theory argues that learning is determined by the surrounding environment and the human organism is adapted to it. People's behaviour is a mechanical answer that is given when subjected to external stimulus (Capitão and Lima, 2003; Mergel, 1998).

Weakness – the learner may find himself in a situation where the stimulus for the correct response does not occur, therefore the learner cannot respond.

Strength – the learner is focused on a clear goal and can respond automatically to the cues of that goal.

Cognitivism – Cognitivist theory is interested in understanding the inside of the human mind. Here learning is the process of building symbolic representations of the external reality (Capitão and Lima, 2003; Mergel, 1998).

Weakness – the learner learns a way to accomplish a task, but it may not be the best way, or suited to the learner or the situation.

Strength – the goal is to train learners to do a task the same way to enable consistency.

Constructivism – Constructivism theory claims that each person constructs knowledge and the way the construction occurs can change from person to person. The knowledge is constructed by the learner instead of being transmitted. Learning is an active and reflective process, the learner interpretation is influenced by her or his previous knowledge and the social interaction brings multiple learning perspectives. Learning requires the understanding of the whole context and not just of the isolated parts and the knowledge cannot be considered for granted as it is relative. The learner is guided from what is presently known and what is to be known (scaffolding) (Capitão and Lima, 2003; Mergel, 1998).

Weakness – in a situation where conformity is essential divergent thinking and action may cause problems.

Strength – because the learner is able to interpret multiple realities, the learner is able to deal with real life situations.

The above educational theories describe the knowledge and the learning process, and they identify which theory suits general education aims.

For Behaviourism and Cognitivism the knowledge is absolute, it exists in the outside world and is accepted as it is. The major difference between Behaviourism and Cognitivism is that Behaviourism does not advert mental activities whilst Cognitivism studies the learners' mental processes.

From the Constructivist perspective, knowledge is relative and it changes from person to person.

The first two theories describe the learning process as a passive process whilst on the other hand, the constructivism theory describes it as an active knowledge building process.

3.2.3 The communication process

In a distance education environment, technology also assumes an important role because it enables people to communicate. So to understand distance education we also need to understand the communication process and its influence on people interactions.

Greater attention must be paid to the communication process in distance education and to its effective use, as it represents an important aspect in the distance education process (Alberta, 1999; Wilson, 1996b; Wilson et al., 1993).

Communication is connected to distance education development. The use of an adequate medium for communication is vital to,

- Provide adequate and dynamic distance teaching and learning process;
- Promote interactive moments;
- Provide feedback mechanisms; and
- Develop a distance education community;

Distance education emerged in the last century and has crossed a few generations as represented in table 3.2. In its past generations went through telecommunication era, multimedia, computer and Internet which represent today's communications generation. These communications changes are associated also to the development of the teaching and learning process (Moore and Kearsley, 1996).

Accordingly, such communication process influence arises mainly from the communication, delivery method and interaction level that is enabled (Barker, 1992; Bates, 1995).

Interaction levels

The achieved interaction level in distance education can be seen from two main perspectives,

- low interaction levels
- high interaction levels.

In the past the available communication to teach and learn at a distance only permitted low interaction levels. Later on, with the communication development higher interaction was enabled.

These communication media changed the way we communicate as a society and influenced the distance teaching and learning process.

Today distance education resources bring characteristics in its communication process much closer to face-to-face education. This fact sometimes brings confusion to the understanding of the distance education process.

Granularity

Such distance education communication can be achieved from two communication perspectives *synchronously* or *asynchronously*.

Synchronous communication – Represents the communication which occurs in "real time".

Asynchronous communication – Represents the communication which occurs intermittently, not in "real time".

An asynchronous communication between teachers and learners can go from mere seconds until days. This is why an asynchronous communication can be more flexible than synchronous communication. It allows a time for reflection for the teacher and the learner and so it may lead to a more accurate information exchange.

On the other hand, there are moments where immediate communication, synchronous communication is important, especially when it is aimed to

increase in learners a deeper feeling of presence or when it is applied in a situation where it requires immediate problem resolutions.

Synchronous communication is more difficult to achieve in some contexts and the information exchange cannot be so accurate as it does not allow time for peoples' reflection.

In the end, as Moore and Kearsley (1996) remark, usually a combination of different communication tools is the most appropriate way to develop distance education, as it allows for a variation of learning styles.

3.3 Evolution and trends

Teaching and learning at a distance began 150 years ago with the communications transportation era.

Since then it experienced several stages until today's Internet generation, which represents a big change in the distance education process.

During the nineties, with the electronic era development and together with growing demands on traditional schools, the use of electronic communication has become a valuable component to provide a distance education complement in many educational systems such as schools, colleges and universities (Bates, 1995; Wilson, 1996a,b).

Information and communication technology enables distance education students to (Ng, Kwok-chi, 2000):

- A faster access to information; and
- A higher interaction level within their education environment.

These were the main characteristics to enable and make the electronic communication technology faster and more easily accepted among research educators.

At the beginning of distance education, courses or modules contents represented a copy of face-to-face courses or modules. Usually the content materials were delivered by mail and the communication was established by telephone, mail or electronic mail (Chaloupka and Kopp, 1998; Dede, 1996).

With the information and communication society growth, the Internet and the World Wide Web became the chosen medium of distribution, because:

- It enables faster information access;
- It permits a more flexible access to the learning contents (anytime/anyplace)(Dede, 1996); and
- It facilitates the use of distinct learning approaches.

But, within those, distinction must be made between what may be referred as an integrated electronic education model established to promote more interactive and effective learning in contrast to that which represents the mere transmission or the delivery of content materials (Richards, 2002).

Those features introduce a change in the traditional way we see distance education and its educational paradigms. The change enables the implementation of a distributed distance teaching and learning paradigm which will (Dede, 1996):

- Promotes the development of distance education communities through the use of synchronous and asynchronous communication;
- Permits a more free exchange of ideas and thoughts (Dede, 1996; Preece, 2000);
- Facilitates the use of constructivism methods¹ (Dede, 1996; Perkins, 1991); also
- Allows more collaborative and co-operative environments (Kumar, 1996; Lehtinen et al., 2002; Panitz, 1996).

This new distance educational model implies a reorganisation and the renewal of four fundamental concepts: the teacher's role, the learners' role and the time and space understood in such context (Chaloupka and Kopp, 1998; Wilson, 1996b).

Teacher – The teacher in this context is seen as a learner facilitator, adviser or as a learning manager.

Learner – The learner assumes his own learning methodology and learns how to use these new distance learning environments to communicate with his or her teacher, educational institution or colleagues.

¹Section 3.4.1 will provide more information regarding the constructivism learning

Space – The classroom becomes a virtual community space, its geographic localisation being irrelevant. Students now belong to a virtual group and must interact as a group.

Time – The learning resources (content and communication media) are always available.

In a distance education process the learner still assumes learning control but now the Internet and its tools are used as an educational support environment.

Nowadays, research efforts become more focused on understanding the possible ways to provide successful teaching and learning communications. These include studying new forms of integrating distinct electronic media tools into the complex process of distance education.

According to Barker (1992), today the main difference between distance education and the face-to-face education rests on the delivery method and on their interactivity level.

Electronic communication technologies made it possible to obtain distance education environments with higher levels of interaction, closer to those we used to find on face-to-face education environments (Cavanaugh, 2002; Wilson, 1996b). Closer enough to promote a sense of deceiving familiarity which sooner or later threatens the distance teaching and the learning process.

That is why it is important to understand distance education surroundings so as to be able to provide an efficient distance education process.

The face-to-face environments have decades of experience in terms of what was already seen as common sense. For most teachers and learners in online distance education such notions still need to be developed.

Similarities between online distance education and face-to-face education potentially lead to confusion and can mislead those involved.

Table 3.2 provides an overview of the communications media and distance education evolution and trends until the present day.

Table 3.2: Communications and distance education history, adapted from Capitão and Lima (2003); Moore and Kearsley (1996); Taylor (2001)

	<i>Communication medium</i>	<i>Distance education</i>	<i>Learning theories</i>
400 a.c.			Platão
1400	Press (1450)		
1700			Rousseau
1800	Telephone (1876) Photography (1888) Cinema (1895) Radio (1895)	First generation Correspondence model based on print and telephone technology.	Wundt (1880)
1900	Television (1926)	Behaviorism	Watson (1913) Skinner (1950) Bloom (1956)
		Cognitivism	Miller (1956)
1970	Video (1970)		
	Microprocessor (1971)	Second generation	
1980	IBM Personal computer (1981), PC	Multimedia model based on print, audio, video and computer-based learning technologies.	Piaget (1968)
	Graphical user Interface (1984)	Third generation Telelearning model based on telecommunications technologies (audio, tele-conferencing, video-conferencing; audio-graphic Communication, broadcast TV/radio and audio-teleconferencing).	Vygotsky (1978)

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	<i>Communication medium</i>	<i>Distance education</i>	<i>Learning theories</i>
1990	CD-ROM and Internet (1990) Web (1991) Browser (1993) Streaming media (1997)	Fourth generation Flexible education model based on online delivery via the Internet technology (Interactive multimedia online, Internet-based access to WWW resources, Computer mediated communication).	Constructivism Merging of the Cognitivism and Constructivism perspectives.
2000		Fifth generation The fifth generation of distance education. Intelligent flexible education model is essentially a derivation of the fourth generation, which aims at capitalising on the features of the Internet and the World Wide Web (Interactive multimedia online, Internet-based access to WWW resources, Computer mediated communication, using automated response systems, Campus portal access to institutional process and resources).	

3.4 Contemporary approaches

The Internet has sustained a phenomenal growth since the beginning of the decade. It can be seen as a tool used by everyone to exchange or access work or personal information.

Within it, people may solve a problem, find an answer to a question, or communicate with each other.

Nowadays the Internet represents many technological innovations. With online communication delivery via Internet, the distance teaching and learning process becomes more flexible and the human distance interactions become more accessible and easier to reach (Stanchev and Iavnov, 1997).

This use of online communication delivery via the Internet to teach and learn at a distance is referred as online distance education.

Online Distance Education – Online distance education represents the process of extending the teaching and learning process to locations away from a classroom by using online communication.

Online Distance Teaching – Online distance teaching represents the teaching process mediated by the online technology.

Online Distance Learning – Online distance learning represents a learning activity where students work on their own at home or at the office and communicate with faculty and other students via e-mail, electronic forums, videoconferencing, chat rooms, bulletin boards, instant messaging and other forms of computer-based communication.

The use of the online communication has changed the distance education process as well the way we learn or teach and the way we interact as a society.

Within it the teacher has responsibility to provide "caring, accepting, respecting, and helping social atmosphere" in the education atmosphere (Merril et al., 2003).

This naturally demands an additional challenge from the teacher point of view, as he or she has to understand the online communication infrastructure and at the same time work as skill facilitator as well as content provider, while remaining focused on his or her teacher role.

Today, distance educators face challenges with regards to the care needed to provide online distance education environments with proper education models which takes full advantage of the online communication capabilities.

Within the online distance education process the teacher stopped being seen as the centre of the knowledge and started to be seen as a coach or tutor where the main purpose is to guide the learner to achieve his or her learning goal (Anderson, 2002).

A teacher should be able to help and understand learner needs, examine their learning progress and keep learners as well as themselves highly motivated and capable of self-actualisation.

one of the most appreciated online distance teacher qualities from a student perspective is being a knowledge specialist, being friendly and approachable (Gaskell and Simpson, 2000).

The teacher is responsible to structure the information in an organised way and present it in a motivating context to the learner.

It requires that, the information presented is credible, respectable, balanced and accurate, rigorous and with appropriate depth.

Achieving a balance of comfort, control and challenges can be difficult for the distance teacher, as it depends on many variables like those related with learners social, psychological and technological virtual learning environment (Wilson, 1996b).

A qualified online distance education provides and fosters a virtual learning environment with online distance independent learners and effective communication (Wilson et al., 1993).

All material and activities present in such virtual learning environments should be consistent and with few distractions (divided into short chunks, easy to use and intuitive), as the learner tends to easily be distracted with their surrounding information environment.

Contrary to the face-to-face education it is difficult to provide a quick answer to learners doubts and therefore those have to be minimised in such environments. A poorly designed virtual learning environment² can lead to learners' doubts and that together with communication delays can lead sometimes to frustration or lack of motivation (Wilson, 1996b).

Due to the complexity of online distance education, sometimes the teacher uses the help of an instructional designer³ to design the virtual learning environment.

Today theories offer advice for pre-determined education methods, although those are only probable scenarios and are not deterministic (Capitão and Lima, 2003; Funderstanding, 2001; Perraudau, 1996).

²Further information regarding virtual learning environments will be provided on chapter 4, section 4.2.

³An instructional designer is someone who has the technological and pedagogical knowledge and should work with the teacher advising and helping him or her to design and implement the most adequate distance education methodologies (Wilson, 1996b).

3.4.1 Distance education models

Education theories are characterised also by distinct pedagogical philosophies (*traditional* and *contemporary*).

Traditional – The traditional pedagogical philosophy includes the Behavioristic and Cognitivist education models. Within the traditional pedagogical philosophy, the teacher decides what is important for the learner and designs the module with the purpose to conduct the knowledge for them. The Bloom, Gagne, or Reigeluth and Moore taxonomies are methodologies which aim the definition of the instructional purpose in a cognitive domain. Usually the Bloom taxonomy is the one elected (Capitão and Lima, 2003).

Today distance education theories tend to implement methods which allow learners to construct their learning with more personalised learning activities that includes the use of a constructive education theory.

Contemporary – The contemporary pedagogical philosophy includes the constructivist education model. Knowledge is constructed by the learner from experience. Learning is an active process in which learners construct new ideas or concepts based upon their current/past knowledge.

The teacher should try and encourage students to discover principles by themselves. The teacher and learner should engage in an active dialogue. The task of the teacher is to translate information to be learned into a format appropriate to the learner's current state of understanding.

Principles:

- Instruction must be concerned with the experiences and contexts that make the learner willing and able to learn (*readiness*).
- Instruction must be structured so that it can be easily grasped by the learner (*spiral organisation*).
- Instruction should be designed to facilitate extrapolation and or fill in the gaps (*going beyond the information given*).

The education models are theories oriented to the teaching process design, offer guidance for the most adequate methods to use in certain scenarios (Reigeluth, 1999). These education models:

- Are oriented to the content structure.
- Identify the education method who facilitates learning and in witch situation those methods should be applied.
- Can be applies differently on different situations.
- Do not guarantee results, only enlarge the probability for success.

Education models main purpose is to offer guidance for the teaching and learning practice. There is no perfect education models, they represent mere guidance, sometimes become useful to joint different methods (Reigeluth and Frick, 1999; Snelbecker, 1999).

According to Capitão and Lima (2003) these models are divided into the following categories,

Constructivist learning environments (CLE) of Jonassen – Presents a model for designing constructivist learning environments (CLEs) that emphasises the learner’s role in knowledge construction (meaning making).

Question/case/problem/project – the focus of any CLE is the question, case, problem or project that becomes the learner’s goal to resolve. The problem drives the learning, which is the fundamental difference between CLEs and objectivist instruction.

Open learning environments (OLE) of Hannafin, Land and Oliver

– As the above model is based on the learner centred apprenticeship. It promotes the constructivist acquisition of knowledge throughout the problem resolution.

The CLE of Jonassen model, the OLE of Hannafin and Land and Oliver are more indicated for a situation where the main aim is to develop a critical thinking by presenting multiple perspectives on real world problem’s resolution.

Selecting, Organising, Integration (SOI) of Mayer – Presents a moderate, individual constructivist approach to text design for learners

engaged in a non-manipulative, non-discovery constructivist learning environment. He advocates the SOI model for designing text-based instruction to enable the learner to construct their own meaningful learning outcomes. The SOI model is intended for the design of instructional messages.

S = selecting relevant information

O = organizing information in a meaningful way to the learner

I = integrating the new information with the learner's prior knowledge

The SOI model is recommended for direct instruction forms as expositive learning methods such as:

- Learning concepts, learning concept definitions, identifying critical and non critical attributes and present examples and non examples.
- Learning principles, demonstration, definition and practical principles.

It sees the learner as constructor of his or her own learning and suggests learning methods which emphasise discussion.

Problem-Centered Coaching in Instruction of Merrill – The Merrill instruction model (problem, activation, demonstration, application and integration) lead to pedagogical practices which can be used together with the above practices.

There are also social cognition theories which devotes much attention to those social factors which influence the cognitive functions. Social cognitions relate to motivation, expectations and performance (Bandura, 2002).

Attention, Relevance, Confidence and Satisfaction (ARCS) of John Keller

– The ARCS of John Keller is directed at the affective domain which promotes motivation in the learning process, with special consideration given to attention, relevancy, trust and satisfaction.

From a constructivist point of view the CLE of Jonassen model, the OLE of Hannafin model, Land and Oliver, SOI of Mayer model and

the elementary teaching instruction concepts of Merrill are the most common (Reigeluth and Frick, 1999).

3.5 Closing remarks

In the early days, distance education only allowed low levels of interaction between the teacher and the learner. Today, with online communication it is possible to achieve higher interaction levels and a faster access to global information.

With the online communication, both teacher and students may now be as far apart as needed. But a distinction must be made between an integrated education model promotes more interactive and effective virtual learning environments from those which promote mere transmission or content delivery.

After overlooking the main concepts of teaching and learning at a distance, the main idea to retain relates to the following issues:

Conceptual framework, section 3.2 Identifies the teaching and learning forms as constituent of a distance education process. Furthering, were also considered: the distance education environment elements, education theories and the distance education communication process.

Evolution and trends, section 3.3 This presents the distance education history.

Contemporary approaches, section 3.4 This addresses today's distance education tendencies.

Chapter 4

Online distance learning

4.1 Introduction

The World Wide Web represents an infrastructure with virtual world forms and shapes, new relationships, organisations and the learning communities. These online communities share common goals, ideas and thoughts, they also exchange information, support each other, create their own relations and discuss ideas.

Educators see those online communications as information resources to support learning. Inspired by them they conceive an avalanche of distance education approaches through the use of a variety of software.

The new environments brought new possibilities for educators. They improved distance education techniques and methods and today online technology enables the development of online distance learning environments, which combines the online tools with instructional design models in just a single environment.

More than ever, today's online distance learning process is seen as a collaborative and constructive learning process, where students and teacher construct and transmit their knowledge to each other. Therefore, these online learning environments besides integrating an online communication technology infrastructure, also combine human, social and cultural interactions.

Understanding that mixture of human relations with the online technology use to communicate and interact at a distance is an essential key to the development of an online distance learning environment.

The lack of an online community sense could lead people to feelings of frustration and aggressive behaviours. An online community fosters trust among its members and therefore, foster their will to co-operate (Preece, 2000). Maintaining and developing, a learning community sense could positively influence people's interactions as well as the character of the online community and their trust beliefs.

Further, this chapter 4 first illustrates the online distance learning process, giving a particular importance to developing online communities within the online distance learning process.

Section 4.2 considers the online learning infrastructure. Section 4.3.2 also addresses the importance of online learning communities and the need for co-operative and collaborative actions in the online learning process.

This chapter ends with section 4.3, where the online distance learning challenges are presented. These challenges might directly or indirectly be related to the online learning process. They enumerate the trust and performance relation within online distance learning.

4.2 Infrastructure

A distance education environment is made of interactions between teachers, learners, the education institution and communication tools and those leads to knowledge construction (Holmberg, 1995).

Today, the online communication via the Internet technology becomes a chosen medium to deliver distance education. Besides, it assembles the technological infrastructure which brings together media, tools, people, places and information into one community.

The Internet is a tool used by organisations and individuals to communicate, search and share information.

Today, those online tools are gathered instruments which facilitate the learning management and establish a parallel with the face-to-face learning metaphors, like:

- Textbooks;
- Learning activities: and
- Education methods.

This technology has developed towards providing online infrastructure tools that integrate different communication instruments in just one environment.

The distance education process through the use of online communication can be achieved in two ways:

Distributed teaching and learning Represents the uses of various electronic technologies to provide distinct teaching and learning approaches. It can also be used as a complement to face-to-face education or distance education. Represents the use of different information and technology tools to teach and learn at a distance.

Learning management system (LMS) – A learning management system integrates the online media available into one environment, where learners, teachers and administrators can interact with each other and form a virtual learning environment community (Holyfield, 2003).

However the most common way to teach and learn at a distance includes the use of a learning management system.

4.2.1 Learning management systems

A learning management systems assists teachers and learners in their learning activities and facilitates the learning process. They combine human needs and technology in a virtual environment.

Learning management systems are complemented with carefully chosen instructional tools through which learners and teachers establish their communications.

Most of the learning management systems software¹ provide an education environment which comprises reliable content management mechanisms, synchronous and asynchronous communications tools, assessment instruments, collaboration support tools and record keeping mechanisms:

Content management – Normally it is SCORM² compliant and enables structured knowledge domain modeling, usage tracking, content em-

¹Such as *Webct*, *Blackboard*, *FirstClass* or *Formare*.

²SCORM – sharable content object reference model for learning management systems content exchange which facilitates the information exchange between LMS platforms and the learning activities management (Holyfield, 2003).

bedded assessment and individual note taking. It also provides a coherent content access interface across all modules, using a tree navigation metaphor.

Synchronous and asynchronous communication – Synchronous and asynchronous communication with several interaction choices ranging from simple text to multipart video conferencing.

Collaboration support – Through embedded group work tools.

Assessment tools – Such as:

- Questionnaire and query authoring;
- Deliverables management; and
- Marking tools.

Record keeping mechanisms – From supporting a student form or record to complex and thorough academic record keeping.

An LMS thus provides the teacher and the learner, with a more usable and accessible environment, where they may interact.

The learning management systems can allow the distance learners more freedom during his or her learning process. It allow distance learners and teachers access to more open environments, where students interact with the computer and with other networked learners, Which learners can have access, anywhere and anytime, (Jones, 1996; Moore, 1993) to,

- Their learning materials;
- Their learning activities;
- Their teachers and education institution;

Distance educators use such LMS from multiple perspectives to foster learning activities. These systems are used to provide,

- A complement to face-to-face education ;
- A mix of face-to-face education with a distance learning education process; or even

- A completely distance education process.

Nowadays communication instruments facilitate the distance education process management, but technology per se does not make miracles.

It is also important to understand the human factor within the online distance education scenario. It is necessary to understand the teacher and the learner responsibility in the education process, and stop seeing the technology adoption as the main concern issue in the online distance education process (Bruck, 2000; Elliott et al., 2002; Wilson, 1997b).

Therefore, the distance education process also involves:

- People's needs and interactions;
- Educational institution's aims and values;
- Learning contents; and
- Educational methodologies.

Simply studying the development of the online communication media and the online communication improvement to provide effective distance education environments is not enough.

With those virtual instruction tools, learning can no longer be seen as a passive activity. It becomes an autonomous activity, where learners are responsible for such education processes and access and participate actively in their virtual learning environment (Richards, 2002).

4.2.2 Virtual learning environments

With the current communication infrastructure some authors even agree that people use these with the same confidence as they use a library or other face-to-face facilities (MacMahon and Luca, 2000; Ryder and Wilson, 1996; Wilson, 1996a).

But the education process is still fundamentally a human, not a technical or economic activity. The learners' autonomy and dialogue represent a potential triangle of interaction with such online media (Moore, 1993).

Within the distance learning process, people are encouraged to work and co-operate in a collaborative virtual learning environment and therefore construct their own knowledge (Brown et al., 1993; Koumpouros, 2000; Wilson, 1996b).

Educators see those learning communities and web resources as learning support. A community, sharing common goals, ideas and thoughts among their members, exchange information. Its members support each other, create their own relations and discuss their ideas.

Those communities inspired an avalanche of distance education approaches³ and the use of a variety of software.

Education approaches contemplate more the human computer interactions and people co-operative actions within a single online learning community (Kumar, 1996; Preece, 2000; Spotts, 1999).

Those online communities serve not only for socialisation, but also to meet specific learning goals and support. More than ever, distance educators see the online distance learning process as a constructive learning process built up through collaborative learning interactions (Brooks and Brooks, 1999; Brown et al., 1993; Perkins, 1991; Ryder, 2004).

With those tools it becomes easier to develop successful virtual learning environments more adapted to the education context, which facilitate the distance education process (Capitão and Lima, 2003; Moore and Kearsley, 1996).

A virtual learning environment should use an effective technological mediated environment presenting a credible, respectable, balanced and accurate, often rigorous and appropriated information depth.

According to Cavanaugh (2002) a qualified virtual learning environment depends on a clear and precise information and communication to students. Students need access to clear, complete and timely information on,

- Module requirements, technical requirements, prerequisites skills, equipment requirements, support services, financial resources, costs and admissions.
- Tuition, materials, interaction, learning expectations and learners/teacher support; it also should provide information regarding
- Qualitative feedback regarding learners performance, needs, and achievements.

Any successful distance educator understands and recognises the time and the effort necessary for planning and developing their online distance

³Some of those instructional design methodologies are addressed in chapter 3.

learning process.

An effective virtual learning environment (VLE) should offer students opportunities to interact through more than one media channel and the student should become proficient at choosing the most appropriate channel for her or his specific needs (email, chat discussion forum, listserv, or phone, audio-video conference, fax or even face-to-face meetings).

Within the online distance learning scenarios, the teacher as a coach provides and facilitates guidance, which gradually decreases as learners become more proficient. He or she also mediates, diagnoses, and scaffolds the communication and facilitates the discussion, their key role being to support the community (Preece, 2000).

This new infrastructure reimposes the use of a multidimensional problem in the distance education structure. Besides the module materials, learning activities and strategies it also regards learners needs, beliefs, feelings, culture and social interactions (Wilson, 1996b).

More than ever it is important to study and develop effective virtual learning environments and to think of issues such as isolation and the importance of social interaction on the learning context (Wesley, 2002; Wilson, 1996b).

As Preece (2000) states, the essential role of an educator is to facilitate construction of knowledge throughout experimental, contextual, and cultural methods in the real world.

4.3 Learning online

Students consider learning online important special those in higher education, some of them even showing their preference for online distance learning over the face-to-face environment (Greenspan, 2002; Sousa et al., 2004).

Although, learning online implies a need to respect and understand students' diversity and various learning styles by providing information diversity.

Even given the best plan, program, materials and students, distance educators also recognise within their virtual learning environment the influence of online mediation in the teaching and learning distance process (Alberta, 1999).

Moreover, according to Carswell (1997) and contradicting some initial

preconceived ideas, the use of the Internet as a communication medium to teach and learn at a distance has no significant effect on student's learning outcomes.

However a computer and, consequently, technology cannot be a substitute of human social interaction. It cannot substitute a friend, family or work colleagues. Computers simply cannot transmit the emotions felt with the simple act of a father telling a story to his son. The reason is due to the fact that these communication interactions come together with sub-linear, feelings and caressing messages that a computer cannot transmit (Wilson, 1997b).

That is why the computer integration in the learning community takes a long time, sometimes many years, with a continuing need for help to resisting communities members to accommodate technology into their lives. The same time as it took, for example, the car, or the telephone to be adopted in our daily lives.

As pointed out by Haythornthwaite et al. (2000) established rules of behaviour, conduct and expression that help individuals to know and understand how to behave in the online space, and how to expect others to behave take time to be accommodated.

These intrinsic social rules are the rules that help the online distance learning communities feel comfortable in their environment, allowing their members to invest time and trust in their ties with others.

As they build stronger and more intimate ties, they gain access to the kind of support and continuity that underpins each community, as people see themselves in a society (Spotts, 1999).

Nevertheless, a simple promotion of collaboration environments among the community members at a distance, is complex and challenging.

As Hudson (2002) highlights, it can be counter-productive to provide participants with simply "free-willing" communication activities within such online distance learning community environments.

This arises from the fact these possible actions can affect a persons' cross-cultural beliefs (Bandura, 2002).

It is then important to understand the online learning interactions dynamism, so to be able to provide confidence feelings to those stressed, fearful or timid individuals. They will be able, then, to take leadership roles within the virtual learning environment.

Therefore, a collaborative environment must be maintained through a well structured and goal-oriented learning environment (Soloman and Felder, 2002; Wilson, 1996b).

Things that in a face-to-face learning scenario are already intrinsic in people's minds and beliefs as learners expectations, in an online learning environment still need to be developed and formed in each culture.

Adding to that is the fact that, in an online distance education scenario, students and teacher need to receive a "dual education". They learn,

- how to use new technology; and
- how to gain experience within an online distance scenario; as well as,
- the subject matter for the program.

Those cognition's, according to Bandura (2002) can be related with peoples motivation, expectations and performances.

4.3.1 Learners expectations

People usually set goals for themselves, plan actions and foresee possible consequences of their plans before and during their course of action. Their aims are to produce their desired outcomes and avoid the undesired ones.

Those desired outcomes motivate and evaluate their self investment, and during that process they can reach positive and negative reactions on their performance, cultivate new competencies or modeling influences.

Today, communication technologies provide people with direct access to information, but within any tool they must experience sufficient success in using it and must feel the need to use it, to value their efficacy.

Promoting encouragement for the online communication use among the online learning community helps to support and establish a social context community. This provides a more effective learning, individual performance as well as sharing of knowledge and avoids feelings of disconnection and isolation (Richards, 2002; Rovai, 2002).

Online technologies now represent the bridge between the face-to-face communities and electronic communities for educators and learners, who cannot be present at the same place and sometimes in time. Those technologies provide a virtual learning environment where collaboration is a ongoing process where knowledge is constructed.

In spite of being difficult, to know exactly why students tend to drop out, Stevenson (2000) believes that learners unmet expectations regarding their teachers and their online support might be one of the factors.

Therefore it is important for a teacher to understand his or her students' needs and expectations as these can be used to help the institutions and the individuals to improve their quality of learning.

Students typically work in co-operative groups rather than individually. They tend to focus on projects that require solutions to problems rather than on instructional sequences that require learning of certain content skills (Conway, 1997; Fosnot, 1996).

Altogether, those results elucidate the increasing research need to understand factors that influence learners' and teachers' resistance to Internet technology use and which may develop and foster their online learning community.

They also help to understand the factors that could or should help distance educators get a better grasp of learning methods and help them to establish the necessary bridges between teachers and learners in their new online learning culture.

4.3.2 Online communities

The feeling of belonging to a group, feelings that permit each member to share a common knowledge, learn a common subject, or share the same aims can also be found within an online community.

According to Blanchard and Markus (2004), an online sense of community includes feelings of membership, of group influence and virtual belonging.

Those online sense of community, according to Blanchard and Markus (2004); Wilson (2001), can be fostered by the sensations of:

- Member recognition;
- Reciprocal identification of themselves and others;
- Giving and receiving support;
- Emotional attachment to the community; and
- Obligation to the community.

Although such sense of community is not uniform, it can change according to the participation level and the perceived benefits from participation. An online sense of community can be represented by a human affective response and a set of behaviours.

Moreover, for this natural social communication to happen it should include a contextual information environment with gestures, voice tone, body language... things which are difficult to transmit or achieve through online technology and which are needed in an education environment.

According to Rocha and Goni (2004), 55% of the information transmitted by a human being to another is non-verbal, where 35% is transmitted by the voice tone, and only 10% is transmitted by words or text.

The lack of those face-to-face non-verbal cues in an online communication could affect or change the way distance educators perceive and the development of peoples' online sense of community as well as their beliefs, expectations and feelings towards it. Research efforts should also focus on finding ways to provide and complement people's non-verbal cues in transmission online context (Rice, 1987, 1993).

Even at a distance, teachers should know their students on a personal level and should maintain the online community bond actively during the module fulfilment.

In the same way, learners should encourage interactions with their teacher and form an online community (Wilson, 1997a).

In the end, the understanding, planning and developing of effective communications and interactions are essential foundations to provide an online sense of presence within an online community (Blanchard and Markus, 2004; Boyd, 2002; Preece, 2000; Riegelsberger and Sasse, 2002).

Furthermore building a sense of community within an online learning environment is important for knowledge construction. An online community facilitates the discussion and solves eventual communication problems, by meeting user needs and keeping the group focused (Rovai, 2002). Successful online distance learning needs care to support and make sure that the technology fits in with core values and goals (Wilson, 1997b).

Online community

An online community is formed through a strong and identifiable need to communicate or interact with a particular community, in this case to com-

municate and interact online. The members of communities have a strong need to exchange ideas and information among them (Preece, 2000; Rheingold, 1998).

People represent the heart beat of any community although within an online community the online communication also represents a strong part in it. This is despite the belief of some that the Internet will never be a substitute of face-to-face human interactions.

According to Preece (2000) an online community nowadays does enable meaningful communication among people separated by distance, time, and to some extent by culture.

People usually form an online community for a vast number of reasons:

- To provide information support;
- To form special interest groups (Sigs) and forae; and
- To interact with each others.

People join an online community in order to:

- To buy or to exchange a product;
- To work and to establish a network connection with work colleagues;
- To learn and to teach; or
- To meet new people or to exchange ideas, for fun or even to connect with their families.

Within the virtual communities people learn how to think critically, to analyse and synthesise information, to learn how to solve problems in such variety of contexts. Such environments allow students to learn in a relatively realistic, cognitively motivating and socially enriched learning context (Leigh and MacGregor, 1992; Preece, 2000). Because those communities members share similar aims and feelings and because they are willing to co-operate, learners are enabled to learn together as a group and benefit from the shared resources, ideas and beliefs.

As a community people:

- Work with the same communication tools within it;

- Develop the necessary skills to communicate with less constraints; and
- Support each other (psychologically, technically, didactically and pedagogically...) throughout their learning and teaching activities.

Teachers and learners are supported within the online community and they foster interactions.

Overall, an online distance education community assures teachers and learners social relations, feelings, expectations, needs and motivations. This is because at a distance teachers and learners continue to need support, encouragement and opportunities to innovate. As discussed before, they need the feeling of belonging to a community with the same shared values, norms and rules.

4.3.3 Co-operation and collaboration

According to Wesley (2002), an online distance learning environment must involve people's will to co-operate. It is through those co-operative actions that teachers and learners construct their knowledge, skills, attitudes, values, sense and emotions. Therefore, there is a need to consider the social and cultural ramifications of such environments (Brooks and Brooks, 1999; Brown et al., 1993; Perkins, 1991; Ryder, 2004).

Interest in the concepts of collaboration and co-operation can be traced back to the 1970s and earlier and gain particular emphasis in the late 1980s. According to Moran and Ian (1993) these issues cover vast areas and those are difficult to understand even in the simplest forms.

Co-operation. A co-operative learning environment represents the learner and teacher acting to work together, to joint efforts towards one same end.

Collaboration. A collaborative learning environment represents a learning structure where students work in groups, mutually searching for understandings, solutions, meanings or creating a product.

Collaboration represents the mutual engagement of participants in coordinating efforts to solve a problem together, and co-operation represents the division of labor among the participants (Lehtinen et al., 2002).

Within a virtual learning environment, such factors represent a process where learners may work together and support each other and use a variety of tools and information resources in the pursuit of learning goals and problem-solving activities (Keith et al., 1993).

Collaborative virtual learning environments consider instruction as an environment and give emphasis to the "place" or "space" where learning occurs. These represent communities of learners who work together on projects and learning agendas, supporting and learning from one another, as well as from the physical environment (Wilson, 1996b).

On the other hand, at a distance or face-to-face people's interactions need people to undertake co-operative actions. This constant interaction amidst the community members seems to create a more motivating environment than an isolating one (Moore and Thompson, 1997; Preece, 2000).

Healthy online communication integrates a community that works together for some purpose and that provokes synergy to foster and construct a healthy learning environment. Otherwise, according to Lehtinen et al. (2002) an unhealthy online community that does not trust each other to co-operate, will not fulfil their needs and that could damage their learning or their working achievements.

People's co-operative interactions lead to a richer online distance learning process with more collaborative and realistic learning social context (Hedestig, 2004; Lehtinen et al., 2002; Moran and Ian, 1993).

According to Hudson (2002), collaboration represents a genuine interdependence involving a shared sense of purpose, a division of labor and joint activity opened for examination, elaboration and change by all within the peer group. So, the underlying premise of collaborative virtual learning environments is based upon consensus building up through group co-operation (Panitz, 1996).

Therefore, people's co-operative actions among their members lead to constructivist learning environments. A constructivist learning environment is an environment where learners work together and support each other and use a variety of tools and information resources to pursue a learning goal or solve a problem (Leigh and MacGregor, 1992).

People's successful relations are achieved by providing a collaborative virtual learning environment with the necessary mechanisms, resources, guidance, feedback and support (Brooks and Brooks, 1999; Fosnot, 1996; Kumar,

1996; Oliver, 1999; Perraudeau, 1996; Ryder, 2004; Ryder and Wilson, 1996).

4.4 Closing remarks

Today, online infrastructures reimpose the use of a multidimensional problem in distance education structure, besides the module materials, learning activities and strategies. Regards also need to be given to learners' needs, beliefs, feelings, culture and social interactions.

Online communication can enable users to a simpler virtual learning environment with higher interactions where learners' autonomy and dialogue represent a potential triangle of human interaction through such online instructional tools.

It is then important to plan and develop an effective virtual learning environment to promote a community sense, avoiding isolating feelings, meeting expectations and promoting and facilitating interaction and accommodating individual and group differences.

An online community is developed through a strong and identifiable need to communicate, interact and exchange information.

In those communities, together with the online communication tools, people represent the heart beat of the community. They provide and develop virtual learning environments which allow students to learn in a relatively realistic, cognitively motivating and social enriching learning context.

Within it a new distance education model promotes people's online collaboration and co-operative behaviours amidst the online learning communities that have emerged.

The previous sections consider some important aspects of the online distance learning process.

Infrastructure, section 4.2 focuses on the online distance learning communication infrastructure and addresses the influence in the learners' knowledge construction. It also evaluates the influence of online tool use to exchange people's ideas and thoughts, feelings, beliefs and needs.

Learning online, section 4.3 begins by addressing learners' needs, expectations, feelings regarding the online distance learning process and then presents the online community concept and focuses on the human relations fostered by the continuous use of online communications

mechanisms to communicate.

It describes the importance of the online distance learning community development to provide effective learning.

It also addresses the importance of fostering collaborative virtual learning environments and people's co-operative behaviours within the online communities to improve their learning and work achievements and construct their knowledge.

Chapter 5

Trust and performance

5.1 Introduction

Trust is a key to create positive relationships in various settings.

Trust is the central key to a human relation, it is the glue that holds most co-operative relations together.

Within an online distance learning scenario trust may be perceived as a trade between individuals and between people and the technology.

Trust is present in so many moments in our life that we sometime consider it unconsciously. Although, consciously or unconsciously of their existence trust represents an important key of our day life relationships.

Trust contemplates a complex two way interrelationship between the individuals who are constituent of a society. To establish a trustful relation implies peoples' permissions to share knowledge, sharing delegation and co-operative actions. A true relationship depends on mutual trust between partners.

To understand trust and its influence inside a human relationship is an important issue, as well as understanding its implications and importance inside a social community of learners, workers, partners, or friends. Such understanding becomes more important, specially when those relationships are made online.

In a virtual learning environment providing an adequate online technology and a careful learning design per se does not ensure success. It also implies an online trustful environment with people willing to interact and work in a collaborative environment, to be successful.

This chapter provides an overview on trust and describes its relation with the online distance learning process. It also explains the importance of using effective performance assessment measures when teaching and learning at a distance.

Section 5.2, defines trust and emphasises its influence and importance as a human social phenomena within the online learning environment.

Finally, section 5.3 defines the learning performance objectives and the use of proper assessment techniques to evaluate and maintain effective online distance learning processes.

5.2 Trust

Everyday, and often without any reflection, we place our trust in people and in services those people provide: we trust our friends will not betray our confidence, that our food will not be poison, we trust our teacher and parents to tell us the truth and teach us well, trust our country, hope that people listen to us. The list is practically endless and staggeringly broad. For the most part, the trust we place in others and the actions we take are largely unreflective.

However, there are occasions when our evaluation is broken or is weakened and in which we have to give more thought to evaluating the risk of some trust assignment.

Trust is a complex phenomena, thus defining its key elements and attributes in "single static" definition is not possible because of trust dynamic characteristics.

People's trust relations change through time. In the earlier stage of the relation it assumes a cognitive level and then during the relationship development it assumes a "mature" stage, during which it crosses to the emotional level (Lewicki and Bunker, 1996).

Cognitive level of trust – people's cognitive level of trust is assumed at the beginning of the relationship.

Emotional level of trust – people's emotional level of trust is assumed later, when the relation becomes stronger.

Trust reaches the cognitive level during the beginning of the relationship. This period is when building trustful feelings becomes more important, as it

is the moment in time that trust is more fragile. Later the during emotional level of trust occurs when the relationship becomes stronger.

After gaining people's trust, violating that trust is dangerous, especially, if it occurs in the beginning of the relationship because it can have a future impact on the relationship.

Distrust feeling. Feelings of distrust inside of a relationship, either implicit or explicit, can lead or motivate thoughts and emotions of revenge and become very difficult to be repaired (Tyler and Degoe, 1996).

Repairing that trust bond afterwards is difficult because recovering the trust betrayed is a bilateral process and requires both people's willingness.

It is then important to understand people's interactions to be able to understand their trust, as well as understand their implications and their importance inside a social community of learners, workers, partners, or just within a group of friends.

That understanding becomes more important, when those relationships are formed online. Because people's online relations can be developed without frontiers, *i.e.*, within an online environment peoples' relations cross cultures and peoples' beliefs, they are shaped within distinct social values and context.

To sum up, trust is represented in so many moments in our daily life that we sometimes consider it unconsciously. Although, consciously or unconsciously of their existence, trust represents an important key of our relationships. Trust is somewhat difficult to define or difficult to develop, maintain or measure. Studying the trust effect on the individuals' and organisations' affordances online is important as it might be the case of success or failure (Weinstein, 2005).

5.2.1 Basic concepts

To establish trust implies at least the development of a relationship between one person or an organisation, or a tool, or a process (a *trustor*) and another person (the *trustee*) (Giddens, 1991).

Trustor – The person, organisation, tool or object who or which is trusted.

Trustee – one who trusts another person, organisation, tool, or process.

Usually, the trustee is a person who is willing to ascribe an intention, a motivation, an interest or a goal to another person or another object (website, a server, a group, a society, an institution) (Preece, 2000).

Further, after that trust bond is established it needs to be maintained as trust floats and changes throughout time; it is a dynamic condition. Trust definition is complex, due to its dynamic nature and it is a constant engaged within the human relation development.

As pointed out by Hawthorn (1998) trust is founded on peoples' beliefs, on mutual self-interest and in functional interdependence.

That may be the reason for the lack of consensus among authors regarding trust definition and their degree of influence. Even so, most authors agree that trust is a key to providing positive interpersonal relationships in various settings (Lewicki and Bunker, 1996; McKnight and Chervany, 1996).

To Lewicki and Bunker (1996) trust is the central key to a human relation. It is the glue that holds most co-operative relationships together. Hence, a major violation of trust is not a simple isolated interpersonal event; rather, it is a significant event that is likely to have impact on the parties and on the relationship.

5.2.2 Social phenomena

Trust is a concept which receives attention in social science literature: psychology (Giddens, 1991), sociology (Hawthorn, 1998), political science (Luhmann, 1998), economics (Dasgupta, 1998; Gellner, 1998), anthropology, history, socio-biology (Batenson, 1998), computer science (Castelfranchi and Falcone, 2001; Shneiderman, 2000) and education (Tschannen-Moran, 2001).

Trust is a central key to people's interaction and how we form a relation (social interaction), at distance or face-to-face. Trust is an important element in,

- providing effective social human relations;
- creating, developing and maintaining working, organisational, or net-working relationships; and in
- developing economic relations, or in the marketing exchange; also is an important element in

- creating, developing and maintaining a school environment, as well as an online distance education environment.

Overall, trust can be seen from two main perspectives,

- there are those researchers who think of trust as an important milestone for forming an organisational life, to facilitate economic transactions or as a political influence as Bachrach and Gambetta (2001); Kramer and Tyler (1996); Meyerson et al. (1996); Roderick et al. (1996); Tschannen-Moran (2003);
- there are others who see the trust influence in developing effective co-operation and communication relationships among people, as Gameta (1998); Lewicki and Bunker (1995); Tschannen-Moran (2001); Tschannen-Moran and Hoy (1998).

So, as cited above trust is a social and psychological phenomena where a person may have trust in an occurrence if he or she expects such leads to a behavior. Moreover, in cases where that trust bond occurs it can provoke positive motivations and if not it can provoke negative motivations.

To understand people's trust we need to understand also their surrounding environment, as those trust fluctuations depend on social context¹.

Trust as a social phenomena contemplates a complex two way relationship between the individuals who are constituents of a society (Good, 1998). Trust is a key element in forming peoples' interactions and these need to be established and maintained.

5.2.3 Online communities

The question to be addressed is:

"How will the rapid technological evolution of the internet as a medium for social intercourse and commerce forces us to alter our definition and context for trust." (Merill, 1999)

Many authors² agree that the clear understanding of trust elements and how it can be built and developed in a human social environment is not

¹People's social external and internal conditions.

²As those cited above.

only a benefit for each individual, but also can be an important element for structured groups or a community and a society.

Trust demands co-operation and interdependence and has been recognised as the most efficient mechanism for the community development (Elofson, 2001). Trust is also important in developing computer supported co-operative and collaborative work among those online distance learning communities and consequently those co-operative actions will be able to nurture successful online social interaction (Castelfranchi and Falcone, 2001; Falcone et al., 2001; Preece, 2000; Wilson, 1997a).

To establish a trustful relation implies people's permissions, sharing knowledge and co-operative actions. Likewise, a pure relationship depends on mutual trust between partners.

Trust also represents the expectation that arises within a community. Such community must share feelings of honesty, and co-operative behaviors, those based on common shared norms and cultural beliefs (Shneiderman, 2000).

Trust relies on confidence in relationships between two or more persons or between an occurrence (Giddens, 1991).

Although, as said before, trusting someone is a risk, a risk to interact and believe in another person or object. And developing these trust bonds within an online community can become a even bigger risk.

Trust and peoples' past experiences

People's trust is based on her or his previous experiences and group initial contact (Elofson, 2001).

Such trust when formed in an online community is developed at a distance using young and unstable communication tools and within a recent social environment.

According to Giddens (1991), when people approach to a new experience, what they try to do is to apply rules that have governed in previous similar experiences to gain their trust in an occurrence or in a person.

Thus, in an online distance learning scenario, people will use their past experiences, in this case their face-to-face education experience to establish their trust bond in a person or in a occurrence, and if those past hopes are not fulfilled people tend to be less motivated to trust (Good, 1998).

As refereed before in chapter 3, section 3.3 online education settings

bring characteristics closer to those found in face-to-face education settings, closer enough to promote a sense of deceptive familiarity which sooner or later threatens the distance education process.

Therefore, people's past influenced and beliefs can be influenced by their trust in the online education environment, and those trust beliefs can lead them to frustration feelings or lack of motivation if their trust expectations are not meet.

The trust development inside an online community is a valuable resource to their members, as it will help to support and build relationships within it, as those online social interactions come surrounded with the ideas of trust, loyalty, and recognition (Bies and Tripp, 1996; Falcone and Castelfranchi, 2001; Lewicki and Bunker, 1996).

Information and communication technology concerns the organizations of interactions between computers, between humans, and between humans and computers³. Naturally, this interest in the interactions characterisation has been brought to the trust concept (Jones and Firozabadi, 2001).

But, building trust in such environments represents a higher risk as peoples' interactions and social communications cannot be achieved when encountering communication difficulties (Bachrach and Gambetta, 2001).

The computer mediated communications technologies are not yet sophisticated enough to inspire trust in users. As pointed out by Nathan et al. (2002) it can be more difficult to develop trust in an online setting than a face-to-face one and consequently, it may be harder to trust an institution or a teacher that we cannot see or touch, than a teacher we can find in the corridors, see and get to know in real life as we normally understand it.

Within an online distance learning scenario, trust may be perceived as a trade between individuals and between people and technology. My interest here is to study and understand student's trust and performance relations in such scenarios.

Rocco (1998) believed as well that co-operation and trust relations in an electronic context, are possible, although they are weaker than in a face-to-face co-operation. As here most of human non verbal cues are not transmitted and humans can more easily omit their personality.

³Known as Human Computer Interaction research area.

Rocco (1998) even proposes a punctual face-to-face meeting to increase trust, as trust is the prerequisite for collaborative task success, and trusting someone at a distance involves risks between those individuals.

Therefore, the development of trust amidst such online communities can foster peoples' online interaction relations and consequently lead to people's online co-operative behaviours (Gameta, 1998; Good, 1998).

It is through those online community collaborative environments that people acquire their knowledge and skills.

Thus, there is a need to understand how online information and communications technologies have influenced and modified people's trust beliefs, expectations and motivations and their social interactions (Castelfranchi and Falcone, 2001).

Right now, the trust phenomena research in the online information and communications technologies can be seen from two main approaches, from those who study and understand the online trust development:

- As a technological social phenomenon. In these approach new technological infrastructures are studied and developed to foster and maintain trust among their users (Boyd, 2002; Eloffson, 2001; Grandison and Sloman, 2000; Jones and Firozabadi, 2001); or
- As a human social phenomenon, based on human social and psychological relations. These, research studies regard new ways of using different online technologies to foster online trustful relations among the online community members or among online technology users (Castelfranchi, 2001; Castelfranchi and Pedone, 2002; Jarvenpaa and Leidner, 1998; Shneiderman, 2000).

It is important to recreate trust within an online distance learning environment as a new area of study, and do the re-conceptualization of the trust problem within those social computer mediated communications.

There is a need to study more these new social traditions applied then into the online electronic environments and online learning communities (Castelfranchi and Pedone, 2002; Shneiderman, 2000; Wilson, 1997a).

The same applies to trust cognitive and affective trust components and their integration in a computer mediated technology environment. Such phenomena are considered important in a face-to-face social interaction but so

little studied when in online learning communities (Gameta, 1998; Giddens, 1991; Lewicki and Bunker, 1995).

Just studying trust within the information and communication technology system security per se is not enough to foster and maintain trustful relationships. It is also important to address the social and physiological interconnectedness of trust with the online communication technology. Those new technologies have deeply modified our social relations traditional forms (Castelfranchi and Pedone, 2002).

This kind of language – trust, relationship, forgiveness – is difficult to find when referring to online distance education scenarios. Few refer to the interconnectedness of the technology and the human social interaction, specially when on the online distance learning case focused.

5.2.4 Online distance learning

The increased omnipresence of network technologies are the preceptor of new social problems and uncertainties. As referred before, there is a need to study the possible interference of a computer computer-mediated communication with a human computer interaction relation and the online human relations.

There is a relevant difference between trust online and in offline contexts (Castelfranchi, 2001). As said before in an online context users hardly make eye or gestual contact with their partners. Such online distance communication if not well cared for, implies a lack of dimensions of: character, personality, nature of the relationship, institutional values, familiarity, sharing of system values, gender, age, role, social status, occupation or body language... those which we normally rely on to form attitudes or base decisions of trust.

New trust sights and new legal and social rules are necessary for building trust in the information communication technology societies. And more research need to be conducted to validate the relationship between users' online trust experienced feelings and beliefs, specially within online distance learning networks.

Castelfranchi and Falcone (2001) also reinforces the need to define trust roles and behavior in those online societies, as, things so easily traceable in face-to-face interactions could represent obstacles to the online trust. Thereby it becomes important to establish the learners' trust emotions and

relations development within an online learning environment (Lewicki and Bunker, 1996).

For a virtual learning environment to prosper within those network technologies, learners must be willing to use the learning resources and to engage in a online interaction with their teacher or colleagues in a order to support their own learning ⁴.

Within the online learning environment they need to have more control over the story line, the flow, the content, and the meaning of the text. They become more self-learners, control more of their surrounding environment and participate more in flexible conversations and discussions, reducing the gap between student and teacher⁵.

According to Garton et al. (1997) to develop effective co-operative actions among learners is important within an online community.

For a learner the decision to attend an online distance learning module is not easy to make. He or she faces the risk of losing time, money, effort or just failure and those risk decisions could affect their ability to trust, therefore affecting their learning achievements.

He or she has to face the risk of trusting an institution or a teacher to be able to fulfil their expectations. If those expectations and beliefs are not fulfilled he or she could feels unmotivated and tends to not co-operate and this could lead to lower performance. As Worchel (1979) stated the potential cost of making a bad trust bond has become drastically higher, than the cost of not offering trust.

Under such conditions, learners' trust motivations should become at least as important as learners' technical skills, knowledge, cultural, social, psychological and information processing factors.

Learners trust motivations

Motivation is a complex concept, closely aligned with the will to learn, and encompassing feelings of self-esteem, self efficacy, effort, self regulation, locus of control and goal orientation. The psychological feature provides incentive for a person to act, to believe or expect.

⁴For further information, see chapter 4

⁵Further information regarding face-to-face education and distance education is available in chapter 3

Motivation is the driving force (desire) behind all actions of an organism and is the reason for the action.

Students' motivation can be regarded as intrinsic or extrinsic (Newstead and Hoskins, 1999).

Intrinsic motivation. An intrinsically motivated student is the student who enjoys the challenge of learning.

Extrinsic motivation. An extrinsically motivated student is the student who is concerned with his or her grades. It implies a means to an end, as a graduate student to be approved in their academic year.

Both motivations can be seen in a group of students with the same goal. Thus, their achievement motivations are difficult to measure.

Students achievement motivation can be measured as higher or lower strength. A lower strength motivated student or an unmotivated student is a student who for some reason:

- Does not understand his or her main purpose,
- See himself or herself as incompetent,
- Or feel that he or she has little control of the surrounding environment.

According to Stevenson (2000) these two "motivating" feelings can be easily found in an online distance learning environment.

A student becomes demotivated towards their learning goals when the online distance education approach does not satisfy students' expectations or beliefs, or when the online distance student feels that,

- He or she does not understand because of failures in communications within the online learning environment;
- Difficulties in use of the communication technology available *i.e.*, learners technology phobia, or
- He or she is lost within the virtual learning environment because it is not well planned and clearly structured for the students.

To provide higher motivated students it is necessary to develop ways to foster trustful relationships among online learning communities.

This collaboration enables teachers to follow more effectively students learning needs and expectations within online learning scenarios. Instructional designers, teachers and learners are most effective when they participate within a community where there is cultural and experiences exchange (such collaboration among them leads to learning) (Williams, 2003; Wilson, 1996a; Wilson et al., 1993).

Therefore, learners' outcome depend heavily on trust, because learner trust beliefs in their learning environment provide students' co-operative behaviours and therefore enable them to engage in a constructive learning environment⁶.

Online learning processes, as performed nowadays, gives a strong emphasis on learners, as opposed to teacher in a face-to-face scenario. Learners here are expected to be self-motivated, self-guided, and self-regulating. Students must comprehend their achievement and request assistance when needed. Online communication tools should provide the engagement and encourage students' learning performance (Williams, 2003).

5.2.5 Co-operation and collaboration

It is agreed that the productivity and adaptability of schools can be enhanced by creating structures that facilitate collaboration among teachers and learners providing them to reflect critically on their own teaching practice.

Trust is seen an important element in providing co-operation actions and therefore enabling the development of collaborative environments among humans in learning communities (Tschannen-Moran, 2001).

Trust in a school setting is an important element. Teachers need to trust their colleagues as well as their principals to co-operate to perform effectively and successfully inside their school scenario. The same happens within teacher and students relationships. Students need to trust their teacher and their competencies to learn effectively (Tschannen-Moran, 2001; Tschannen-Moran and Hoy, 1998).

⁶Further information regarding online constructive learning environment is available chapter 4

A positive school climate has to regard trust, behaviours, feelings and security among the school community, or learning community, to make differential impacts on the quality of peoples performance.

Accordingly, any co-operative environments need to have trust, as without a trust relation those environments tend to inhibit the level of collaboration that goes on⁷ (Castelfranchi and Pedone, 2002). An atmosphere of trust can improve group effectiveness, communication, organizational citizenships and achievement (Gameta, 1998).

Constructivist learning requires more preparation from the students, teachers, and schools, and more cultivated sense of trust and belonging within schools groups (Wilson, 2001). Many online instructors have learned that their classes will rise or fall depending on the strong sense of trust, good will, and connectedness among participants.

Therefore, trust in school community represents an important element of organisational life. In such a complex structure as the online distance learning environment, trust relationships represent part of peoples' social online organisational life, that is waiting to be studied.

The following section 5.3 describes the main performance related issues and establishes the relation with the online distance education process.

5.3 Performance

An assessment process intends to reveal what students understand, know and can do. Measuring a performance enables the identification of students learning outcomes, based on collected evidence and judgments according to established assessment criteria and based on various assessment techniques.

Assessment – assessment regards the process of collecting information, on student achievements and performance. A balanced assessment includes a variety of assessment tasks. Ongoing diagnostic assessment provides information instruction and improves student performance (Consortium, 2003).

Performance – student's performance relates to a list of students skills and cognitions that students should acquire throughout their learning

⁷For further information regarding co-operation and collaboration see chapter 4, in subsection 4.3.2

process, those enable him or her to do or act according to learning performance aims previously determined (Organization, 2002).

According to Palmer and Crain (2001) the performance assessment has three basic components,

- The learning performance,
- The established criteria *i.e.*, performance objectives, and
- The observer' judgments and feedback to be communicated.

By observing a student during such assessment, the teacher can see how a student learns and use the result of that assessment to guide the learner and to change if necessary the teaching methods to a more effective use of teaching practises. But, assessment is not only to infer what students have learned or can do, it also can help students explain, demonstrate, apply and or reflect upon what they have learned.

The power of assessment lies in the ability to incorporate these three components into the dynamic learning and teaching process. The challenge here remains to develop and implement precise and adequate performance assessment criteria, as assessment is a dynamic and ongoing process within the learning process (Palmer and Crain, 2001).

Consequently a good performance assessment combine these forms of knowing, enable understanding of what students know and do not know, is about measuring possible students learning misunderstandings and provides more effective learning.

Hence, performance assessment criteria must be well-constructed and defined within online distance learning, because they will help to evaluate and validate student learning effectiveness. These rarely involves just one method, because those choices have to satisfy all educational purposes (Alberta, 1999).

Moreover, the choice of which assessment methods to use for effective learning can determine the success or not of an online distance learning environment, because those assessment results are based on teacher or instructor judgements and evaluation of learners' progress.

In relation to assessment methods two important points have to be considered.

Firstly, provide an assessment method to diagnose students at the beginning and during the lessons to acknowledge what learners already know, to help the teacher realise the strengths and weakness of the learners and suggest ways to modify the learning activities, accordingly.

Those can be achieved by performing various assessment methods related to various aspects of the initial performance objectives (Palmer and Crain, 2001).

Secondly, to clearly define tasks and well structured assessment performance measures, alert students that those are important for measuring their performance. As assessment may explicitly be used to guide students in their study (Wakeford, 1999).

In conclusion,

- Focus first on learning, second on encouraging effort and third on grading;
- Give as much feedback as possible to the student, *i.e.*, never assess without giving comments about how they might improve;
- Assess during learning and at the end, set realistic tasks problems, reward integration and application;
- Learn from students, discover their misunderstandings, then modify the teaching to address them;
- Get students to participate in the assessment process throughout:
 - Discussing appropriate methods and how the methods relate to course goals.
 - Using self and peer assessment activities.
 - Offering choice among different methods.
- Do everything possible to listen the anxiety raised by assessment, give lucid and frequent messages; and
- Reduce the competitive aspects of assessment between students.

In summary, the choice of performance assessment methods must be conditioned to the online distance learning performance objectives, as well as informing student learning progress and providing feedback throughout.

Today, online technology allows access to areas of human cognition and performance not possible to consider within paper based techniques.

Similarly, technology has changed not only the way we do assessment but our objectives and expectations for assessment (Fry et al., 1999; Gitomer and Bennett, 2003; Means and Haertel, 2003).

Understanding learners performance within such environments will also help the teacher or instructor to understand learners' expectations.

An assessment technique with the necessary feedback to support and guide students throughout their learning forms an important part of an online distance learning design.

5.3.1 Assessment fundamentals

According to Cotton (1995) student assessment should be:

- valid;
- reliable;
- practicable;
- fair; and
- useful to students.

The primary purpose of assessment and evaluation is to improve students learning. With the information gathered from assessment techniques, we can determine student' strengths and weakness, and be guided on the adoption of the student's needs and instructional approaches, which can lead us to greater effectiveness of classroom practices (Organization, 2002).

Assessment makes it possible to compare the performance of students and to identify patterns of strength and weakness in the students' instruction.

Basically, there are two main kinds or modes of assessment. Assessment may be seen as informal and formative within the teaching process, or as summative, involving formal decisions about progress and level of achievement (Wakeford, 1999).

Formative assessments. Assessments which are carried out during the course. Their main goal is to provide the learners with feedback on how they are doing and to help them to learn better. They do not normally count towards a final grade or mark nor are used to determine whether the student will be allowed to progress to a later stage of a course (Boston, 2002); and

Summative assessments. Assessments which are normally completed at the end of a course or module to establish or measure learners' performance achievements. These differs from formative assessment in that they generally do count towards a final grade or mark, or may determine whether the student is allowed to make progress through the course (Organization, 2002).

An assessment technique can be norm-referenced, criterion-referenced and ipsative assessment.

Norm-referenced assessment. This is also known as relative assessment as it is based on comparing the relative performances of students, either by comparing the performances of individual students within the group being assessed, or by comparing their performance with that of others with some similar characteristics.

Criterion-referenced assessment. Also known as standard-referenced assessment which generally involves determining whether the student can perform, to a set of minimum standard, a specific set of tasks or activities within a particular situation or context.

Finally,

Ipsative assessment. This is about the comparison of the students' performance with their own earlier performance.

One final assessment procedure distinction to consider is that between terminal assessment and continuous assessment. Before concluding this short elaboration on student performance assessment, it should also be noted that assessment procedures may be implemented in several ways. Common assessment procedures include:

- objective tests;

- short-answer tests;
- extended-answer tests;
- practical tests;
- situational assessment;
- assignments;
- projects; and
- portfolios.

Some of these assessment procedures can be carried out as closed-book or open-book assessment and all can be performed by external examiners, teachers, and peers and by the students themselves, see (Fry et al., 1999).

A classroom assessment should represent the day-to-day teaching and learning that takes place in the classroom (Organization, 2002). Also, assessment should provide regular ongoing feedback regarding students' progression in the classroom performance objectives (Thomas and Cross, 1993). Those issues must be clearly defined to measure students' achievement and provide an effective communication between teacher and student.

Assessment ideally should be part of the learning process and should be a real world performance with relevance to the student and learning community. Assessment is connected with learners as Black and William (1998) highlight, when classroom assessment combined with constructive feedback to the student, carried out, effectively raises student achievements.

Further the next section will examine the relation between learners' performance and feedback within an online distance learning environment.

5.3.2 Providing feedback

An effective performance assessment actually reflects the same combination of an individuals' abilities, achievements, skills and potential and ideally it permits predictions about future behaviors (Wakeford, 1999).

According to Ramsden (1992), assessment plays a key role in determining the quality of student learning and is considered something that follows learning. But, unfortunately assessment is often regarded as an addition

to teaching rather than an essential part of it, reporting only a student's achievement based on a mark or grade.

The main purpose of assessment besides measuring student performance at the end of instruction is to provide online distance learners with helpful feedback on how they are doing and clear guidance of assessment expectations. For students this is the principal means to reinforce students autonomy.

Moreover this also serves to help the teacher to adjust or change teaching methodology to help learners achieve the initial performance objectives. Therefore, such assessment methods must be carefully understood to be effectively adopted in the online distance learning process.

In a classroom the teacher make assessments of their students' learning every day, as for example observing the way students make use of material provided for task oriented learning (National Academy of Sciences, 2003).

For these, feedback is important as it gives the necessary cues to guide the teacher and learners to improve their learning performance (Gitomer and Bennett, 2003; Juwah et al., 2004; National Academy of Sciences, 2003). This is specially so within an online learning environment where some classroom transmitted cues are diminished because of the online communication medium.

Such feedback also helps teachers or instructors remain vigilant and aware of students' learning performance, helping them to ensure that such an online learning environment includes proper support, guidance, and rich resources and tools.

Providing feedback in relation to students' performance enables them to restructure their understanding and skills and to build more powerful ideas and capabilities.

Such feedback practice:

- Facilitates the development of self-assessment (reflection) in learning;
- Encourages teacher and peer dialogue around learning;
- Helps clarify what good performance is (goals, criteria, expected standards);
- Provides opportunities to close the gap between current and desired performance;

- Delivers high quality information to students about their learning;
- Encourages positive motivational beliefs and self-esteem; and,
- Provides information to teachers that can be used to help shape the teaching.

Learners need a constant monitoring in order to provide the necessary learning progress feedback. It is through such feedback that teacher and learners identify their learning performance progress and therefore can adjust their learning to their performance objectives. The feedback also helps teachers identify students misconceptions and modify their instruction according to student learning aims or expectations Juwah et al. (2004).

Online communication technology is also a valuable aid in supporting practice as well as providing assessment information for teachers (Jones and Behrens, 2003). However, many online distance education causes fail due to underestimate the consequences of using these new online communication technologies and the need to accommodate, to respond to and serve learners needs and provide proper support, guidance, and rich resources and tools.

In a face-to-face scenario learning can be more top-down, hierarchical, and formal. Here teachers can assume more control of the learning methodology and are more easily alerted to eventual demotivating, students deviations – most of the time based on the unconscious non verbal feedback cues given by the students in relation to their learning achievements and frustrations.

On the other hand in online learning scenarios, it is the learner who assumes most of his or her learning methodology. Because of the nature of their communications, mediated by online technology, the online distance teacher perceives learners demotivating and feelings differently.

Accordingly a virtual learning environment has to be carefully designed to be able to meet students' expectations, as learners can easily get unmotivated feelings, or be frustrated in ways that could affect their performance.

Therefore, online learning effectiveness largely rests upon on the decision and teacher's willingness to accommodate students' needs, to facilitate effective communication among them and their perception of the surrounding social context, as was refereed in chapter 4.

Many online distance learning environments fail because designers and teachers neglect these changes in roles and expect learners to just use the

technology without analysing learner expectations and without designing ways to support them in their new roles and activities (Cavanaugh, 2002; Wilson, 1997a,b).

In an online distance learning environment, both teacher and students depend upon each other to learn. Therefore, a healthy respect for varied contexts of use will result in learning performance effectiveness, with more flexible, modular, and accessible online distance learning resources.

A mutual response dialogue between teachers and students, or between learning resources and users of those resources should end in collaboration among them.

To sum up as said before, such conversation among them represents an exchange of ideas and thoughts, based on a relationship with a particular history of trust, varied motives, mistakes, and forgiveness. These only can be achieved through an effective online learning community development.

5.4 Closing remarks

Within an online distance learning scenario trust may be perceived as a trade between individuals and between people and technology. It helps to foster an online community where people are willing to communicate, interact, co-operate and support each other as a community.

This chapter emphasises the importance of trust within the online learning process. It also emphasises the need to use effective online learning performance to be able to cope with learners needs and expectations and to provide the necessary support and guidance to learners.

Trust, section 5.2 defined trust and describes its importance within online distance learning environment. It also stressed the importance of providing co-operative actions among online learning community members to provide effective online distance learning environments.

Performance, section 5.3 considers the importance of using adequate performance assessment techniques to provide learners with an effective learning environment.

Chapter 6

Related work

6.1 Introduction

An online distance learning student and a face-to-face student act differently in each case scenario.

If an online distance learning community is not well supported and people do not experience sufficient success in using it, or value their efficacy in its use to communicate, or interact, or to learn, this can lead to anxiety emotions and to a lack of trust in and motivation towards it.

Providing an effective virtual learning environment just by studying the learning methodologies and by understanding the online technologies, is not enough per se.

Distance learners need to be reassured emotionally, need feedback, need to trust in the system, to trust in their teacher or instructor, in the education institution, in the support given, the content provided, in the available communication, the technology provide and in their surrounding environment.

Learners have to feel inside a community, to feel part of it, sharing similar aims and goals, as they build up stronger ties within an online distance learning community. Once belonging to the community, they gain access to the kind of support and continuity they need, moving from an individual position to membership in a known learning community.

This chapter provides a related overview on online distance learning, trust and performance.

Section 6.2 addresses research evidence on online communication media,

people's expectations and the online community influence on the success of the online learning process.

Further, in this chapter, section 6.3 presents related evidence regarding student trust attitudes, students beliefs and their performance within the online learning process.

6.2 Online distance learning

According to Martine and Freeman (1999), the use of different online communication media has proved to be successful for delivering materials and maintaining appropriate communication with students and among students.

The use of multiple communication media to provide online distance learning is an effective resource. According to Martine and Freeman (1999) online communication is an adequate media to exchange instructional content information and maintain appropriate contact with students.

However, to Merrill et al. (2003), in an online learning environment the lack of personal contact decreases the personal dimension and the online learning quality.

According to Merrill et al. (2003), distance students who do not have adequate access to an effective virtual learning environment feel they learn less, feel anxious, confused and disappointed.

For Wilson (1996b), the answer to a successful online education process is in the design; it must be well planned and guide learners towards their learning or else it can damage their performance. As said before, inflexible products that block users from experimenting or adapting can be frustrating and can affect their performance.

The education methodology implemented by the teacher or the instructional designer, has an important role to guarantee the learners' performance success (Mehring, 1996).

Students who do not understand the purpose of assessment will not learn. Therefore, the online learning focus should remain on addressing learners' needs as well as on their learning process, rather than only on the content (Black and William, 1998; McDonald and Boud, 2003).

According to McDonald and Boud (2003), a direct student involvement in assessing his or her own work and access to frequent opportunities to reflect on goals, strategies and outcomes are highly effective in enhancing

learning and achievement.

Newstead and Hoskins (1999) believe that through continuous assessment together with proper classroom assessment measures it is possible to increase students motivation for learning.

Perkins (1991) suggests that poorly planned learning environments are vulnerable to failure due to lack of support, leaving students feeling confused and face poor performance expectations.

Providing an effective online communication is important to help learners understand their virtual learning environment.

Effective online communications need to utilise the technology affordances to be able to use them appropriately with the adequate support (Jones and Firozabadi, 2001; Lawhead et al., 1997).

6.2.1 The communication process

Rovai (2002), in his study¹ provides evidence that it is the learning methodology used and not the media that matters in learning effectiveness.

As said before, students who participate in distance education environments must be highly motivated and capable of self-actualisation, and also need to feel safe, accepted in the community group. Those factors, are characteristics which mostly contribute to learning effectiveness.

Further, he also remarks on the need to balance instructional design and technology with the needs of the learners, promoting clarity in learner-content, learner-learner and learner-teacher interactions.

Perkins (1991) points to the fact that an online education process depends on the degrees of guidance, and such guidance implies learning instructional challenge.

To Beyth-Marom et al. (2000), there is a need to change distance education approaches when within such environments.

According to Shea et al. (2000), changes in organisations – either technological, or cultural – cause different reactions or even resistance.

Wilson (1997b) also highlights people's resistance to use the computer technology in a community. For him, people must be committed to that change. For example, a parent cannot expect that the computer might work

¹Rovai (2002) studies the search for structural differences between higher face-to-face educational communities and asynchronous learning communities.

miracles per se, if he or she is not involved in his or her child's education. In that case a computer can do more harm than good.

His experience of information and communication technology adoption in schools revealed that given the right conditions (with adequate support), major change can occur within the school community very quickly and with few negative side effects.

Providing adequate technological support appears to relieve some of initial users' anxieties and resistance. On the other hand when that technology is unreliable this also affects students performance.

According to Wilson (1997b), technology adoption in a learning community should be a group decision. The community members must be willing to co-operate with each other so that it succeeds, otherwise it can lead to feelings of frustration.

Even in the best circumstances, teachers and learners need high levels of support, training, and access to technology.

As said before, while technology can open up new possibilities, care should be taken firstly to make sure that the technology is fitted to our core values and goals and not the other way around, specially in an online learning community.

Once more, according to Wilson (1997b), such change does not happen quickly or easily.

On the other hand, according to Shea et al. (2000), learners who reported high levels of satisfaction with their help desk support, also showed high learning satisfaction levels and vice versa.

To respond to these questions it is necessary to identify people's existing skills, experience and attitudes toward information and communication technology and online learning.

An online learning scenario includes people's interactions with the communication media². However, based on ideas expressed on previous chapters, an online learning process represents much more than instructional content design and established communication. It includes also a community of learners with needs, expectations and beliefs surrounded by people's cultural and social behaviours (Cavanaugh, 2002).

²Human Computer Interaction.

6.2.2 Learners expectations

As it was said in chapter 3, section 3.4, an online learner expects his or her online teacher to be knowledgeable, as well as to have affective; friendliness skills qualities and face-to-face contact is also considered important (Gaskell and Simpson, 2000).

Sims-Knight and Upchurch (2001) state that students tend to feel a constant need to assure the learning methodology adopted is correct and that in the end they will be able to acquire the necessary skills and acknowledges.

To Carnwell and Moreland (2000), student needs concern three different aspects:

- Academic support;
- Emotional support; and
- Practical support.

And among those three, the emotional support is considered by the students as the most important need within online learning environment.

For students, a good virtual learning environment cannot be fully prepackaged with defined learning methodologies. When it is not well designed and supported, there is a tendency toward chaos and entropy. In those environments there is also a need to understand:

- Learners' and teachers' responsibilities and their learning roles;
- Online distance learning community development;
- People's social context; and
- Adequate teachers' and learners' communication interactions.

Distance learners need:

- To be emotionally reassured;
- Feedback;
- To trust in their Learning management system;
- To trust in their teacher or in the instructor;

- To trust in the education institution;
- To trust in the support given;
- To trust in the content provided; and
- To trust in the available communication.

Above all they need to trust in the technology and the surrounding environment (Carnwell and Moreland, 2000; Carswell, 1997, 1998)

According to Wilson et al. (1998), if the learners' social context is not considered in the learners virtual learning environment, people could avoid using it. His research revealed that learners avoid using their virtual learning environment³ because of reasons such as:

- Hardware and software problems;
- Computer accessibility and usability problems;
- Module subjects were not compatible with their work and training routines; and
- No available time on their schedules to attend the module.

An effective an online distance learning environment has to consider learners' virtual learning environment adoption (Grandison and Sloman, 2000; Wilson, 1997b).

6.2.3 Online communities

Instructional material constitutes an important kind of artefact in our culture and the online learning resources become artefacts which support individuals and groups in their knowledge based activities.

At another level, according to Wilson (1997a), online learning resources can be seen as tools in the hand of a user, enabling a teacher to effectively communicate, present information and interact with his or her students.

However, those learning resources and interactions are presented within a social context and those web social relationships help to define how students interpret those resources (Wilson, 1997a) .

³CD-ROM module (with diverse multimedia products, web site, performance support and collaborative environments based on training centres).

It represents an online community where distance learners and teachers express their behaviours, conducts and act according to rules on how individuals should behave in the online space and how to expect others to behave within these online social contexts (Blanchard and Markus, 2004; Haythornthwaite et al., 2000; Preece, 2000).

As Chih-Hsiung (2002) stated, students' social presence in an online learning process is not only determined by the media attributes (online communication) but also by users' perceptions (social context) and also the activities in which the users are engaged (interactivity).

Accordingly there are three dimensions of social presence within an online learning environment:

- Social context;
- Online communication; and the
- Interactivity among the community.

A research made by Carswell (1997) reveals that a communication medium per se does not affect students' learning outcomes, but their social context beliefs on the technology can. It does influence learners' attitudes toward technology.

Higher technological level users, even when frustrated, appear to maintain a more optimistic attitude toward technology when compared to the lower technological level users. Those lower technological level users believe that the benefits of using instructional technology are not enough to overcome the barriers.

Also, according to Chih-Hsiung (2002) and Holmberg (2000), social presence is a factor which influences students' learning performance in online learning environments because a lack of social presence within the virtual learning environment can often lead to a high level of frustration.

Moreover, Rovai (2002) agrees that by providing social-emotional driven interaction based on user social context promotes feelings of friendship and connection among learning community.

As they build up stronger, more intimate ties in the community, they gain access to the kind of support and continuity, moving the individual from a position of isolation to membership in a known community.

However according to Wilson (1996a), an online community cannot be seen as given in any specific context. It has to be developed and maintained⁴.

An education community is formed by people's exchanged ideas and thoughts. Those are based on people's interactions as a group and an sharing similar beliefs and values within the community.

Carswell's (1997) study revealed that the communication medium alone is not enough to improve or impair performance significantly. The main advantage regards the effect on the student and his or her will to provided faster and more flexible interactions *i.e.*, their willingness to co-operate.

According to Moreland and Levine (1989), people's social context can influence their ability to co-operate and, therefore, influence their ability to work or learn in a constructive collaborative environment.

To Elofson (2001), the online communication process among the community members requires a mutual dialogue between teachers and students, or between learning resources and users of those resources. This represents the learning process where ideas and thoughts are exchanged.

According to Preece (2000), it is easy to find lack of commitment in online interactions and those can create frustrated relationships and lead to low performance.

The online learning process is based on people's interactions and includes a particular history of trust, varied motives, mistakes, and forgiveness that has to be created and maintained within the online learning community (Elofson, 2001).

To work at a distance as a group, the community members must be committed to each other. Those commitments take place within a group accommodation process and that requires trust between the community members (Wilson, 1996a). However people's online co-operation can be extremely fragile (Moreland and Levine, 1989).

6.3 Trust and performance

According to Kramer and Tyler (1996), faculty trust between colleagues and the principal has been linked to school effectiveness, as well as to positive school climate.

⁴Results gathered by Wilson (1996a),

Accordingly, the principal's and the teachers' trust behaviour in a school environment makes differential impacts on the quality of school relationships (Barlow, 2001; Hoy and Tschannen-Moran, 2003; Smith, 1999; Tschannen-Moran and Hoy, 1998).

Bryk and Schneider (2002) work on the relationship analysis of trust. Students' achievement indicates that trust alone does not guarantee success; but, schools with little or no trust have almost no chance of improvement. They state that trust initiates and fosters a set of organisational conditions to initiate and sustain the kinds of activities necessary to affect productivity improvements.

Moreover, Tschannen-Moran and Hoy's (1998) exploration of the school trust climate⁵ revealed that trust in schools can be viewed from the point of view of the students, the teachers, the administrators as an organisation group or from a school community point of view, *i.e.*, one trusts others, not simply to be consistent in action, but also to act in one's best interest.

However, it also indicates that people at different levels in an organisation use different criteria in their judgments of trust.

On the other hand, when trust combines technology, distance learning effectiveness and friendliness, according to Martine and Freeman (1999), it is not the technology which influences the students' motivation. It is instead their trust in the technological media used and the way they are implemented.

Evidence supports the view that students come to an online distance learning course full of expectations, hopes and fears about the frequency of contact with their teacher, the type of support provided and the styles of teaching (Stevenson, 2000).

Also, in those virtual learning environments learners' trust attitudes and motivations towards computer technology differs and that represents to us an indicator of their online work performance *i.e.*, a student studying business has distinct trust expectations and motivations towards a computer from those students studying science (Wilson, 1985).

Although, according to Wilson (1985), research on students' attitudes and motivations towards computers revealed that students accept computers but, with lack of trust. Most of them see computers in a pragmatic way *i.e.*, for them, computers are primarily tools to support a quality of life.

⁵A school climate in relation of faculty trust and authenticity

Wilson (1985) also stated that, even between people with supposed similar social contexts, it is possible to find differences in people's trust beliefs and motivations toward the online interactions and this can affect their performance.

Therefore, students' trust attitudes and motivation toward online distance learning play an important role in perceiving learning (Akinci, 2000).

For Wilson (2001), learner trust attitudes have become at least as important as questions of technical skills-building or knowledge accumulation, or learning methodologies within the online education process.

Such attitudes can only be understood by understanding people's cultural and social context.

Building trust is an ongoing process that needs people's collaboration. The more interaction the parties have over time, the more their willingness to trust one another. Trust is based upon the other party's actions and their perceptions of one another's intentions, and integrity (Brewster and Railsback, 2003).

Evidence was cited by Nathan et al. (2002), that trust can be established in a rich media communication. These findings were related to a virtual team context where co-workers or partner organisations worked together.

Also Wang and Rubenstein-Montano's (2003) analysis revealed that trust is important in people's computer mediated interactions because as trust levels increase and knowledge sharing increases as well.

As reminded by Conway (1997), learners' performance in relation to confidence and beliefs depend on the feedback given. However, feedback which draws attention away from the task and towards learners' self-esteem can have a negative effect on students' attitudes and performance.

Learners' beliefs influence the learning goals set (personal and academic) as well as their commitment to these goals. More recognition should be given to the role of feedback on learners' beliefs and self-esteem. That depends however on how teachers or instructors provide feedback and how students construct their own trust attitudes and motivation towards their learning (Black and William, 1998; Juwah et al., 2004)

Thus, an effective virtual learning environment requires the understanding of people's trust attitudes and motivations towards online learning (Brown et al., 1993; Hobbs, 2002; Richards, 2002; Wilson et al., 1998).

For Osberg (2001), research focus should remain on understanding peo-

ple's trustful online learning interactions together with learners' needs and motivations.

Trust is developed and maintained by fostering a belief in an individual's expertise, experience, competence, and credibility in a determined situation.

Trust represents a key element to learners' acceptance of their learning resources to engage them in a successful online learning relationship (Wilson, 1997a) .

For Rovai (2002) learning community members have feelings of belonging and trust. The development of a community implies mutual interdependence, connectedness, interactivity, spirit, trust, common expectations and also implies shared values and beliefs among members.

These can be defined in terms of four components, spirit, trust, interaction and learning:

Spirit – Denotes recognition of membership in the community (friendship, cohesion). It is a feeling that the community can be trusted and learner's lack of spirit may affect the learner's ability to cope.

Trust – Trust represents the willingness to rely on other member of the community in whom one has confidence. Feedback will also be timely and constructive in this case.

Interaction – Can be either task-driven or social-emotional. It is an important element of the learning process (Moore, 1993). And,

Learning – Represents the purpose of community and members of the community grow to feel that their educational needs are being satisfied through active participation in community.

For Dillon et al. (2002), a social sense of community is important to foster safe and trustworthy online places.

6.4 Closing remarks

In general, it is agreed that online communication media can help to increase school knowledge, as it can offer real support on communication, on presentation, or on access to information.

Today it is through such media that people communicate their ideas, and thoughts and acquire and construct their knowledge.

However people within those environments have to learn how to communicate and interact online and at a distance. An online learner must be highly motivated and capable of self-actualisation within those virtual learning environments.

They also need to feel safe, accepted in their learning community group, to be able to engage in a mutual dialogue between teacher and students, or between learning resources and users of those resources.

Communication among members is the process of exchanging ideas and thoughts based on relationships with a particular history of trust, various motives, mistakes and forgiveness, that has to be created and maintained.

It is important to understand and develop learners' trust attitudes towards online learning and to provide adequate technical and instructional support to guarantee learner's performance success.

This chapter cites the online learning, trust and performance research related work.

Online distance learning, section 6.2 presents research evidence regarding the online learning process.

Trust and performance, section 6.3 Highlights the trust and performance research related issues within the online learning process.

Part III

An empirical approach

Overview

Following the rationale presented and discussed in part II, these four chapters provide design implementation, the methodology discussion and present the results of the empirical study undertaken to test the hypotheses underlying the first chapter.

The *trust effects on performance* chapter lays the ground work to test the presented hypothesis.

Further, the *Trust factors survey* chapter delineates the main trust factors gathered from Jean Piaget University of Cape Verde student's opinions when asked about their trust beliefs when studying at a distance. It also establishes the students' profiles regarding information and telecommunication communication.

The *Trust and performance study* chapter presents and discusses the results of an experiment undertaken to test if trust and performance are related in some way and, when so, to foster the understanding of the nature of its relation.

The last chapter, the *Online module usage appreciation* chapter considers students' opinions and examines their study environment, regarding their **Information and Communication Technologies Online** distance education module used to implement the trust and performance study research methodology.

Chapter 7

The effects of trust on performance

7.1 Introduction

This chapter provides a brief introduction of the following three chapters.

These three chapters present the methodology and the results of an empirical study undertaken to foster the understanding of the effects of trust on academic performance in online distance learning.

Section 7.2 provides a concise presentation on the assumptions underlying the study of the effects of trust on performance.

Next, section 7.3 highlights the research questions and presents the research strategy designed to explore the effects of trust on academic performance in online distance learning settings.

7.2 The relation between trust on performance

Contrary to early distance education, today's online tools allow communication processes much closer to face-to-face than their off-line counterparts.

This characteristic can, sometimes, lead learners and teachers to expect online social rules and attitudes to be similar to face-to-face situations.

Unfortunately, online communication lacks in a number of ways less obvious or indirect communication features, potentially misleading the parties involved to confusion, and frustration towards the virtual environment and their interlocutors.

In online distance learning, avoiding or diminishing the risks of confusion, misunderstanding and frustration in the communication process is crucial as this process is the only link connecting the student with her peers, teachers and education institution.

On the other hand, online teachers usually adopt more open, decentralised and informal actions to lead the learner to their aims asking students to assume part of the traditional teacher role, creating their agenda and taking charge of their own learning whereas the teacher is expected to come forward with answers to the students' requests (Wilson, 1996b).

This happens as general online distance education methodologies usually follow a learning methodology which seeks to adapt to each learner's needs and guide them towards the satisfaction of their needs and goals.

These learning methodologies imply the engagement of learners and teachers' co-operative actions which rely on sound and reliable communication processes. Communication processes that are able to foster sound and trustful online distance learning processes lead to successful teaching and learning experiences.

Thus, the belief underlying the empirical study about to be presented, is that students' trust in the online distance learning process is the common denominator of several related problems leading to low academic performance, such as:

- Lack of motivation;
- Frustration; and
- Anxiety.

This is so as the above trust related problems might impair the student's will to co-operate and engage in a collaborative interactive environment thus affecting his or hers academic performance.

In short, trustful online distance learning processes relate to the students' academic performance.

The next section addresses the consequent research questions and the strategy outlined to answer these.

7.3 Research questions and strategy

In order to foster the understanding of the interaction between trust and performance in online distance learning, two research questions were stated:

- What kinds of trust are relevant in online distance learning; and
- How does trust relate to academic performance in online distance learning.

To find answers to the above questions, an empirical study was conducted at graduation level at *Universidade Jean Piaget de Cabo Verde*.

This empirical study was organised in two stages, as pictured in figure 7.1:

Stage one was designed to identify the main trust factors. Main trust factors that, according with the under-graduated students at *Universidade Jean Piaget de Cabo Verde*, are relevant in online distance learning. The design and results of this first stage are presented in chapter 8.

Stage two goal is the characterisation of the relation between trust and performance in online distance learning. The design and results of this stage are presented in chapters 9 and 10.

Adding detail to the overall research methodology depicted in figure 1.1, chapter 1, the diagram presented in figure 7.1 provides a more detailed overview.

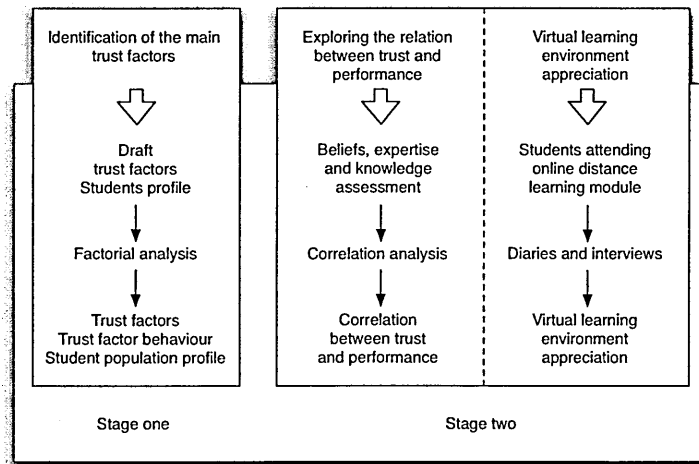


Figure 7.1: Expanded overall research methodology diagram

The following sub-sections further elaborate stages one and two of this empirical study.

7.3.1 Stage one

This research stage was designed to identify the main trust factors. In order to achieve this goal a survey was conducted followed by a factorial data analysis.

The survey's questionnaire was completed by first year under-graduate students at *Universidade Jean Piaget de Cabo Verde*. It included a total of eighty-five questions¹ of which:

- Twenty-two questions covered the students' demographic data as well as their skills in information and communication technology. Those twenty-two questions aimed to provide an initial student profile at *Universidade Jean Piaget de Cabo Verde*.
- Sixty-three related to the influence of trust in online distance learning. These questions resulted of six clusters of approximately ten (10) sentences for each one in the six initial draft trust factors; and

¹A translated copy of the survey is available in appendix D.

Figure 7.2 provides a diagram that provides an overall view the survey's procedure.

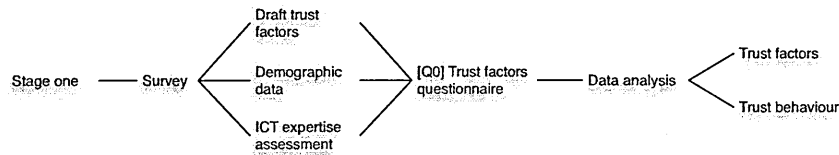


Figure 7.2: Stage one research methodology elements

Four-hundred and eight questionnaires were collected from a sample of six hundred and seventy three and from those, three-hundred and seventy-four surveys were selected for data analysis.

On those selected, a varimax rotation analysis identified the survey questions which, according to the students' opinions and beliefs, might influence their trust in online distance learning.

Further, word patterns were identified from those questions which lead to the identification of three main trust factors.

Furthermore, the survey's profiling questions provided an understanding of students' trust distribution:

- Across the three factors;
- Across age and gender;
- Among computer ownership condition;
- Among computer access condition;
- Across Internet access condition:
- Across previous experience in distance education: and
- Across information communication technology (ICT) skills and knowledge.

Results gathered from this first stage also contributed to the design of the second research stage.

Please refer to chapter 8 for a presentation of the design and results of this first stage.

7.3.2 Stage two

As depicted before in figure 7.2, the second research stage was designed to:

- Explore the relation between trust and performance *i.e.*, test the hypotheses that trust and performance are related in online distance learning; and in parallel to
- Assess the students' trust specific appreciation of the virtual learning environment provided by *Universidade Jean Piaget de Cabo Verde*. Providing an additional insight on the use of the **Information and Communication Technologies Online** module to explore the relation between trust and performance.

As schematically presented in figure 7.3, this second research stage used non-interventionist multi-methodological approach.

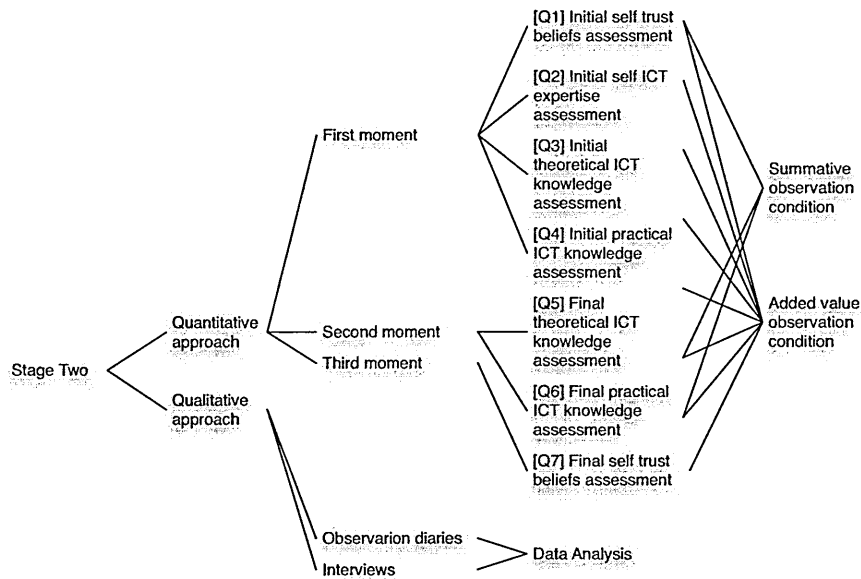


Figure 7.3: Stage two research methodology elements

This stage of the research uses the **Information and Communication Technologies Online** module attended by every under-graduate first year student at *Universidade Jean Piaget de Cabo Verde* to achieve its goals.

A quantitative approach caters for testing the hypotheses that trust and performance are related in online distance learning whereas a qualitative approach deals with a parallel assessment of the students' appreciation of trust specific aspects of the virtual learning environment.

The qualitative approach looks into the relation between trust and performance from two observation conditions:

- Studying the relation between students' trust and their academic performance as gathered from the students' summative assessments results on the **ICT Online** module; and
- Studying the relation between students' trust and their performance, using the results of students' academic added values looking into the variation of the students' trust and academic performance as measured at the beginning and end of the **ICT Online** module.

The entire second research stage took place between February and June 2004. The quantitative approach data was gathered in three different moments in time whereas the qualitative approach data was collected throughout the entire lapse of time:

First moment – The first quantitative data collection moment occurred before the start of the **ICT Online** module. At this time, four questionnaires were applied to gather data on the students' initial:

- Self trust beliefs (questionnaire [Q1]);
- Self information and communication technology expertise (questionnaire [Q2]);
- Theoretical ICT knowledge (questionnaire [Q3]); and
- Practical ICT knowledge (questionnaire [Q4]).

Second moment – This second quantitative data collection moment was accomplished during the course of the online module. Two questionnaires were used to:

- Assess the students' theoretical ICT knowledge after attending the equivalent of eight hours of theoretical ICT content lessons (questionnaire [Q5]); and

- Assess the students' practical ICT knowledge after attending the equivalent of eight hours of practical ICT content lessons (questionnaire [Q6]).

Third moment – This third and last quantitative data collection moment took place at the end of the **ICT Online** module. A last questionnaire (questionnaire [Q7]) was applied to gather data on the students' trust beliefs after completing the **ICT Online** module.

Throughout the entire lapse of time – Data related to the **ICT Online** module usage appreciation was collected in observation diaries throughout the duration of the module. This qualitative data gathering was later complemented with 35 additional interviews conducted in end of the module.

The online module ran for fifteen weeks². Every study participant was an under-graduate student attending their first academic year.

Results indicates a correlation between the students' trust and their academic performance although those correlation's were indirect in both observation conditions.

Generally *Universidade Jean Piaget de Cabo Verde* students' considered trust as an important issue in online distance learning and the majority agrees that initial face-to-face contact with a tutor or teacher would help to foster an online trustful environment.

Please refer to chapters 9 and 10 for a presentation of the design and results of this second stage.

7.4 Closing remarks

This chapter briefly outlines a research project to understand and evaluate the relation between trust and the students' academic performance in online distance learning. This research project was conducted in Cape Verde, in a Portuguese speaking context.

Chapter 8, describes the methodology and results of this research's first stage. Finally chapters 9 and 10 offer a presentation of the design and results of this second stage.

²An academic semester last for fifteen weeks in *Universidade Jean Piaget de Cabo Verde*.

Chapter 8

Trust factors survey

8.1 Introduction

This chapter presents the first stage design, procedure and results. Results are further discussed in chapter 11 together with the discussion of the second stage results.

The goal of this research stage is to identify the main trust factors in online distance learning as perceived by the under-graduate students at *Universidade Jean Piaget de Cabo Verde*.

Section 8.2 begins by outlining this first research stage's design and procedure. It includes a description of work undertaken, materials and instruments, the necessary resources, an action plan, a description of the pilot study and the participants involved.

Section 8.3 presents the results achieved identifying three main trust factors and the behaviour of trust factors across some of the students' attributes.

8.2 Design and procedure

In order to identify the main trust factors in online distance learning, a survey was designed to soundly build the trust factors from a larger set of initial tentative trust factors.

This survey was conducted using a questionnaire specifically built from a large number of questions related to the initial tentative trust factors.

The initial tentative trust factors, listed in table 8.1, were based on the

theoretical landmarks, presented in chapters 3 through 6, which raised trust related issues such as:

- Satisfying the students' needs;
- The availability of resources;
- Communication;
- Social behavior;
- Co-operation;
- Technology's reliability;
- Processes reliability; and
- Institutional credibility.

Table 8.1: Six draft factors of trust

<i>Draft factors</i>	<i>Initial trust factors</i>
[D1]	Trust towards online distance learning
[D2]	Trust towards online distance learning facilities
[D3]	Trust towards student/teacher interaction
[D4]	Trust towards interacting with their colleagues
[D5]	Trust towards the virtual learning environment
[D6]	Trust towards the distance institution

The next section depicts the process of building the questionnaire [Q0]¹ used on the survey conducted to build the main trust factors.

¹Throughout this empirical study questionnaires are numbered [Q0] through [Q7]. Only questionnaire [Q0] is used within the first research stage.

8.2.1 Materials and instruments

The only instruments used in this research stage was a questionnaire designed to foster the construction of the main trust factors.

The questionnaire² accounted for eighty-five questions and was divided in three parts:

- Demographic data questions;
- Information and communication technologies expertise assertions;
- Trust related assertions;

Demographic data was collected through nine questions on issues like place of birth, gender, age, computer ownership and internet access.

Information and communication technologies expertise was assessed with thirteen assertions on, for instance, using the Internet, sending electronic mail and processing texts. The students were requested to mark these assertions using a seven degree *Likert scale*.

Trust was explored by the remaining sixty-three questions which were also assertions to be marked by the students using a seven degree *Likert scale*.

These sixty-three sentences were generated from the initial tentative trust factors each factor contributing with an average of ten sentences to be marked by the students. Each of these assertions was randomly distributed on the survey after the initial 22 questions and assertions on demographic data and ICT expertise.

The scale adopted to mark the ICT expertise and trust related assertions is presented below on table 8.2.

²A complete copy of the Portuguese original questionnaire and English translation is available in appendix D, section D.3.1.

Table 8.2: Seven degrees likert scale

<i>Likert scale</i>	<i>Answers choice</i>
1	I strongly disagree with the sentence
2	I disagree with the sentence
3	I partially disagree with the sentence
4	I neither disagree nor agree with the sentence
5	I partially agree with the sentence
6	I agree with the sentence
7	I strongly agree with the sentence

On top of the eighty-five questions and assertions, the questionnaire also included:

- An initial paragraph of thanks and a brief explanation of survey's aims;
- A section with a detailed explanation on how to answer the questions and mark the assertions; and
- Another sentence thanking the students at the end of the questionnaire.

The survey was also carefully structured to positively motivate subjects to fill it in. It was design bearing in mind that:

- Questions and assertions used short and simple sentences to facilitate comprehension;
- All assertions indicated strong positive beliefs avoiding the possibility of misleading;
- Analogous assertions were used to validate purposes as suggested in Cohen et al. (2000);
- All eighty-five (85) sentences were included in a single A4 form with four pages to avoid possible lost of data and minimize the apparent survey size; and
- The survey's look was similar to university forms to provide students with a familiar instrument to deal with.

The survey was written in Portuguese as it was conducted at *Universidade Jean Piaget de Cabo Verde*. A copy of the questionnaire and an English translation are provided in appendix D, section D.3.1.

The next section identifies additional resources necessary to conduct this survey.

8.2.2 Necessary resources

Main necessary resources were the questionnaire described in the previous section and the participants depicted later.

Other resources included the university's staff help on locating survey's sessions spaces and on deploying and attending the survey's sessions.

For data processing and analysis a personal computer and a statistical analysis package was also needed.

The next section depicts this survey's action plan.

8.2.3 Action plan

Data collection was conducted with special care in order to avoid randomly completed questionnaires and increase response rate. Each student was informed about the survey's goal and context and requested to sign a consent form.

The data collection procedure was personally supervised by the researcher and all data was collected between October the 7th and the 19th 2002. Data was then processed and analyzed from November to December 2002. Relevant results and conclusions gathered delineated on January 2003 to enable the immediate deployment of the second stage³ of this empirical study.

This survey's overall model is presented on figure 9.1.

The questionnaire's protocol is provided in appendix D, section D.1.2.

The next section depicts this survey's pilot test.

8.2.4 Pilot test

A pilot test was carried out on seven university staff members and some minor corrections were made.

³The second stage of the empirical study is presented in chapters 9 and 10.

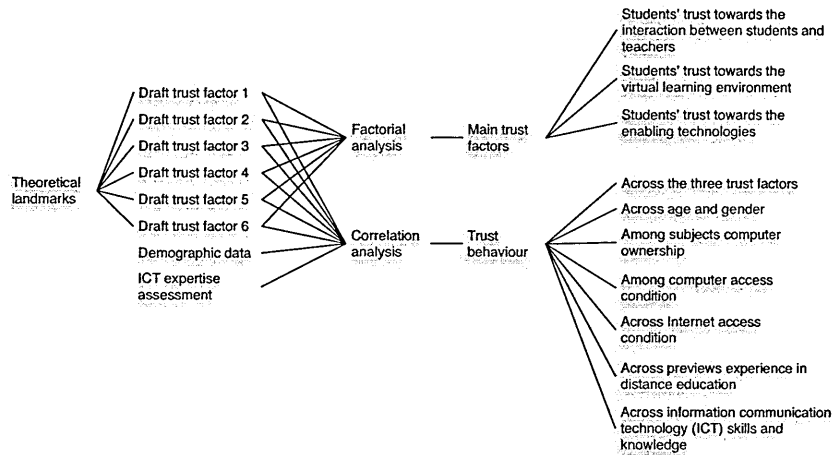


Figure 8.1: Survey implementation diagram

This questionnaire's pilot test provided useful information regarding its design. All participants in the pilot test agreed that the questions were clear and easy to understand.

Even so, some sentences needed to be cleared and an illustration was added to the explanation about how to mark the assertions with the Likert scale.

Some participants asked questions about sentences with similar meanings but those were explicitly included for validation purposes.

The next section depicts this survey's participants.

8.2.5 Participants

This survey's subjects were all undergraduate students from *Universidade Jean Piaget de Cabo verde*.

The university has sixteen graduation level courses available. The survey was conducted in all courses' first year in order to allow for the greatest profile mix possible but "contamination" from academic life.

Four-hundred and eighty (480) questionnaires were collected from a population of six-hundred and seventy-three (673) available first year students.

Table 8.3 provides a gender distribution by age of the subjects who participated in the survey.

Table 8.3: Subjects' distribution by gender and age

<i>Gender</i>	<i>17 to 21</i>	<i>22 to 26</i>	<i>27 to 52</i>	<i>Total</i>
Female	75	59	112	246
Male	69	49	116	234
Students	144	108	228	480

Gender was equally distributed across age which naturally eliminates any gender bias.

From these four-hundred and eighty (480) questionnaires, three-hundred and seventy-four (374) were selected for data analysis.

From the selected three-hundred and seventy-four (374) cases, only thirty-five students had had some sort of distance education experience as shown on table 8.4.

Table 8.4: Subjects' experience in distance education

<i>Subjects' experience in distance education</i>	<i>Number of cases</i>
No	339
Yes	35
	374

After data collection, processing and analysis, results were achieved and are presented on the following section.

8.3 Results

This section presents the result of the survey.

Section 8.3.1 presents the factorial analysis which resulted in the construction of the main trust factors.

Section 8.3.2 presents the results of the study on the behaviour of trust.

8.3.1 Trust factors

A factorial analysis of principal components was conducted to enable the construction of the main trust factors.

A three component approach was used. Then, the assertions which converged to a value 0.5 or over were selected in each component.

Table 8.5, 8.6 and 8.7 present a translated transcription of those selected set of assertions per each component.

Word patterns from the selected set of assertions (see figure 8.8) were ultimately used to build the trust factors presented on table 11.1.

Table 8.5: Principal component analysis table with component 1 selected assertions

<i>Question</i>	<i>Component 1</i>	<i>Survey assertions</i>
[24]	0.564421	In a distance education environment I'll certainly have a better study environment.
[28]	0.636617	I believe that a distance teacher is more qualified.
[29]	0.70874	Certainly, I will get better learning results with a distance teacher.
[36]	0.52624	In a distance education module the work is more original.
[38]	0.633097	In a distance education module the distance teacher will certainly be more available.
[39]	0.522383	Within a distance education environment I will have all necessary support.
[42]	0.687053	I believe that I will work better with a distance teacher.
[48]	0.596409	I trust that by studying at a distance I will get better results.
[49]	0.581602	Learning at a distance to better focus more in what I want to learn.
[56]	0.618898	Learning at a distance, I will be able to have more control on my learning methods.
[58]	0.50326	I trust in the quality of distance education courses.
[65]	0.585211	I believe that I have more support in distance education.

Table 8.6: Principal component analysis table with component 2 selected assertions

<i>Question</i>	<i>Component 2</i>	<i>Survey assertions</i>
[53]	0.506656	A qualified university must have distance learning.
[68]	0.516328	Nowadays, teaching demands distance education.
[72]	0.591656	I certainly prefer studying at distance through the Internet.
[73]	0.532072	Using digital library is better to learn.
[78]	0.512079	In distance learning environment our questions are answered more quickly.
[79]	0.550423	In a distance education module it is easy to have positive assessment grades.
[83]	0.58351	The digital library is a better information source.

Table 8.7: Principal component analysis table with component 3 selected assertions

<i>Question</i>	<i>Component 3</i>	<i>Survey assertions</i>
[27]	0.572249	The computer is a reliable communication tool.
[32]	0.509066	Distance education provides equal opportunities for all.
[33]	0.503217	With distance education my studying possibilities are higher.
[40]	0.522467	The Internet fosters dialogue between colleagues.
[52]	0.539885	The computer is a reliable tool.
[62]	0.511099	The Internet is a very interesting means of communication.

Table 8.8: Trust factors' word patterns

	<i>Word patterns</i>
[F1]	Teacher-qualification; teacher-results; teacher-availability; teacher-support
[F2]	Distance learning-quality; distance learning-teaching
[F3]	Technology-reliability; technology-opportunity; technology-communications

Table 8.9: The main trust factors

	<i>Main trust factors</i>
[F1]	Students' trust towards the interaction between students and teachers
[F2]	Students' trust towards virtual learning environment
[F3]	Students' trust towards technology

The next section presents an analysis of the behavior of trust across some of the students' attributes.

8.3.2 The behavior of trust

The following paragraphs depict the results achieved from a analysis of the behavior of trust in relation to:

- The trust factors;
- Age and gender;
- Computer ownership;
- Computer access;
- Internet access;
- Previous experience in distance education: and
- Information and communication technology (ICT) skills and knowledge.

Trust distribution across factors

Student's trust more in technology than in the other factors as figure 8.2 and table 8.10 indicate.

Students' trust towards the interaction between students and teachers is slightly below neutral⁴ ($[F1]=3.51$). Students' trust towards virtual distance learning environment is almost neutral($[F2]=4.23$). Students' trust towards technology shows some positive expectations ($[F3]=5.14$).

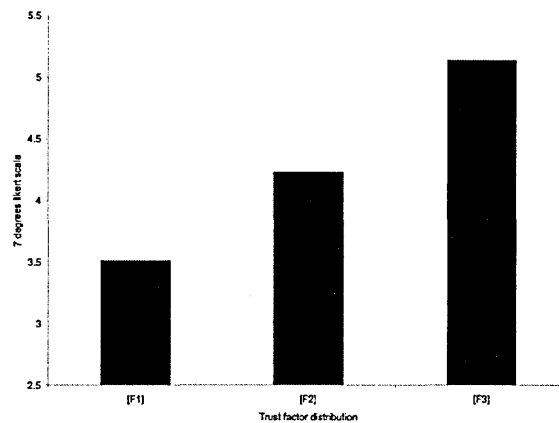


Figure 8.2: Trust distribution across factors

Table 8.10: Trust distribution across factors

	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>
[F1]	0.92	6.25	3.22
[F2]	1.29	6.71	4.23
[F3]	2.00	7.00	5.14

Trust distribution across age

Participant belong to a age rage between seventeen (17) and fifty-two (52) years old.

An analysis of variance shows no significant differences in relation to any trust factor across age groups with the exception of the trust that subjects

⁴The scale used accounts for 7 levels ranging from 1 to 7. In this case, 4 indicates the scale's neutral point.

had in technology between the youngest and oldest, as figure 8.3 and table 8.11 illustrate.

It is thus possible to conclude that trust in technology is equally distributed across age groups with the exception of the trust in technology for the younger and the older population which significantly show that the levels of trust for older students are 20% higher ($t(374) = 1.94, p = 0.007$) than the levels of trust for the younger student group.

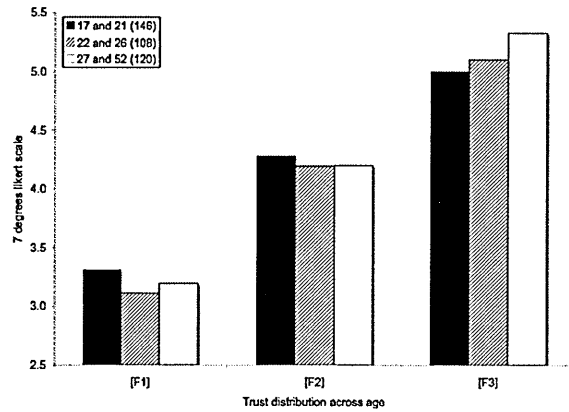


Figure 8.3: Trust distribution across age

Table 8.11: Trust factor distribution across age

	<i>17 and 21</i>	<i>22 and 26</i>	<i>27 and 52</i>
[F1]	3.31	3.11	3.20
[F2]	4.28	4.20	4.20
[F3]	5.00	5.10	5.33
Students	146	108	120

Trust distribution across gender

A T-test shows that trust in the three factors is equally distributed across gender. This confirms that there is no gender bias towards trust in this sample, see figure 8.4 and table 8.12.

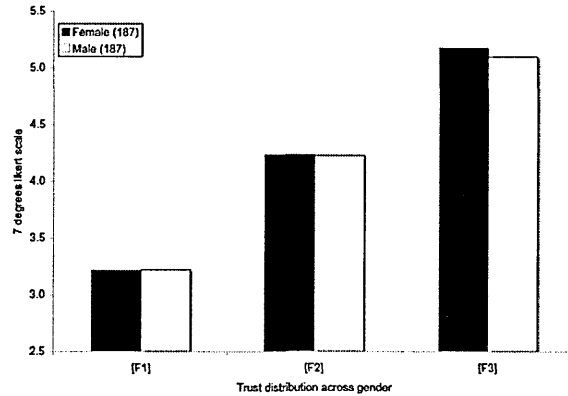


Figure 8.4: Trust distribution across gender

Table 8.12: Trust distribution across gender

	<i>Gender</i>	<i>Students</i>	<i>Mean</i>
[F1]	Male	187	3.22
	Female	187	3.22
[F2]	Male	187	4.23
	Female	187	4.24
[F3]	Male	187	5.10
	Female	187	5.18

Trust distribution across computer ownership

A T-test shows a significant correlation in relation to the computer ownership condition regarding:

- Students' trust towards the interaction between students and teachers ($t(372) = 1.711$ $p = 0.25$);
- Students' trust towards virtual learning environment ($t(372) = 1.572$ $p = .036$); and
- Students' trust towards technology ($t(372) = 0.34$ $p = 0.15$)

Figure 8.5 and table 8.13 indicate that having a computer at home influences the subjects' trust. In fact a T-test shows a significant difference between subjects with and without computer at home.

Subjects with a computer at home have higher levels of trust when compared with subjects with no computer at home.

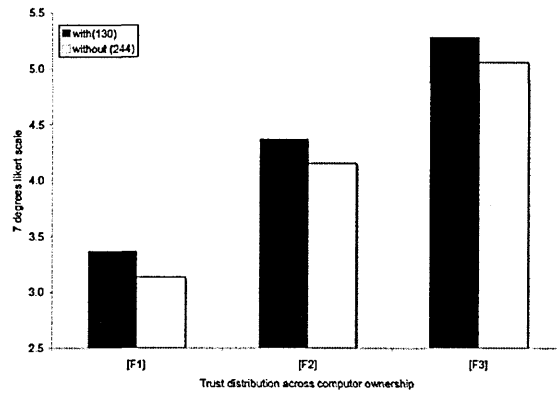


Figure 8.5: Trust distribution across computer ownership

Table 8.13: Trust distribution across computer ownership

	<i>With or without</i>	<i>Students</i>	<i>Mean</i>
[F1]	with	130	3.37
	without	244	3.14
[F2]	with	130	4.37
	without	244	4.15
[F3]	with	130	5.29
	without	244	5.06

Trust distribution across computer access

A T-test shows that having access to a computer is not enough to foster trust in factors one and two.

Regarding factor three, trust towards technology there is however a difference with statistical significance ($t(372) = 0.303$ $p = 0.022$).

Having access to a computer does increase the subjects' trust in technology, see figure 8.6 and table 8.14.

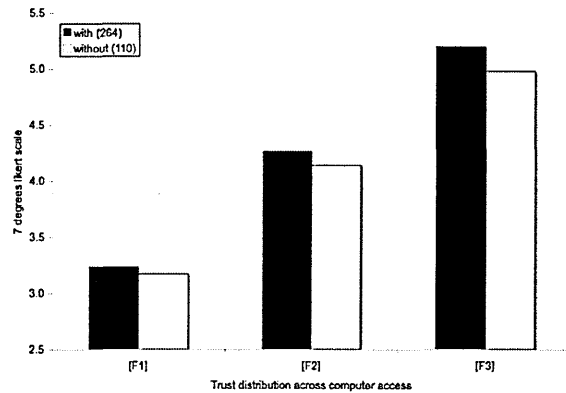


Figure 8.6: Trust distribution across computer access

Table 8.14: Trust distribution across computer access

	<i>With or without</i>	<i>Students</i>	<i>Mean</i>
[F1]	with	264	3.24
	without	110	3.17
[F2]	with	264	4.27
	without	110	4.14
[F3]	with	264	5.20
	without	110	4.98

Trust distribution across Internet access

A T-test shows significant differences in relation to trust factors two ($t(372) = 0.368$ $p = 0.045$) and three ($t(372) = 0.692$ $p = 0.001$) distribution across the Internet access condition.

Figure 8.7 and table 8.15 indicates that subjects who have access to the Internet do have higher trust towards the virtual learning environment and towards technology than towards the relation between students and teacher.

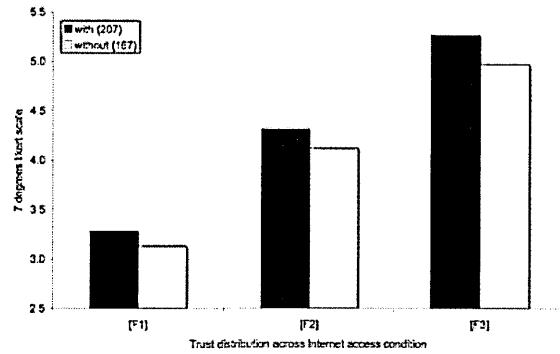


Figure 8.7: Trust distribution across Internet access

Table 8.15: Trust distribution across Internet access

	<i>With or without</i>	<i>Students</i>	<i>Mean</i>
[F1]	with	207	3.29
	without	167	3.13
[F2]	with	207	4.32
	without	167	4.12
[F3]	with	207	5.27
	without	167	4.97

Trust distribution across previous distance education experience

A T-test shows that previous experience in distance education does relate to trust in factor one ($t(372) = 1.126$ $p = 0.001$) and factor three ($t(372) = 1.884$ $p = 0.001$).

On the other hand, regarding trust towards the virtual learning environment, the subjects trust levels are equally distributed across the condition.

Figure 8.8 and table 8.16 illustrate results presented above.

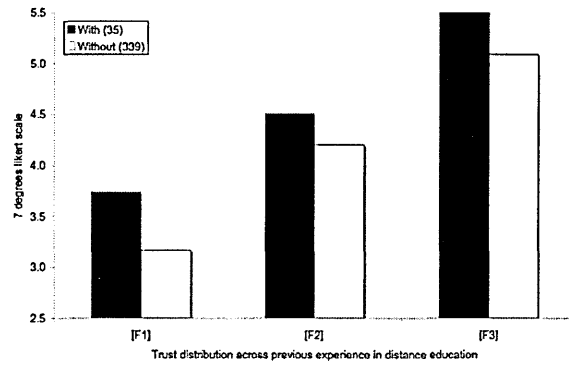


Figure 8.8: Trust distribution across previous distance education experience

Table 8.16: Trust distribution across previous distance education experience

	<i>With or without</i>	<i>Students</i>	<i>Mean</i>
[F1]	with	35	3.74
	without	339	3.16
[F2]	with	35	4.51
	without	339	4.20
[F3]	with	35	5.60
	without	339	5.09

Trust distribution across subject's ICT skills

There is a significant correlation between ICT skills and:

- Students' trust towards the interaction between students and teachers ($r(374) = 0.171$ $p < 0.01$);
- Students' trust towards the virtual learning environment ($r(374) = 0.206$ $p < 0.01$); and
- Students' trust towards technology ($r(374) = 0.206$ $p < 0.01$).

The higher a subject's ICT skills, the higher is her or his trust as figures 8.9 represents those correlation.

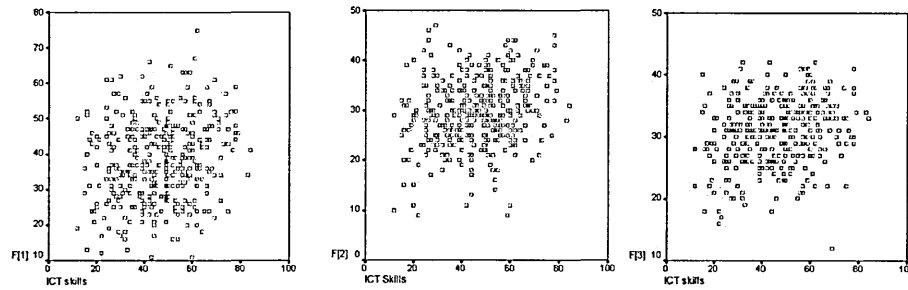


Figure 8.9: Trust distribution across subject's ICT skills

8.4 Closing remarks

Results are discussed in chapter 11.

This main purpose of this chapter was to present the design, procedure and results of the first stage of the research project outlined in this document.

Chapter 9

Trust and performance experience

9.1 Introduction

This chapter presents the second research stage's quantitative approach design, procedure and results. Results are later discussed in chapter 11 together with the discussion of the results from the first stage of the research.

The goal of the quantitative approach of this research stage is to explore the relation between trust and performance *i.e.*, test the hypothesis that trust and performance are related in online distance learning.

Throughout this chapter, the word *trust* refers to trust as characterized by the three trust factors built in chapter 8. When referring to a particular kind of trust *i.e.*, as defined by one of the factors, explicit references are used.

Section 9.2 begins by outlining this second research stage's quantitative approach design and procedure. It includes a description of the materials and instruments, necessary resources, action plan, pilot study and participants.

Section 9.3 present the results achieved identifying the significant interactions between trust and academic performance.

9.2 Design and procedure

In order to test the hypothesis that trust and performance are related in online distance learning an experiment was conducted and examined from two observation conditions:

- Examining the relation between students' trust and their academic performance measured by summative assessments in the **ICT Online** module; and
- Examining the relation between students' trust and their academic performance using the results of students' added values¹.

To achieve these goals, seven questionnaires were prepared and applied at three different moments in time following a carefully delineated action plan.

The next section presents the questionnaires [Q1] through [Q7]² used on the experience conducted to explore the relation between trust and performance.

9.2.1 Materials and instruments

The main instruments used in this research stage, included seven questionnaires. They were designed to explore the hypothesis that there is a relation between trust and performance in online distance learning.

These questionnaires used a mix of four closed questioning techniques:

- Yes or no questions;
- True or false questions;
- Assertions to be marked by the students using the seven degrees *Likert scale* shown on table 9.1; and
- Multiple-choice questions, where students have to choose the correct answer from a list of four possible options.

¹The added values are the variation of students' trust and academic performance measured at the beginning and at the end of the **ICT Online** module.

²Throughout this empirical study questionnaires are numbered [Q0] through [Q7]. Only questionnaire [Q1] to [Q7] are used within the second research stage.

Table 9.1: Seven degrees Likert scale (repeated)

<i>Likert scale</i>	<i>Answers choice</i>
1	I strongly disagree with the sentence
2	I disagree with the sentence
3	I partially disagree with the sentence
4	I neither disagree nor agree with the sentence
5	I partially agree with the sentence
6	I agree with the sentence
7	I strongly agree with the sentence

A detailed description of these seven questionnaires will be provided further on.

Questionnaire [Q1] on the assessment of self trust beliefs (before)

Questionnaire [Q1] was designed to measure each student's self trust beliefs before the **ICT Online** module begun and counted twenty-five assertions:

- Twelve were related to the first trust factor³;
- Seven were related to the second trust factor⁴; and
- Six were related to the third trust factor⁵.

All sentences were reused from questionnaire [Q0] used to build the trust factors.

A translated copy of questionnaire [Q1] is available in appendix D, section D.3.2.

Questionnaire [Q2] on the self-assessment of ICT expertise

Questionnaire [Q2] was designed to measure each student's ICT expertise before the **ICT Online** module began and counted eighteen questions and assertions:

- Three yes or no questions; and

³Students' trust towards the interaction between students and teachers

⁴Students' trust towards virtual learning environment

⁵Students' trust towards technology

- Fifteen assertions to be marked with the seven degree Likert scale.

A translated copy of questionnaire [Q2] is available in appendix D, section D.3.2.

Questionnaire [Q3] on the assessment of ICT knowledge (before)

Questionnaire [Q3] was designed to measure each student's ICT knowledge before the **ICT Online** module began and counted sixteen questions and assertions:

- Seven multiple-choice questions;
- Nine true or false assertions; and

A translated copy of questionnaire [Q3] is available in appendix D, section D.3.2.

Questionnaire [Q4] on the assessment of ICT skills (before)

Questionnaire [Q4] was designed to measure each student's ICT skills before the **ICT Online** module began and counted sixteen questions and assertions:

- Seven multiple-choice questions; and
- Nine true or false assertions.

A translated copy of questionnaire [Q4] is available in appendix D, section D.3.2.

Questionnaire [Q5] on the assessment of ICT knowledge (after)

Questionnaire [Q5] was designed to measure the knowledge on ICT. Questionnaire five was answered by every student after attending the **ICT Online** module. And counted thirty-one questions and assertions.

Part of this questionnaire questions and assertions are identical to questionnaire [Q3] and for those a translated copy is available in appendix D, section D.3.2.

Besides those sixteen questions and assertions enumerated before on questionnaire [Q3], fifteen more questions and assertions were included on this questionnaire.

Although, those additional questions and assertions above mentioned were not considered for data analyses purposes.

Questionnaire [Q6] on the assessment of ICT skills (after)

Questionnaire [Q6] was designed to measure student's ICT skills after the **ICT Online** module began. Questionnaire six counted with thirty-four questions and assertions.

Sixteen questions and assertions of this questionnaire are identical to those made on questionnaire [Q4] . For those questions and assertions a translated copy is available in appendix D, section D.3.2.

The remaining eighteen questions and assertions made on this questionnaire, were not considered for data analyses purposes.

Questionnaire [Q7] on the assessment of self trust beliefs (after)

This questionnaire is identical to questionnaire [Q1] and a translated copy is available in appendix D, section D.3.5.

The next section identifies additional resources necessary to conduct this survey.

9.2.2 Necessary resources

The experiment was conducted using the **Information and Communication Technologies Online** module as its testbed. The **ICT Online** module was designed, implemented and deployed specially for this experiment.

Also, as the experiment required that students attended the **ICT Online** exclusively through the Internet, and most students had neither a personal computer or Internet access. Two computer labs were set aside to run this experiment. Each lab accounted for 20 similar personal computers with Internet connection and was available to students throughout the day.

A convenient side-effect was that all students ended-up sharing the same personal computer and Internet access conditions, thus eliminating a potential source of *data noise*.

To accomplish this study a large number of *Universidade Jean Piaget de Cabo Verde*'s staff were also involved which provided:

- Technical support; and

- Pedagogical support.

For data processing and analysis, a personal computer and a statistical analysis package was also needed.

The next section outlines this survey's action plan.

9.2.3 Action plan

Data collection was conducted with special care in order to avoid randomly completed questionnaires and to increase response rate. Each student was informed about the study's goal, and was context and requested to sign a consent form.

The data collection procedure was personally supervised by the researcher and all data was collected between February and June 2003. It occurred in three distinctive moments in time:

- The first moment was the 27th of February 2003 during the students' first **ICT Online** module lesson. Four questionnaires ([Q1], [Q2], [Q3] and [Q4]) were distributed at that time.
- The second moment occurred between March the 27th and 24th 2003 and between April 10th and 10th 2003. In that period two questionnaires ([Q5] and [Q6]) were collected.
- The third and final moment occurred after the students completed the **ICT Online** module on June 12th 2003.

Data was then processed and analyzed. Relevant results were gathered and conclusions delineated.

The overall model of the quantitative approach of this research stage is presented on figure 9.1.

The questionnaires' protocol is provided in appendix D, section D.1.3.

The next section outlines this experiment's pilot test.

9.2.4 Pilot study

A pilot test was carried out on university staff members and some minor corrections were made.

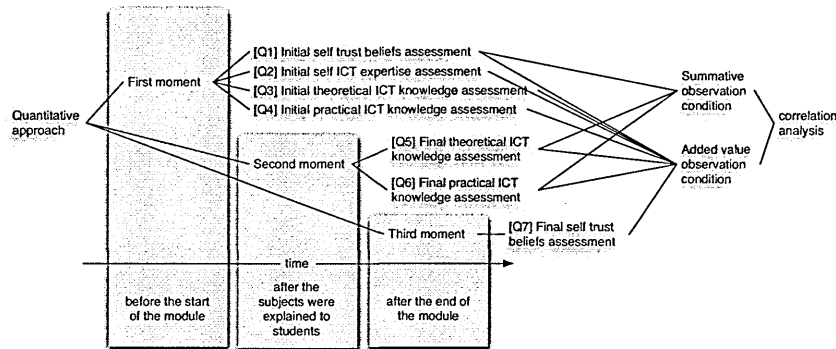


Figure 9.1: Experiment implementation diagram

These questionnaires' pilot tests provided useful information regarding their design. All participants in the pilot test agreed that most of the questions were clear and easy to understand.

Even so, some sentences needed to be made more clear.

The next section describes this survey's participants.

9.2.5 Participants

This experiment's subjects were all undergraduate students from *Universidade Jean Piaget de Cabo verde*.

A total of ninety-eight students participated in this experiment. From these ninety-eight students:

- Seventeen attended the *Physiotherapy* course;
- Forty-four attended the *Economy and Management* course
- Thirty-eight attended the *Communication Sciences* course

As shown in table 9.2, most of these students didn't have a personal computer or even access to a computer or the Internet.

Table 9.2: ICT facilities profile of first year students attending the **ICT Online** module at *Universidade Jean Piaget de Cabo Verde*

<i>Course</i>	<i>Owns a computer</i>	<i>Has computer access</i>	<i>Has internet access</i>
Physiotherapy	3	8	7
Economy and Management	9	26	18
Communication Sciences	11	30	23

Furthermore, students rated themselves as scoring an average of 48% in a 100% scale in a self ICT expertise assessment using assertions marked with a Likert scale (data collected in questionnaire [Q2]).

Examining the results of the assessment of ICT knowledge and skills, conducted before the **ICT Online** module started, one finds that students rate on average of 39% in ICT knowledge and 48% in ICT skills. Self-assessment and formal assessment results are summarised by figure 9.2.5.

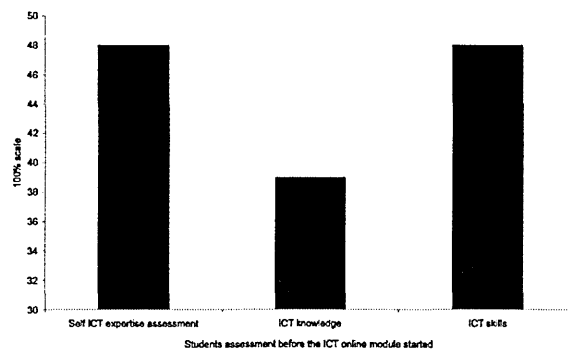


Figure 9.2: Students' ICT self-assessment and formal assessment results before attending the **ICT Online** module

After data collection, processing and analysis, results were achieved and are presented in the following section.

9.3 Results

Data collected during those three distinct moments in time was analysed under two observation conditions:

Summative assessment – In this condition, the analysis examined the relation between students' trust and their academic performance measured by summative assessments in the **ICT Online** module; and

Added values – In this condition, the analysis examined the relation between students' trust and their academic performance using the results of students' added values⁶.

9.3.1 Summative assessment observation condition

In order to carry out the analysis of the interaction of trust and performance under the summative assessment observation condition, a group of students with homogeneous ICT expertise was selected. Further, students were rated as having high, middle or low trust levels on all trust factors and global trust, perceived as an average trust factor.

Homogeneous ICT expertise group

The initial subjects' group accounted for 98 students. An homogenous group was selected eliminating students who rated either too high or too low when compared with the group's statistics ($28.98 (\bar{x} - \sigma(x)) < \text{homogeneous self ICT expertise scores} < 66.04 (\bar{x} + \sigma(x))$). The new ICT expertise homogenous group accounted for 70 students.

Table 9.3 shows the evolution of the general dispersion indicators from the 98 student group to the homogeneous 70 students group.

The box plot presented in figure 9.3 depicts the homogenous group dispersion.

⁶Again, the added values are the variation of students' trust and academic performance measured at the beginning and at the end of the **ICT Online** module.

Table 9.3: Initial and homogeneous groups statistics comparison

<i>Statistics</i>	<i>Initial population</i>	<i>Homogeneous population</i>
Size	98	70
Range	75	35.19
Minimum	14.81	29.63
Maximum	89.81	64.82
Mean	47.51	47.14
Std. Deviation	18.53	9.58
Variance	343.21	91.77

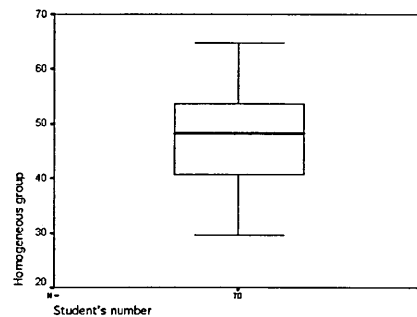


Figure 9.3: Homogenous group dispersion

Trust clusters

The 70 student group was later divided into three trust level clusters.

In order to class students as either High, Middle or Low on trust, for each factor and global trust, the range of trust scores was broke up into three intervals with the same size and students were assigned to each cluster on the basis of their score in each case. Figure 9.4 provides a diagram that illustrates the clustering results.

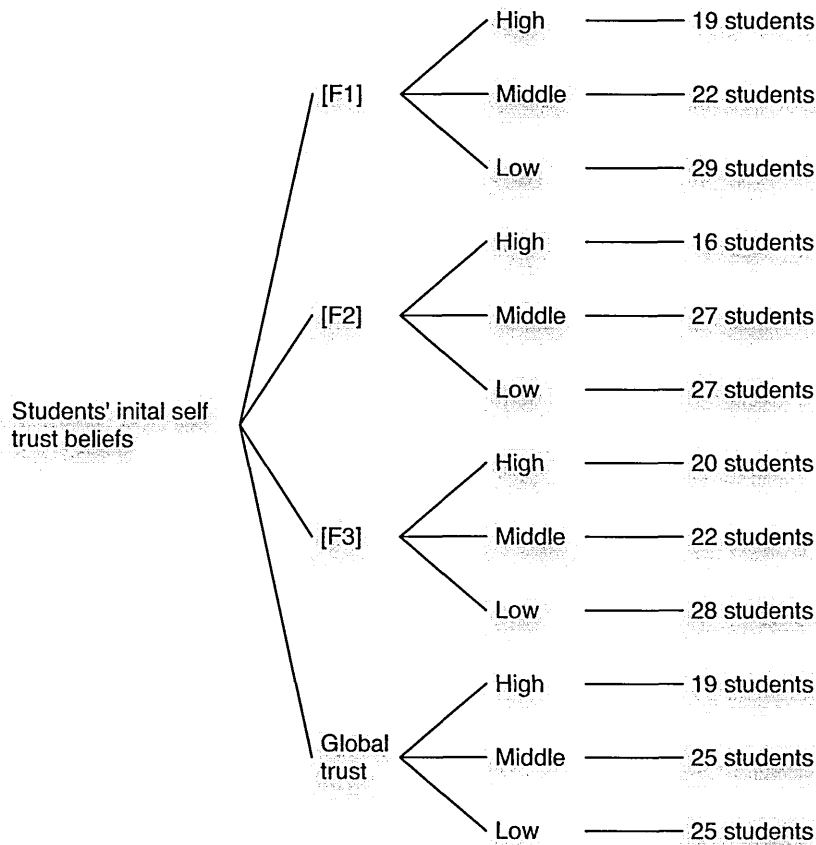


Figure 9.4: High, Middle and Low trust level clusters

Variables

Finally, under the summative assessment observation condition, variables are:

Independent There are four independent variables:

- *F1* – Trust towards the interaction between students and teachers as assessed by questionnaire [Q1] before attending the **ICT Online** module. Ranges from Low – minimum – to High – maximum.
- *F2* – Trust towards the virtual learning environment as assessed by questionnaire [Q1] before attending the **ICT Online** module. Ranges from Low – minimum – to High – maximum.

- *F3* – Trust towards technology as assessed by questionnaire [Q1] before attending the **ICT Online** module. Ranges from Low – minimum – to High – maximum.
- *Global trust* – This trust level indicator is the average of the values of *F1*, *F2* and *F3*. Ranges from Low – minimum – to High – maximum.

Dependent There are two dependent variables:

- *ICT Knowledge score* – As assessed by questionnaire [Q5] after completion of the **ICT Online** module's relevant component. Ranges from 0 – minimum – to 100 – maximum.
- *ICT Skills score* – As assessed by questionnaire [Q6] after completion of the **ICT Online** module's relevant component. Ranges from 0 – minimum – to 100 – maximum.

Interaction analysis

Interaction between trust and academic performance was explored using the 70 students homogeneous sample and the variables *F1*, *F2*, *F3*, *Global trust*, *ICT Knowledge score* and *ICT Skills score*.

In order to explore the interaction between trust and academic performance, analysis of variance of *ICT Knowledge score* and *ICT Skills score* were conducted with *F1*, *F2*, *F3* and *Global trust* as independent variables.

This analysis of variance showed that:

- A significant main effect of *F1* such that *ICT Skills score* was higher for subjects within the Low level of trust cluster and was lower for subjects within either the Middle or High level of trust cluster ($F(2, 67) = 13.649$ $p = 0.001$ and $F(2, 67) = 13.649$ $p = 0.002$). See also figure 9.5 for chart depicting the behaviour of *ICT Skills score* over *F1*;
- A significant main effect of *F2* such that *ICT Skills score* were higher for subjects within the Low level of trust cluster and lower for subjects within the Middle level of trust cluster ($F(2, 67) = 3.589$ $p = 0.042$). See also figure 9.6 for chart depicting the behaviour of *ICT Skills score* over *F2*;

- A significant main effect of $F3$ such that *ICT Knowledge score* were higher for subjects within the Low level of trust cluster and lower for subjects within the High level of trust cluster ($F(2,67) = 3.539$ $p = 0.041$). See also figure 9.7 for chart depicting the behaviour of *ICT Knowledge score* over $F4$; and
- A significant main effect of *Global trust* such that *ICT Skills score* were higher for subjects within the Low level of trust cluster and lower for subjects within either the Middle or High level of trust cluster ($F(2,67) = 9.565$ $p = 0.001$ and $F(2,67) = 9.565$ $p = 0.002$). See also figure 9.8 for chart depicting the behaviour of *ICT Skills score* over *Global trust*.

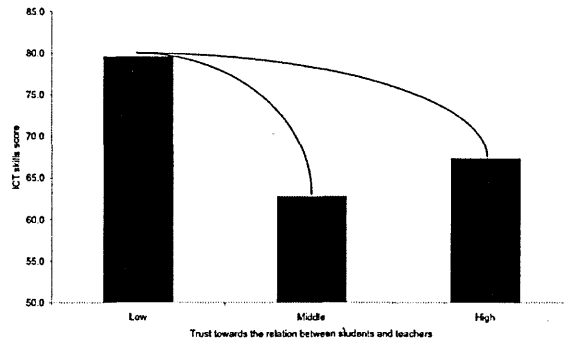


Figure 9.5: *ICT Skills score* over $F1$ (lines highlights the interactions effects)

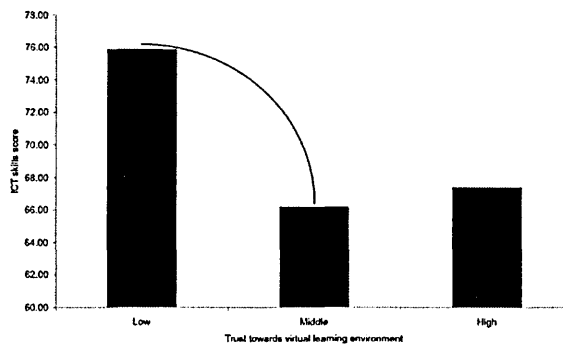


Figure 9.6: *ICT Skills score* over $F2$ (lines highlights the interactions effects)

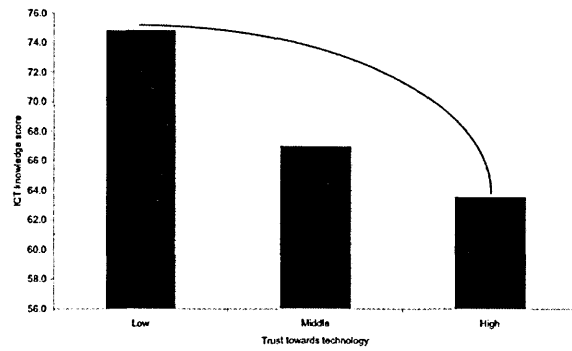


Figure 9.7: *ICT Knowledge score over $F3$* (lines highlights the interactions effects)

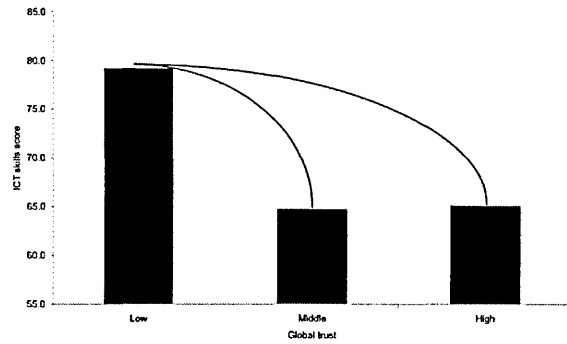


Figure 9.8: *ICT Skills score over Global trust* (lines highlights the interactions effects)

No other significant effects were found but, just as contextual information:

- Figures 9.9 illustrates the behaviour of *ICT Knowledge score* over $F1$, $F2$, $F3$ and *Global trust*; and
- Figures 9.10 illustrates the behaviour of *ICT Skills score* over $F1$, $F2$, $F3$ and *Global trust*.

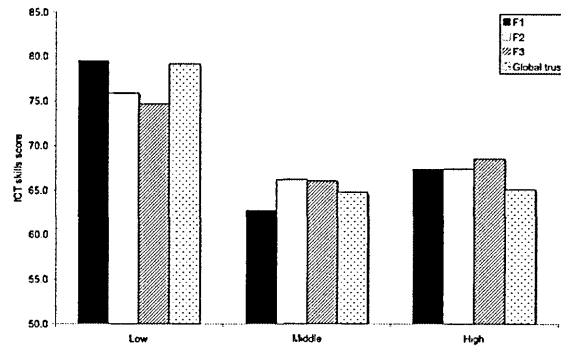


Figure 9.9: *ICT Knowledge score over F1, F2, F3 and Global trust*

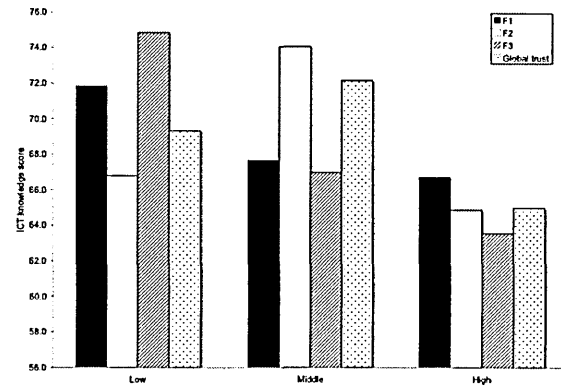


Figure 9.10: *ICT Skills score over F1, F2, F3 and Global trust*

9.3.2 Added values observation condition

The analysis of the interaction of trust and performance under the added values observation condition used the full students set.

Variables

Under the summative assessment observation condition there are six variables, which are:

- *Delta F1* – The difference of the levels of trust towards the interaction between students and teachers as assessed by questionnaires [Q1]

before attending the **ICT Online** module and [Q7] after completion of the module. Ranges from -100 – minimum – to 100 – maximum.

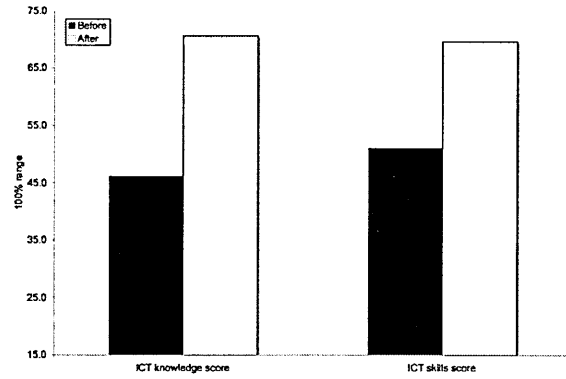
- *Delta F2* – The difference of the levels of trust towards the virtual learning environment as assessed by questionnaires [Q1] before attending the **ICT Online** module and [Q7] after completion of the module. Ranges from -100 – minimum – to 100 – maximum.
- *Delta F3* – The difference of the levels of trust towards technology as assessed by questionnaires [Q1] before attending the **ICT Online** module and [Q7] after completion of the module. Ranges from -100 – minimum – to 100 – maximum.
- *Delta global trust* – The difference of the levels of global trust calculated as the average of the values of *F1*, *F2* and *F3* assessed before and after attending the **ICT Online** module. Ranges from -100 – minimum – to 100 – maximum.
- *Delta ICT knowledge score* – The difference between ICT knowledge assessment scores as measured by questionnaires [Q3] before the beginning of the **ICT Online** module and [Q5] after completion of the module's relevant components. Ranges from -100 – minimum – to 100 – maximum.
- *Delta ICT skills score* – The difference between ICT skills assessment scores as measured by questionnaires [Q3] before the beginning of the **ICT Online** module and [Q5] after completion of the module's relevant components. Ranges from -100 – minimum – to 100 – maximum.

Preliminary results

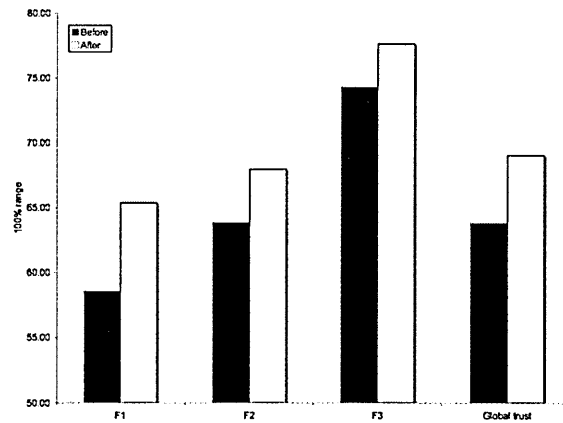
Preliminary results show an increase in knowledge, skills and trust levels across all factors. Table 9.4 and table 9.5 present the results and respective charts are depicted in figures 9.11 and 9.12.

Table 9.4: The evolution of *ICT Knowledge score* and *ICT Skills score*

<i>Moment</i>	<i>ICT Knowledge score</i>	<i>ICT Skills score</i>
Before	46.17	51.02
After	70.52	69.54

Figure 9.11: The evolution of *ICT Knowledge score* and *ICT Skills score*Table 9.5: The evolution of *F1*, *F2*, *F3* and *Global trust*

<i>Moment</i>	<i>F1</i>	<i>F2</i>	<i>F3</i>	<i>Global trust</i>
Before	58.6.1	63.89	74.34	63.87
After	65.40	67.97	77.65	69.06

Figure 9.12: The evolution of *F1*, *F2*, *F3* and *Global trust*

An initial analysis of correlation shows a significant correlation ($R(98) = -0.406$ $p = 0.000$) between *Delta ICT knowledge score* and *Delta ICT skills score*. Meaning that when students knowledge increases, their skills also

increase. This result helps confirm that the **Information and Communication Technologies Online** module was in fact effective as students' academic performance increases coherently, in knowledge and skills, by attending the module.

Interaction analysis

Interaction between trust and academic performance was explored using the 98 students sample and the variables *Delta F1*, *Delta F2*, *Delta F3*, *Delta global trust*, *Delta ICT knowledge score* and *Delta ICT skills score*.

Tables 9.6 and 9.7 as well as figures 9.13 and 9.14 present the variables values.

Table 9.6: The variation of *ICT Knowledge score* and *ICT Skills score*

<i>Delta ICT Knowledge score</i>	<i>Delta ICT Skills score</i>
24.35	18.52

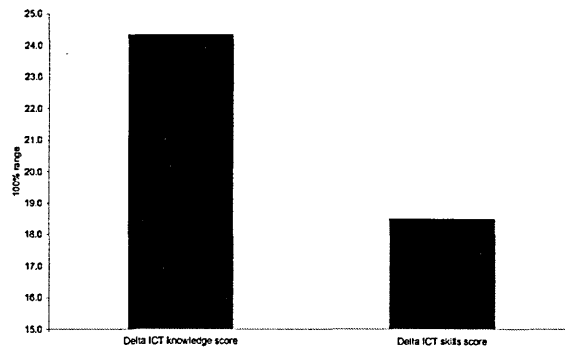


Figure 9.13: The variation of *ICT Knowledge score* and *ICT Skills score*

Table 9.7: The variation of *Delta F1*, *Delta F2*, *Delta F3* and *Delta Global trust*

<i>Delta F1</i>	<i>Delta F2</i>	<i>Delta F3</i>	<i>Delta GlobalTrust</i>
6.79	4.08	3.30	5.2

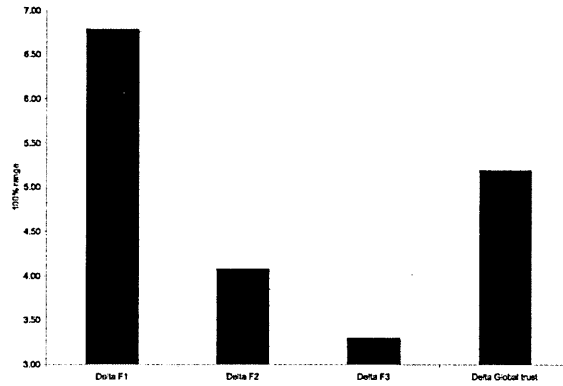


Figure 9.14: The variation of $F1$, $F2$, $F3$ and *Global trust*

In order to explore the relation between trust and academic performance, an correlation analysis was conducted to tested the interaction of *Delta F1*, *Delta F2*, *Delta F3* and *Delta global trust* with *Delta ICT knowledge score* and *Delta ICT skills score*.

This correlation analysis showed that:

- There is a significant correlation between *Delta F2* and *Delta ICT knowledge score* ($R(98) = -0.236$ $p = 0.019$). The chart in figure 9.15 illustrates that interaction as a scatter plot;
- There is a significant correlation between *Delta F3* and *Delta ICT knowledge score* ($R(98) = -0.227$ $p = 0.025$). The chart in figure 9.16 illustrates that interaction as a scatter plot; and
- There is a significant correlation between *Delta global trust* and *Delta ICT knowledge score* ($R(98) = -0.210$ $p = 0.038$). The chart in figure 9.17 illustrates that interaction as a scatter plot.

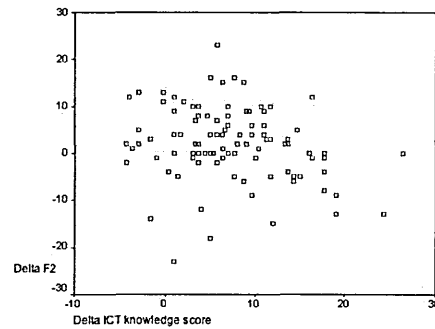


Figure 9.15: Scatter plot of the interaction of *Delta F2* and *Delta ICT knowledge score*

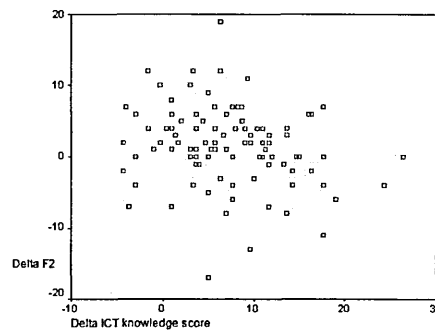


Figure 9.16: Scatter plot of the interaction of *Delta F3* and *Delta ICT knowledge score*

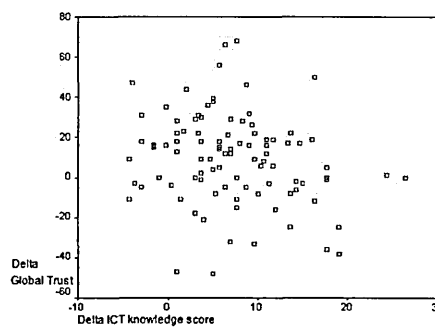


Figure 9.17: Scatter plot of the interaction of *Delta global trust* and *Delta ICT knowledge score*

No significant correlation was found between *Delta F1*, *Delta F2*, *Delta F3* or *Delta global trust* and *Delta ICT skills score*.

No significant interaction was found between *Delta F1* and either *Delta ICT knowledge score* and *Delta ICT skills score*.

9.4 Closing Remarks

This second research stage goal was to study the relation between students' trust and their academic performance in online distance learning.

This chapter described a quantitative research approach used to explore the relation between trust and academic performance in an online distance learning scenario.

Results are discussed later in chapter 11.

Chapter 10

Online module usage appreciation

10.1 Introduction

This chapter presents the second research stage qualitative approach design, procedure and results. Results are discussed later in chapter 11. The goal of the qualitative approach of this research stage is to provide additional insight on the use of the **Information and Communication Technologies Online** module to explore the relation of trust and academic performance.

Throughout this chapter, the word *trust* refers to trust as characterized by the three trust factors built in chapter 8. When referring to a particular kind of trust *i.e.*, as defined by one of the factors, explicit references are used.

Section 10.2 begins by outlining this second research stage's qualitative approach design and procedure. It includes a description of the materials and instruments, necessary resources, action plan, pilot study and participants.

Section 10.3 presents the results achieved on assessing students' trust specific appreciation of the virtual learning environment provided by *Universidade Jean Piaget de Cabo Verde*.

10.2 Design and procedure

In order to provide an addition dimension to the experiment conducted to explore the relation between trust and performance, two qualitative data collection techniques were used:

- Observation diaries; and
- Interviews.

The main goal is to assess the students' appreciation of the virtual learning environment provided by *Universidade Jean Piaget de Cabo Verde*.

The next section presents the observation diaries and interview scripts.

10.2.1 Materials and instruments

The main instruments used in this research stage were observation diaries and interview scripts.

Observation diaries

The observation diaries accounted for:

- A summary of the sessions events;
- General problems;
- General attitude;
- Students' observations;
- Methodological remarks; and
- Suggestions.

Appendix D, section D.3.6 provides a sample observation diary sheet.

Interview scripts

The interview scripts accounted for questions aiming to asses the students opinion on the usage of the virtual learning environment. The questions explored several appreciation aspects and a translation is available in appendix D, section D.3.7.

The next section identifies additional resources necessary to conduct this survey.

10.2.2 Necessary resources

As the qualitative data collection has been conducted alongside with the experiment presented on the previous chapter, necessary resources are the same as the one used on the experiment (see chapter 9 for more details).

The next section describes the action plan of this survey.

10.2.3 Action plan

Data collection was conducted with special care. Observation diaries were regularly used in order to avoid randomly answered questions. Each student was informed about the interview's goal and context. Consent forms were signed for all conducted interviews.

The data collection procedure was personally supervised by the researcher. It occurred in two distinct moments in time:

- Observation diaries were completed during the **ICT Online** module's execution; and
- Interviews were conducted after the conclusion of the **ICT Online** module.

Data was then processed and analyzed. Relevant results were gathered and conclusions delineated.

The overall model of the qualitative approach of this research stage is presented on figure 10.1.

The interview's protocol is provided in appendix D, section D.1.4.

The next section elaborates on eventual pilot tests.

10.2.4 Pilot study

The observation diaries format evolved the first few times it was used but no pilot study was carried out.

A pilot test of the interview script was carried out with university staff members and some minor corrections were made.

The next section describes this survey's participants.

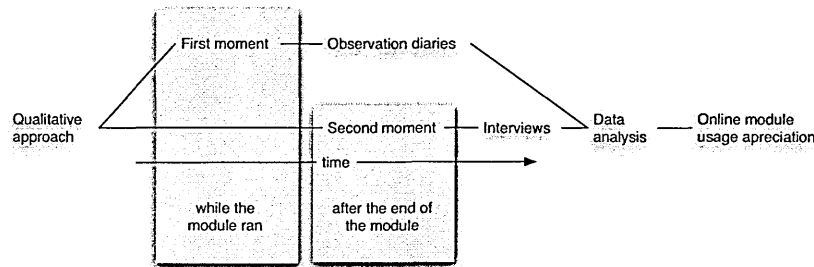


Figure 10.1: Qualitative data collection implementation diagram

10.2.5 Participants

The subjects were the same as the the ones involved in the experiment presented on the previous chapter (see chapter 9 for more details).

A total of ninety-eight students participated:

- Seventeen attended the *Physiotherapy* course – they will be referred to as the **science group**;
- Forty-four attended the *Economy and Management* course – they will be referred as the **economy group**; and
- Thirty-eight attended the *Communication Sciences* course – they will be referred as the **communication group**.

After data collection, results were achieved and are presented on the following section.

10.3 Results

As mentioned before this qualitative research approach provides an additional dimension to the experiment conducted to explore the relation between trust and performance. It evaluates the students' appretiation of the **Information and Communication Technologies Online** module study environment provided by *Universidade Jean Piaget de Cabo Verde*.

To achieve those aims this qualitative approach uses observation diaries and interview techniques.

A description of Cape Verde and the **Information and Communication Technologies Online** module are available on appendix A and B. These provide additional insight and might help understand the interpretation of the results..

10.3.1 Observation diaries

Observation diaries techniques aimed to analyse the learners' **Information and Communication Technologies Online** module on virtual learning environment provided by the *Universidade Jean Piaget de Cabo Verde*.

Analysis framework

Data returned from the observation diaries techniques was analysed from three online distance learning aspects according to Grandison et al. (n.d.) which are crucial prerequisites for a successful and effective online educational experience.

Figure 10.3.1 provides which scheme of those three elements guided by the "community of learning" theoretical model developed by Grandison et al. (n.d.).

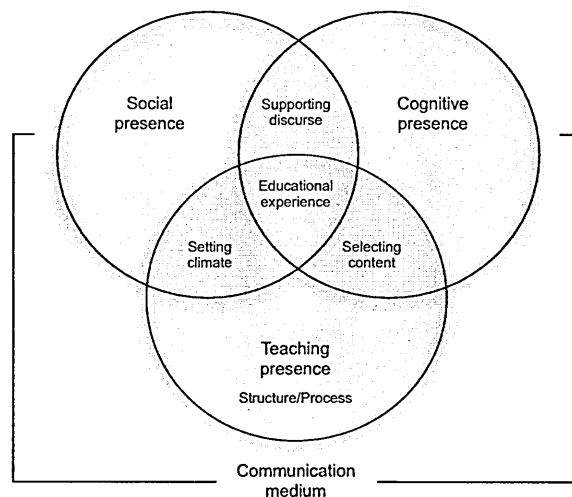


Figure 10.2: Community of inquiry (Grandison et al., n.d.)

This framework identifies three elements:

- Cognitive presence;
- Social presence; and
- Teaching presence.

The next paragraph describes the student's cognitive presence element.

Cognitive presence

This cognitive presence element refers to the extent to which learners are able to construct knowledge, through sustained online communication. It mainly addresses observation patterns related to:

- Students' knowledge construction.

Students' learning management system use During the first two on-line distance activities, students showed difficulties in navigating on the *Formare* environment¹.

Those initial difficulties were already expected, as this online module's main goal was to teach students' computer skills.

Students beginning difficulties in the use of the learning management system were shown first by the science group and were followed by the communication group and then the economy group.

According to the observation diaries notes (*external observer*), the menu available in the learning management system to access to the interactive content materials was not intuitive for students.

On their third distance lesson some students continued to show difficulties in working with the computer and in navigating in the learning management system, but by this time the number of students with difficulties diminished.

On their sixth learning activity ² students claimed to have difficulty in distinguishing the interactive images from those which were not.

Observation diaries notes (*external observer translated quote*):

"The interactive images confuses the students, they showed difficulties in understanding if the image was an exercise or not."

¹Formare was the learning management system used to fulfil the **ICT Online** module at *Universidade Jean Piaget de Cabo Verde*

²Students first practical learning activity

Students felt confused with the possibility of saving images and also the exercises available in the interactive content confused students.

Observation diaries notes (*external observer translated quote*):

"Some believed that by saving the interactive images would be a possibility to interact with their distance teacher. Students doubted if the exercise provided in the content was to assess their skills or not."

Students' technical difficulties Many technical errors occurred during this **Information and Communication Technologies Online** module procedure and those affected students' knowledge construction.

Those problems occurred randomly throughout the module. When those technical problems occurred several times during short periods students seemed more anxious and nervous, as it was difficult to work and some-time impossible to study.

Observation diaries notes (*external observer translated quote*):

"The Internet access was so slow that students hardly could work. Some finished early that day because of that they were less focused in their work ."

Some difficulties related to regarded infrastructure problems such as:

- Electricity failures;
- Internet connection failures; or even a simple
- Mechanical technical problem as for example:
 - Computer failures;
 - mouses failures³

There were technical difficulties related to the Learning Management system errors such as:

- Script errors;
- Browser errors;
- *Run time* errors,

³The computer mouse did not work properly sometimes because of the dust, a common phenomena in Cape Verde.

- Provoked closing of the sessions⁴.

The slow Internet connection or connection failures provoked frustrations on the spirit of students because it slowed their learning rhythm, especially when these occurred near an assessment task activity.

Some students' expressions of disappointment whenever a technical problems occurred are provided:

Observation diaries notes (*external observer translated quotes*):

Today students encountered many technical problems. It was normal to hear comments like:

It went off again... I am going away;

Every Monday we stand in front of the computer;

What a stressful lesson; and

The Internet is to search not for learn, it is easier when the teacher teaches us and is responsible.

Observation diaries notes (*teacher observation translated quotes*):

Here it is some online chat transcript messages:

Under this condition it is impossible to work;

I should be in lesson eight but I am only on the seventh ; and

I am not going to work at home, the Internet cost is to high.

Those technical problems affected mainly the science group. The science group had to delay some of the learning task activities to recover those missed activities later on.

This situation made learning difficult. Some of the students, even chose not to do some assessment activities so as to be able to keep up with the rhythm of the other **ICT Online** module learning students. Even so, the science group continued to be motivated in learning.

Students' learning activities Generally students worked actively and concentrated in their activities tasks during the entire **ICT Online** module.

Their learning rhythm was adequate and increased more near an assessment task period. In those moments students seemed to be more focused and efficient.

⁴Such errors occurred especially when student's did not refresh the web page from time to time.

Almost all students used all their reserved time in the computer laboratories and asked for extra time whenever they were near an assessment activity especially during the students skills learning activities.

It was also during those assessment periods that students seemed to be more anxious, nervous and expressed more intolerance with technical failures.

Observation diaries notes (*teacher observations translated quote*):

"Sometimes students during their skills project task had to learn how to use more than one application and it was difficult because those applications were in English."

Some students even chose not to do their first project, because of the difficulty. They felt they needed more time to finish it. Also as refereed to above, it was during this period that most of the technical difficulties occurred and they needed time to recover their lost time.

However according to the observation diaries notes (*external observer*) during that period, students continued to collaborate and were anxious to learn, but not as much as they had shown in the beginning of their **Information and Communication Technologies Online** module.

The skills assessment difficulties experienced during the **ICT Online** module were also aggravated because the applications were in English and because at that time the technical problems provoked a delay in students' learning activity schedule.

However, according to the learning management system data logs the majority of student's had delivered their projects.

Generally, in spite of the technological problems all students maintained their learning rhythm and motivation throughout all the module.

It seemed that it was the science group which had more learning difficulties and encountered more technical difficulties.

The economy group was the group with less energy and seemed less motivated. According to the observation diaries notes (*external observer*) the science group was the more motivated group.

Unfortunately, the science group encountered many problems during their **ICT Online** module accomplishment and that affected their motivation for learning but this fact was not enough to prevent all of them from finishing the **ICT Online** module.

Social presence

The second core element of the model is related to the establishment of a supportive environment, such that students feel the necessary degree of comfort and safety to express their ideas in a collaborative context and to project their personal characteristics into the community.

Those observed patterns related to:

- Student's feelings; and
- Students co-operation actions.

Learners' perception of their virtual learning environment Students in the beginning of the **Information and Communication Technologies Online** module apparently didn't understand what to expect from their virtual learning environment. Only later on did they realise they could make adjustments in their learning and task activities.

At the end students used their reserved timeline schedules to work in their learning activities.

Observation diaries notes (*teacher observation translated quote*):

"Students from the communication group studied in the morning and the science and the economy group studied during the afternoon at *Universidade Jean Piaget de Cabo Verde* campus facilities.

However, a student from the communication group chose to work at home and another preferred to work in the afternoon shedule. Also, a student from the economy group preferred to work in the morning schedule."

Those who worked in the morning period seemed more active than those in the afternoon period.

Teachers, the external observer and the students only expressed anxious and frustrated feelings whenever an error occurred, especially if it occurred in short periods of time and near an assessment period.

Observation diaries notes (*teacher observation translated quotes*):

"Apparently students were more anxious and nervous when a technical problem occurred often during short periods of time, especially if those periods were near to an assessment task. During that period It was common to hear expressions about the pedagogical support like: Those students have no luck..."

Observation diaries notes (*external observer translated quotes*):

"Student's easily got impatient and frustrated when the learning management system showed a "runtime error" because it took to much time to start it all over. But, those feelings were just momentary."

"Around 13.25 the Internet got slow and ten minutes later went off and never came back. According to the technological department it is not an internal problem. Students waited 40 minutes longer and then went away. This science group had no luck."

During those periods, when a technical error occurred near an assessment activity they also expressed insecurity and claimed that they needed more time to study.

Observation diaries notes (*teacher observation translated quote*):

"Students claim that it is difficult to access to a computer outside the reserved time."

Students co-operative actions In the middle of the **Information and Communication Technologies Online** semester students' motivation towards learning decreased but just when the module changed from working in student ICT knowledge to ICT skills⁵, students' motivation towards learning increased again.

Knowledge content activities required less interaction with their colleagues and the skills content learning activities enabled more group work.

According to the observation diaries notes (*external observer*) students preferred to work alone in their knowledge content learning activities but during their skills content learning activities they preferred to work in groups.

During those skills learning activities student started to co-operate more with each other.

Observation diaries notes (*external observer translated quote*):

"The science group seemed to be the most co-operative group, maybe because they had faced more technical difficulties during their first online learning activities or because it is a smaller group."

According to the observation diaries notes (*teacher observations*) it was noted that the online chat messages exchanged during the **Information and Communication Technologies Online** between students and teachers and between teachers and the pedagogical support enabled a better understanding of students' needs in relation to their surrounding learning environment.

This was especially so during those periods when more technical errors occurred. During that time the notes made by the external observer indicate

⁵Further information regarding the **Information and Communication Technologies Online** is available on appendix section B

more opinions and solutions related to the teacher's instructional learning methods.

Observation diaries notes (*teacher observations translated quote*):

"The online chat between me and the pedagogical support enables me to maintain a closer approach to students problems and needs, mainly the technical problems."

Students with less developed computer skills capabilities were helped by those with higher skills capabilities and this attitude seemed to keep students more motivated according to the observation diaries notes (*external observer*). Even so this **Information and Communication Technologies Online** module needed more interactive moments, especially those between students and their teachers.

The external observer felt that the teacher should see his students more as individuals and not as a group especially the science group. Besides students expressed the need for more feedback regarding their assessments.

During the skills learning activities moments some students chose the help from their colleagues instead of their teacher's help, as they claimed that the teacher feedback was slower.

Observation diaries notes (*external observer translated quote*): "The teacher takes too much time to answer and students need immediate answers"

Students also used their reserved time in the computer laboratory for other things besides performing their learning activities tasks.

According to the observation diaries notes (*external observer*) students use the computer to see and send email messages, web pages, images and to chat with their friends.

Observation diaries notes (*teacher observations translated quote*):

"It is impressive to see a student who hardly can work with the computer and the mouse but, already knows how to use a browser and the web-mail."

When a student encountered a technical problem, for example Internet problems like a web content page in the learning management system it implied a loss of at least five or ten minutes to recover all over again. So to compensate for those dead moments some browsed web pages or accessed to their email.

Teaching presence

The teaching presence element comprises two functions: the design of the educational experience and the facilitation of the learning activities.

This teaching presence observation patterns related to:

- The students' learning activities;
- The students' learning support; and
- The students' learning interactions.

The science group encountered an initial administrative problem which originated from a later **Information and Communication Technologies Online** module start up. Subsequently the technical problems made their learning difficult.

Observation diaries notes (*teacher observations translated quote*):

"Due to administrative problems, the science group started the lessons a week later than the other groups. Some readjustment had to be made in their learning activity schedule."

(.../...)

"Students couldn't work in this afternoon because of an electricity failure. The pedagogical support is working in another schedule period for them to finish this week activity. If that is not possible I will have to readjust again the science group learning activities schedule."

During the first distance lessons, students expressed the need to access to a printed version of the **ICT Online** instructional content material. Students claimed they felt more secure on their learning if they accessed a printed version.

Those were found to be more of the female population, according to the observation diaries notes (*external observer*) and at the beginning of their module.

Observation diaries notes (*external observer translated quotes*):

"Some students wrote down the content on paper, or used the commands *copy/paste* to take the contents with them, maybe to print or read on paper later on."

(.../...)

"To solve their insecurity some students kept writing many notes on the paper or tried to copy the content into their floppy disk."

Observation diaries notes (*teacher observations translated quote*):

"Messages exchanged between students, and teacher in the learning management system show students' insecurity with instructional content later on."

[Teacher, I will have access to the interactive content later on].

These were felt mainly during the knowledge learning activities maybe because it was the first distance learning activity or because it used the subjects' content materials as one of the main supports for their learning activities.

The technical problems prevented students from doing some learning activities during the task activity timeline. When student realised this they become frustrated.

Observation diaries notes (*external observer translated quote*):

Today I heard a student saying:

I am still working in my first project and this abstract activity is related to the second project

Students chose distinct learning methodologies during their **ICT Online** module accomplishment especially when practising their skills or knowledge learning activities.

During their knowledge learning activities the majority of students preferred to work alone, in silence and to read the instructional content.

When a technical problem occurred students seemed to be more frustrated for not being able to access their knowledge instructional content.

It was in those periods that students expressed the need to access a printed version of the knowledge instructional content.

Later on, during the skills learning activities this need diminished. During their skills learning activities the majority of students worked in groups and used their instructional content only as a guide manual.

Observation diaries notes (*external observer translated quote*):

"Some students prefer to work with a computer to practice the interactive content exercises before performing their project task. Others performed directly in their task projects and used the content as a guide."

Both learning activities showed different instructional content access rates.

According to the observation diaries notes (*external observer*) students' skills project tasks were too demanding for students. He felt students needed more time to practice.

Observation diaries notes (*external observer translated quote*):

Today I hear students saying:

"This project is difficult ; and

One student commented during a project task: "It is getting too difficult... and he smiled

But for him the last task skill assessment project was better as it was more personalised and autonomous. It enabled students to be more creative and communicative.

Observation diaries notes (*external observer translated quote*):

"This last project was less demanding than the other but instead gave students more autonomy."

Feedback provided on the skill exercises was not explicit enough and sometimes confused students.

Observation diaries notes (*external observer translated quote*):

"The interactive warnings windows within the instructional content, saying that students had not finished their exercises yet didn't help. It just confused them. The explanation available must be more explicit."

Students also felt the need for more teacher feedback on their skills assessment.

Observation diaries notes (*external observer translated quote*):

"Some students felt the need to confirm with their colleagues if they had performed the exercise correctly".

Means and materials to use Sometimes two students had to share the computers and those seemed less motivated by their learning activities.

Observation diaries notes (*external observer translated quote*):

"Student's who had to shared a computer felt to be less active and less motivated than the others."

Some decrease of motivation was noted in the afternoon periods when compared with the morning.

Maybe it was due to the fact that some computers were positioned in the direction of the sun and this fact made students work harder.

Rules and norms Usually students worked with a defined purpose.

Observation diaries notes (*external observer translated quote*):

"It is admirable to see students' strong willingness to learn, special the oldest persons and the less experienced students in the science group."

The students who spend most of their time with other activities besides their learning activities became more anxious when near an assessment task period.

Observation diaries notes (*external observer translated quote*):

"Student's who spend most of their time using the computer for email, for chat, for browser or for seeing photos... were more nervous and anxious just before an assessment task."

Feedback from the teacher and pedagogical support helped students to solve local difficulties and needs punctually.

It also helped to reassure the teacher regarding student's learning activities, actions, feelings and needs.

Observation diaries notes (*external observer translated quote*):

"There was a difference between what the teacher realised was happening inside the laboratory and what did really happened. Special regarding students feelings and needs when a technical problem occurred."

10.3.2 Interviews

Data gathered from the interviews provided a complementary perspective on students' opinions regarding their virtual learning environment and trust beliefs.

Interview results are presented in the following paragraphs.

Importance of virtual learning environment implied actors

Assertion one of the interview includes a group of assertions asking student's opinions regarding their:

- Distance teachers;
- Pedagogical support; and
- Colleagues.

Students used a six degrees likert scale of importance to answer each assertion and at the end justified their choice.

The distance teacher importance According to the students, the teacher had a partially important role within their virtual learning environment (*With an average of 3.3*).

Students argued that:

- It was difficult to exchange ideas with each other because communication did not occur easily; and
- Their teacher could not follow their work and did not understand their difficulties, especially their technical difficulties.

But, there were others who considered that:

- Their teacher had an important role in their virtual learning environment because this showed interest in their learning progress.

The next lines present a translated transcription of students' arguments about the importance of their relation to the distance teacher.

"It was impossible to exchange ideas during the online chat."

"The teacher couldn't follow students learning progress."

"I preferred the pedagogical support. The pedagogical support helped overcome my doubt more easily, he understood me better"

"There were always some things we needed to do face-to-face."

"The pedagogical support had to answer some of our doubts because doing that throughout the *Formare* was sometimes difficult."

"Our contact with our teacher was difficult. I had a stronger contact with the pedagogical support. Sometimes I forgot I had a teacher."

"The distance teacher should be always near their students to be able to help overcome our doubts."

"Distance made communication more difficult."

"I did not consider him to be important because he couldn't understand our difficulties during the semester."

"I had no relation with my distance teacher. Our interaction moments were short because of the technical difficulties."

"The distance teacher was always interested in our progress."

"The distance teacher taught me how to communicate at distance."

"Even, at a distance, the distance teacher could teach and evaluate our performance."

"The presence of the teacher was not always needed."

"Being away, it demanded from students more attention in their learning."

"Even, far away it was possible to learn many things."

"The distance teacher always answered demands, though sometimes he took some time to answer."

"It was very important because we could contact our distance teacher when we had doubts."

Pedagogical support importance According to the students, their pedagogical support had an extremely important role within their virtual learning environment (*With an average of 5.6*).

Students argued that the communication between them was simpler because they were face-to-face with each other and that led to a stronger trust bond between them.

The next lines are a translated transcription of students' arguments about the importance of their pedagogical support.

"The interaction with the pedagogical support was easily assessed and that simplified my learning and increased my performance."

"It was very important to maintain the respect inside the laboratories and he also solved momentary problems more easily."

"It was always available to overcome our doubts and that increased our performance."

"Sometimes it is important to know more about the person whom we communicate with."

"Very important, the pedagogical support was always near to answer our doubts."

"Because he was face-to-face, he could understand us better."

"A face to face communication cannot be compared with a distance person, the distance communication can be very impersonal."

"The pedagogical support was the only one who could overcome our doubts and solve our technological problems."

"With the pedagogical support I felt I learned more."

"Learning always needs a face to face situation."

"It was the pedagogical support who helped us during our learning activities."

"I trusted more on the pedagogical support because he was always available to answer my needs."

"The pedagogical support overcame our doubts in a more personal way."

Colleagues importance According to students their pedagogical support had very important role within their virtual learning environment (*With an average of 4.9*).

Students considered that with their colleagues they could easily discuss their ideas, exchange knowledge or could search for punctual support.

The next lines depict a translated transcription of students' arguments towards the importance of their colleagues.

"When we could exchange opinions my knowledge increased."

"It provided a more unified learning environment."

"Though sometimes there was some noise, when I needed and when they could my colleagues helped me."

"Some of them helped me."

"Very important, we could exchange experiences."

"Very important, it improved the communication, because we used a more accessible language. Also, with them I felt not shamed to express my doubts."

"They were available to help whenever was possible."

"Sometimes the noise didn't help."

"Our colleagues couldn't always overcome our doubts."

"Not so important, I prefer to work alone."

Importance of ICT Online module instructional contents

The second interview assertion asked students' opinion about the importance of the **Information and Communication Technologies Online** module instructional contents for their learning achievements.

Again, students used a six degree likert scale of importance to answer to this assertion and justify their choice.

Students considered their **ICT Online** module instructional contents to be very important for their learning achievements (*With 6 degrees likert scale of 5*).

These **ICT Online** module instructional contents represented one of their main learning supports and because it was not knowledge biased, it enable them to construct their own learning. Nevertheless, were some of them considered it demanding according to their learning expectations.

The next lines present a translated transcription of students' arguments about the importance of **ICT Online** module instructional contents for their learning achievements.

"It was my main learning medium. It was throughout the instructional materials that I learned what I know now."

"It is not opinion bias. It enables the reader to construct his own opinions about the learning subjects."

"I liked the way they were presented. Unfortunately sometimes I felt difficulties in the use of those instructional materials more often because my computer access difficulties."

"It helped me to elucidate some doubts."

"Well designed, presented, structured and chosen."

"It was very important although I considered this subject difficult to learn."

"It enabled me to learn things that I was anxious to learn."

"It was a modern way of teaching. The text available was very easy to understand, and I could save it and study every time I needed."

"The contents were always available in an easier way to learn and practice."

"This way of delivery of the content is better to learn, because we can always access when we need."

"Well designed because it came together with exercises."

"Very good especially those abstracts available at the end of each subject."

"Four hours of study is too long and the Internet is always failing."

"There were not enough computers for all and some didn't work properly, that didn't helped."

"Too much to learn for the available time. It has too much detailed information for first-year undergraduate students."

"The contents were available only in the computer but not every student had access to one."

Importance of students' online distance learning experience

The third interview assertion asked students' opinions about the importance of their online distance experience.

Once more, students used a six degrees likert scale of importance to respond to this assertion and justify their choice.

Students considered their online distance learning experience (*With an average of 5*) very important because the module was always available.

Also because, the **Information and Communication Technologies On-line** module was completed and it addressed different knowledge areas and argued that today it is important to learn at a distance.

The next lines present a translated transcription of students' arguments about the importance of their online distance learning experience.

"Very good because nothing was missing and the instructional subjects addressed distinct areas of knowledge."

"With today's Internet technology it is possible to learn online, special when the teacher is always available."

"It is very important because nowadays we need to learn at a distance."

- "It is very important especially for those who cannot learn face-to-face."
- "I didn't notice a difference between a face-to-face learning methodology and an online learning methodology."
- "It was a very good experience, unfortunately sometimes I couldn't access a computer."
- "It still needs to be worked in some aspects. Everyone should have access to the online conversation."
- "The problems arising in the computer did not help."
- "Was a different way of learn."
- "I learned, but this way is not the way I choose to learn."
- "Despite the fact I had to read a lot, I learned and with that method we can choose when and how to study."
- "Yes, because the content was always available."
- "Very important because, it teaches us to be more independent. Even so I believe that we still need someone nearby."
- "We could learn at home what was very good."
- "The technology difficulties meant that students were unable to study."
- "Not important, because the teacher was not always available and sometimes did not understand my doubts and my technological problems. At the end, students were damaged because of that."

Students trust in the possibility of working with someone at a distance

The fourth question asked student's trust opinion regarding the possibility of working with someone at a distance.

This was an open question with justification.

Almost everyone considered trust an important factor to maintain a proper distance relation.

The communication established and face to face contact were considered important issues to examine when working with someone at a distance.

The following lines address a translated transcription of students' arguments about the possibility of working with someone at a distance.

- "I agree, because my distance teacher was always in contact with me."
- "Yes I would, but we need to be always able to communicate with each other."
- "I agree. I need to trust someone to be able to work, if not I will be doomed."
- "I agree, because I was able to trust in my distance teacher and I learned a lot with him. That is why, I am sure that I will be able to trust and work with someone at a distance again."

"Sometimes I tend to trust but there are other times that I tend not to, especially if there is a problem."

"Yes I would. If the online learning conditions were equal to those I had experienced. If not, it wouldn't be easier to trust because I didn't know his behaviour and aims. Under those conditions it will be difficult to fulfil his expectations."

I agree but I need to meet that person face-to-face first to be able to trust."

"Yes I would, based on this experience I believe that would be easier."

"I agree, because to be able to work with someone at a distance that person needs to be trustworthy."

"Yes I would. Everyone should know their responsibilities, especial at the university level."

"No, because I do not trust a person's whose face I cannot see. I could only see what he was writing."

"No, I do not agree. Nowadays, it is difficult to trust someone at a distance because is difficult to know that person real intentions."

"No, at a distance we cannot see what he is doing."

"It is not possible to trust someone at a distance if I cannot know his behaviour."

"I don't know... It depends on the way we work and it depends on exchange of information safely."

"If I had to I would accept it but I didn't consider it easy. I need a face-to-face contact to be able to trust."

"I don't know. It depends on my distance interaction with that person."

Students' trust beliefs

The fifth question includes a group of assertions on students' trust:

- Interaction with the distance teacher;
- University capacity to teach at a distance;
- Interaction with their colleagues;
- Interaction with the pedagogical support: and
- Technology.

Students used a six degrees likert scale of trust to answer to the above assertion.

Students partially trusted in the interaction with the distance teacher (*With an average of 4*).

The same indicators were shown on students' trust in the university capacity to teach at a distance (*With an average of 4*).

Students did trust on their relation towards their colleagues and towards their pedagogical support (*With an average of 5*).

Finally, students trusted less in the technology (*With an average of 3.7*).

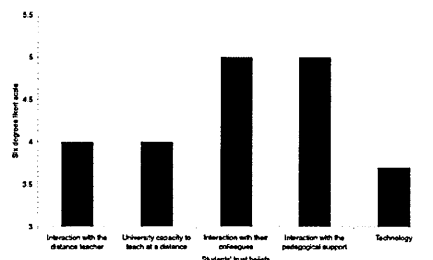


Figure 10.3: Students' trust beliefs within their **ICT Online** module

Students did consider trust in the technology as a problem in this **Information and Communication Technologies Online** module implementation.

It is also interesting to note that students rated their trust beliefs in relation to those elements at a distance and those which were face-to-face, as figure 10.3 illustrates.

At a distance in this case were the teacher and the institution and the face-to-face elements were represented by the pedagogical support and their colleagues.

Additional comments

This sixth question was an open question students for which could add extra comments, they considered lacking.

All sorts of issues were found regarding this sixth question.

- Some students expressed their anxiety regarding the technological problems and argued that those affected their learning achievements;
- Others cited the existing communication difficulties; and
- Others asked for more exercises and work.

Sentence transcription, are included in the follow paragraphs:

"I would like to perform more exercises and learning activities regarding information and communication technology."

"All students should have access to a computer."

"I considered important the **Information and Communication Technologies Online** module, unfortunately computers were slow considering difficulties in learning."

"I would like to enhance the important influence that the **Information and Communication Technologies Online** module leaning subjects and the classroom environment had on me."

"We need to be patience with all these technological problems."

"Sometimes, it was difficult to make the teacher understand our technical problems. He sometimes thought that those problems were excuses so we would not fulfil our tasks."

"Sometimes the computer didn't work and even so we had to perform our assessment tasks."

"Having access to a computer outside our lab reserved hours was very difficult and, even at that time computers were not enough for all of us, which was difficult for our performance."

"It was difficult to access an online chat because of the technical difficulties. I believe those problems affected my final grade."

"Those classes were very important to me but, sometime we had to study and work a lot and the time available to practice was not much."

"The pedagogical support was always available to help us but the technological problems were many and occurred especially near an online chat. The teacher should be at the university more often."

"The next time, please take technological difficulties more in consideration so we could be able to learn more."

"I didn't like to perform the online chat assessment task, because not everyone could take part of it."

"There were not enough computers available for all students and I didn't like to meet my teacher only once."

Further, the closing remark section summarises the main issues highlighted within these qualitative research.

10.4 Closing Remarks

This second research stage goal was to study the relation between students' trust and their academic performance on online distance learning.

This chapter, described a qualitative research approach used to provide additional insight on the use of the **Information and Communication Technologies Online** module to explore the relation between trust and academic performance.

Results are discussed later in chapter 11.

Overview

This part provides both an overall discussion of the results gathered as well as a summary of the work presented in this document and some future work proposals based on the content of the previous chapters.

The *Overall discussion* chapter encompasses all results and aims for a comprehensive discussion bringing together theoretical landmarks and findings presented throughout the document.

Besides recalling the path taken, the *Summary and future work* chapter also evaluates the relevance of this work's contribution, underlining the significance of the undertaken research and the results of the survey, the empirical study and the complementary research study. The limitations of this work are also acknowledged, stressing what was proposed but was not addressed and on what should have been done to foster better and more self-sustainable results.

Finally, some consequent research lines are suggested.

Chapter 11

Overall discussion

11.1 Introduction

This research project has explored trust in an online distance learning context and the nature of that relationship.

This chapter begins with a brief description of the research context, provides an overall discussion of the results and illustrates some possible implications.

Section 11.2.1 describes Cape Verde and the context of its surroundings. The following section 11.2.2 briefly introduces the design, development and implementation of the **Information and Communication Technologies Online** module which was the context for research.

The final section 11.3 summarises and discusses the main results achieved outlined in chapters 8, 9 and 10. It also addresses possible implications for the online distance education process.

11.2 Research context

This study was performed in Cape Verde at *Universidade Jean Piaget de Cabo Verde*.

The following paragraphs briefly introduce us to the research context, illustrating possible implications and limitations of this context in relation to the university and to the distance education environment in particular.

11.2.1 Cape Verde

Cape Verde belongs to the list of least developed countries (LDC) and is located in the North Atlantic Ocean, 500 km west of Senegal in Western Africa.

The Cape Verde economy is fragile, due to its few natural resources, including serious water shortages and limited agricultural possibilities. Therefore it is heavily dependent on foreign assistance and overseas resources.

Fishing and tourism represent the main Cape Verde areas for economic growth and development. Tourism holds a considerable potential and it is the area of the majority of foreign investments. Fishing is an important source of livelihood, yet its full potential has not been achieved.

Higher education

Cape Verde has a population of 418,224, with a majority of young people and, in spite of considerable efforts made, there is a lack of higher education opportunities. In the year 2001, two thousand students had to go abroad in order to pursue tertiary education compared to the estimated fifteen hundred who studied in Cape Verde (Evora-Sagna et al., 2002).

Unfortunately, the majority of students who study abroad tend to stay in those foreign countries, contributing therefore to the increase in the country's higher emigration rate.¹

Distance education

The use of distance education could help alleviate the shortage of higher education opportunities.

However, although there have been some initiatives to develop distance education in Cape Verde, none have borne fruit. The failures of these initiatives have not been analysed so it is not clear what the problems were. Successful experiences of other countries in this area suggest that, if applied appropriately, distance education could be of immense benefit for Cape Verde.

¹Cape Verdeans' emigration estimates vary, there are at least as many Cape Verdeans abroad as in the country. There is much anecdotal evidence that there are more Cape Verdeans living abroad than in the country but few hard statistics. One problem is that some Cape Verdeans may be living abroad illegally and therefore not showing up in official statistics.

Internet access

The country's Internet facilities are still under development, as the Cape Verde Information and Communication Development (ICT) started relatively late (Evora-Sagna et al., 2002).²

The development began in 1996 with an experimental network based on a 64 kbps connection and the service was commercialised a year later. Although legally the Internet market is open, Cape Verde Telecom (CVT) is still the only Internet Service Provider (ISP) with limited and costly rates.

At the end of 2001 there was a limited broadband access to the Internet, with 550 basic rate Internet users and 23 primary rate subscribers.³

In December 2001, there was an estimated 2.8 per cent of Internet users and in 2002 the Internet was hardly visible in Cape Verde. Dial-up Internet prices in Cape Verde are high and do not encourage heavy surfing and Internet penetration is therefore limited. Another reason for lower rate Internet use is awareness, as many may not be aware of the Internet benefits or even its existence. This limits the broadband access to the Internet in Cape Verde.

Information and communication technologies dissemination

Despite the efforts made by the government to promote the use of ICT in the education sector there has been no concrete plan to supply all schools with PCs or connection to the Internet.

Some schools offer basic ICT courses but these courses remain optional. One of the problems faced is the lack of technical know-how. While schools are connected to the Internet they often do not know how to use the basic application or have problems with the configuration and basic maintenance.

Even so, all institutes of higher education have some kind of Internet access. One third of secondary schools are connected to the Internet (9 out of 27), a few primary schools are connected and the Cape Verde government is probably the country's major Internet user.

In conclusion, the use of the Internet facilities could in this case play a key role in providing greater education opportunities. However, the country

²It was the 29th African country to get connected to the Internet.

³Basic rate has 64 kbps and primary rate interface has 128 kbps, whilst the highest leased circuit speed available is 256 kbps.

still needs to make a big effort to push itself in to the information society, not to mention the knowledge society.

11.2.2 The Information and Communication Technologies Online module

The university developed the **ICT Online** module as its first undergraduate online module to foster students' self-sustained distance learning and ICT skills. This module forms a part of the *Universidade Jean Piaget de Cabo Verde* first year curricula and has been implemented since 2002.

Design process

During the **ICT Online** module design process, a careful analysis was made in order to plan the most adequate teaching, learning and instruction strategy within the available options.

As it was the first undergraduate online distance learning module the design aimed to provide;

- an easy and transparent integration of this online module with the undergraduate courses and the existing rules and regulations;
- a sound instructional strategy;
- the identification of students' profiles and needs;
- the acknowledgement of university capabilities and constraints;
- the choice and implementation of the necessary technical facilities, as for example the Learning Management System; and
- the development of content for the **ICT Online** module.

At first an analysis of a face to face version of the module enabled a better understanding of the university's environment. This face to face *Information and Communication Technology* module analysis took place together with the implementation analysis of three post-graduate online distance learning modules. During that time a few teaching and learning strategies, as well as the university's suitability for such an initiative, were tested and evaluated.

These two experiences enhanced a number of concerns related to this module implementation and deployment and highlighted that:

- students had very little or no ICT knowledge and skills;
- a small number of students had access to a computer and Internet facilities;
- the irregularity and the weak quality of the electrical power supply together with a low bandwidth tended to endanger the successful deployment of the module; and
- computer failures to work due to the high temperatures in the computer laboratories.

All these aspects contributed to the number of possible technical problems within the **ICT Online** module deployment.

By the time this project started, in September 2002, the electricity supply had to be stabilized, all computer labs had to be equipped with fans and air conditioning and the Internet connection went from an ISDN with 64 Kbps capacity to a leased line with 128 Kbps.

Today, *Universidade Jean Piaget de Cabo Verde* has a 512 Kbps leased line together with three 1 Mbps digital subscriber lines for a population of more or less 1700 students and staff members.

Teaching and learning strategies

The main paradigm of use at the university is based on self-study, through which learning objects support a pre-determined learning purpose. Special attention was also given to both individual and environment differentiation attributes as mentioned above.

The instructional design is based on goal-oriented learning activities in which students are requested to perform specific weekly tasks.

This includes a text-based content with exercises, multimedia illustrations, interactive graphics, and assessed feedback. Asynchronous and synchronous online discussions are also facilitated every two weeks. A very detailed student guide⁴ and learning strategy help line is available for both students and teachers. Each aspect of learning content is hierarchically organised, content written in small chunks to enable a better comprehension and a printable version made available.

⁴More information regarding this student guide is available in appendix section C.

Moreover, collaboration opportunities are made available through the teaching and learning strategy.

As the majority of students had no access to the Internet or computer facilities two computer laboratories together with help desk facilities were available for students. This common space in which the **ICT Online** module took place provided opportunities collaboration among the students. Such opportunities especially occurred when students worked on the skills content part of the **ICT Online** module⁵

In the end, this instructional design strategy aimed to guide students throughout their module and simultaneously respect their learning styles, needs and opportunities.

More detailed information regarding Cape Verde and the **ICT Online** module implemented at *Universidade Jean Piaget de Cabo Verde* are available in appendix section C and section B.

Implementation

The **ICT Online** module was implemented during the second semester of 2002/2003 and involved close to one hundred students. The pass rate was over 90% with grades presenting a normal pattern consistent with other modules and courses.

Eventually in spite of stressful moments that occurred together with technical infrastructure difficulties, students' performance improved with time as they became more and more used to studying online. At that time, as most students did not have access to a personal computer at home the computers were heavily used. Also, date access statistics provided by the Learning Management System showed that students continued to use the **ICT Online** module six months after it finished.

At the end of the module, research indicators revealed that students generally accepted learning online and the majority stated that they would not mind attending an online module again, in spite of being used to teacher-centered classes in which they sit passively waiting for the lecturer to transfer her or his knowledge.

⁵Further information is available in chapter.10.

Impact

Today, the university is extending the number of library computers due to demand and the impact of the **ICT Online** module on the way students perceive and use computers and the Internet. At this time the university provides one computer for an average of ten persons.

The university also has integrated new distance education rules and regulations and new online distance learning measures.

Two more online distance learning modules with similar characteristics are being implemented. These are included in all first year course curricula and involve Portuguese and English contents.

The *Universidade Jean Piaget de Cabo Verde* has also been recognised by the *Instituto Piaget* community and Cape Verde community as a distance education provider. It works in collaboration with both communities on the development and implementation of distance learning initiatives.

11.3 Achieved results

A multi-method approach was used to attain these empirical research aims by triangulation of the findings from each approach.

Two distinct research stages were developed.

First stage – The goal of this stage was to identify the trust factors that influence students' beliefs and opinions when studying at a distance.

In order to accomplish those goals a survey was designed. It consisted of an underlying list of probable trust influence issues which could influence students' beliefs and opinions when studying at a distance.

Chapter 8 presents the research stage one design methodology and results achieved from the quantitative research stage two procedure.

Second stage – This second research stage integrated two distinct approaches.

- A quantitative approach tested the hypothesis that in online distance learning trust and performance are related. Chapter 9 outlines the methodology and results achieved.

- A parallel qualitative approach provided additional insight on the use of the **ICT Online** module. It explored the relation between trust and academic performance.

Chapter 10 presents the design methodology and results achieved from this parallel qualitative research stage two procedure.

11.3.1 The main trust factors

A factorial data analysis identified three main trust factors of students' trust influence in online distance learning:

Table 11.1: The three main trust factors

<i>Trust factor</i>	<i>Students' beliefs on trust</i>
<i>F[1]</i>	Students' trust towards the interaction between students and teachers
<i>F[2]</i>	Students' trust towards virtual learning environment
<i>F[3]</i>	Students' trust towards technology

An additional analysis established an *Universidade Jean Piaget de Cabo Verde* undergraduate student trust distribution profile. Results indicated that:

- Students have higher levels of trust towards the technology when compared to the other factors;
- Trust was equally distributed across age with the exception of trust towards technology for the younger⁶ and the older⁷ population;
- Gender was equally distributed across this sample;
- Having a computer at home does influence subjects' trust. Although having access to a computer is not enough to foster students' trust in the first two trust factors, only on the third trust factor;
- Having access to the Internet influences students' trust in the second and third factor only;

⁶The younger population belong to a range of ages between 17 to 21 years old.

⁷The older population belong to a range of ages between 27 to 52 years old.

- Having previewed experience in distance education does influence students' trust in the first and third trust factors; and,
- The higher students' ICT skills were the higher was their trust in those three factors.

A detailed description of research stage one results analysis is available in chapter 8.

11.3.2 The relation between trust and performance

The overall second research methodology was designed from two distinctive research approaches, a quantitative and a parallel qualitative approach.

Quantitative approach – The quantitative approach explored the relation between trust and performance in online distance learning. It looked into the relation between trust and performance from two observation conditions:

- A summative observation condition – establishes the correlation between students' initial self trust beliefs and final knowledge and skills assessments grades;⁸ and
- An added value observation condition – examines students' trust correlation to students' performance by analysing trust indicators, and knowledge and skills marks gathered before and after students attended their. **ICT Online** module⁹

Qualitative approach – The parallel qualitative research approach appreciated students' trust in relation to specific aspects within the **ICT Online** module provided by *Universidade Jean Piaget de Cabo Verde*. In this approach observation and interview techniques were used.

Results found through the quantitative research approach, indicated a significant correlation between students' trust and their academic performance in all three trust factors.

More specifically on the first observation condition an analysis of variance (ANOVA) showed a statistical significantly negative correlation between students' summative assessment and students' trust between:

⁸Also known in this work as summative assessment.

⁹Also known in this work as added value performance.

- *F1 and ICT Skills score.*
 - Subjects with Low level of trust cluster had higher *ICT Skills score*; and
 - Subjects within either Middle or High level of trust cluster had lower *ICT Skills score*.
- *F2 and ICT Skills score.*
 - Subjects with Low level of trust cluster had higher *ICT Skills score*; and
 - Subjects with Middle level of trust cluster had lower *ICT Skills score*.
- *F3 and ICT Skills score.*
 - Subjects with Low level of trust cluster had higher *ICT Skills score*; and
 - Subjects with High level of trust cluster had lower *ICT Skills score*.
- *Global trust and ICT Skills score.*
 - Subjects with Low level of trust cluster had higher *ICT Skills score*; and
 - Subjects within either Middle or High level of trust cluster had lower *ICT Skills score*.

On the second observation condition an analysis of covariance (ANCOVA) indicated statistically significant negative correlation between students' trust and their added values performance between:

- *Delta F2 and their Delta ICT knowledge score;*
- *Delta F3 and Delta ICT knowledge score; and*
- *Delta global trust and Delta ICT knowledge score.*

Additional results are presented in chapter 9.

The qualitative second research stage assesses students trust on specific appreciation of their **ICT Online** module provided by *Universidade Jean Piaget de Cabo Verde* and indicated positive aspects of the module, nevertheless some negative aspects were also found.

The **ICT Online** module positive aspects were:

- **ICT Online** instructional content; and
- Students pedagogical support;

The **ICT Online** less positive aspects were:

- Technical failures (electricity, Internet, computer hardware and learning management system); and
- Teacher and student communication difficulties;

During those less positive aspects students tended to become anxious and sometimes frustrated because they believed those aspects affected their academic performance.

But, as referred to previously, in spite of those stressful moments, the majority of students considered their online distance learning experience positive and most of them agreed they would not mind attending another online distance learning module.

Students completed the module with a good impression of the content and the learning strategies adopted. During the interviews they stated that the content provided was clear, easy to understand and unbiased.

The majority of students believed that an online distance learning relationship is maintained by trust and to maintain a trustful relationship it is necessary to have at least one face to face meeting.

The lack of communication between the distance teacher and the students seemed also to influence students' trust in their learning capabilities. Some believed that faster and more punctual feedback might solve such uncertainties throughout the module.

11.3.3 Discussion

In discussing these results a brief review will be made of the concept of trust developed in this study and consideration given to how this might be

an influence for successful online distance learning processes.

This review is also intended to help understand possible students' trust beliefs influences on the above results. Consideration is also given to students' beliefs about trust and online learning.

Trustful relations

Trust is an aspect of so many moments in our life that we mostly consider it unconsciously. It represents an important key in our daily life relations, as it represents a social and psychological phenomenon where a person may have trust in a occurrence if he or she expects such to lead to certain behaviour. Most of the time it is the central key to human relations; it is the glue that holds most co-operative relations together (Lewicki and Bunker, 1996) .

A real relationship is dependent on a mutual trust between people or with another object such as a Website, a server, a group, a society or an institution. (Preece, 2000). It is the central key to people's interactions and how we form our social interactions at a distance or face to face.

Trust is related to the will to co-operate and work in a collaborative environment at distance or face to face. Although, trusting someone or an object represents a risk.

This can become an even greater risk when it is developed within an online distance education scenario where new and unstable communication tools are applied and supported in a new social environment. It is difficult to establish healthy social interaction if communication problems are encountered in this environment.

In some cases the computer mediated communication tools are not yet sophisticated and mature enough to inspire trust.

As Hawthorn (1998) pointed out it can be more difficult to develop trust in an online setting than a face to face one and consequently, it might be harder to trust in an institution or a teacher that we cannot see or touch, than a teacher we can find in corridors, see and get to know in real life as we normally understand it.

This is especially so, when these online environments can bring characteristics closer to those found in face to face education settings; closer enough to promote a sense of deceptive familiarity, which sooner or later threatens the distance education process.

This easily occurs because people's past influences help to define future

trust occurrences. If those beliefs and trust expectations are not met feelings of frustration and lack of motivation can follow.

A clear understanding of trust elements and how they can be built and developed in a human virtual social environment can be a benefit for each individual, for a structured group, a virtual community and to the older society.

Implications

According to the empirical results there are three main trust factors which concern most students when in an online distance learning environment. These related especially to students' trust in the:

- Interaction between students and teachers;
- Virtual learning environment; and
- Technology.

Results from this study also indicated that there is a relation between students' trust and their academic performance in online distance learning. In contrast to what most of us expect, when trust increases students academic performance tends to decrease. Students who ranked higher on trust beliefs achieved lower academic performance results.

Maybe when the trust is too great, the unexpected difficulties introduced by the environment produce a global failure of performance (Castelfranchi and Falcone, 2004).

Results also indicated that special care should be taken to understand the implications of those trust beliefs and their changes throughout the learning experience.

These changes occurred during specific moments in time, such as a technical failure, or poor teacher student communication periods, especially if those occurred near an assessment period.

Results also revealed that when learning the knowledge content of the module, students seemed to be less motivated. Most of them preferred to work alone.

On the other hand, when learning the skills content of the module, they were more motivated to work and learn. The majority worked in groups

and were not so dependent on the Learning Management System and the Internet.

The underlying reasons for the relationships between trust and performance that were highlighted by this study are both complex and context specific. The aim and scope of the study do not enable more than some tentative conclusions about the possible reasons for some of the more unexpected but most interesting results. In relation to the students in this study it is possible that:

- Those students who trusted too much tended to work less and therefore learn less.
- Higher trust expectation could be associated with higher levels of self confidence, less effort and consequently lower performance.
- The technological difficulties and poor communication that students encountered during the module may have contributed to the increased feelings of frustration from those who had higher levels of trust. This frustration could have led to a decrease in their motivation to work and co-operate on their learning aims.

It seems like teaching a child how to walk. A child needs to learn how to deal with their initial expectations and frustrations to be able to trust and walk alone. She or he has to gain confidence and balance by her or himself.

All these feelings become associated with their learning process. Our role as a mother, father or educator is not to walk with him or her, but to to stand beside him or her to be able to support whenever necessary. If we insist on walking with him or her and showing our fear it will be undermine his or her learning process and performance achievements.

Understanding of trust and the degree of influence on students' performance within an online distance learning process is more difficult than it might first seem. To understand people's trust we also need to understand their surrounding environment, as people's level of trust and its fluctuation depends also on their social context.

In this case time, space and technology within the online distance learning process can influence students' trust beliefs and therefore influence their motivation and will to co-operate. The answer for a successful online dis-

tance learning design should remain in providing an adequate level of trust needed to:

- maintain students' motivation towards their learning;
- help students in dealing with their frustrations in good time;
- provide for students' feelings of safety and acceptance within their learning community group; and
- Help students to engage in a mutual dialogue with their teacher and colleagues.

This leads us to conclude that today, distance education pedagogues should aim to integrate trustful virtual learning environments, especially those who are concerned with constructivist education models.

For a virtual learning environment to prosper within those network technologies, learners must be willing to use the learning resources and to engage in a online interaction with their teacher or colleagues in order to support their own learning.¹⁰

They need to be able to assume more control over the story line, the flow and of the learning content. For them to become more self-directed learners, control more of their surrounding environment and participate more in flexible conversations and discussions, the gap between student and teacher needs to be reduce.

For a learner the decision to attend an online distance learning module is not easy to make. He or she faces the risk of losing time, money, effort or just failure and those decisions could affect their ability to trust and hence their learning achievements.

He or she has to face the risk of trusting an institution or a teacher to be able to fulfil their expectations. If those expectations and beliefs are not fulfilled he or she could feel unmotivated and tend not to co-operate leading to lower performance. As Worchel (1979) stated the potential cost of making a bad trust bond has become drastically higher, than the cost of not offering trust.

¹⁰For further information, see chapter 4

Under such conditions, learners' trust motivations should become at least as important as learners' technical skills, knowledge, cultural, social, psychological and information processing factors.¹¹

Trust can be perceived as a trade between individual and an object, in this case the technology used to establish the online communication.

It is therefore important to recreate trust within an online distance learning environment as a new area of study, and to do the re-conceptualisation of the trust problem within those social computer mediated communications. Simply studying trust within the information and communications technology systems is not enough to foster and maintain trustful relationships. It is also important to address the social and psychological interconnectedness of trust with the online communication technology, as those technologies have deeply modified our traditional social relations.

In an online context users hardly make eye and gestural contact with their partners. If such online distance communication is not well cared for, it implies a lack of the dimensions of: character, personality, nature of the relationship, institutional values, familiarity, sharing of system values, gender, age, role, social status, occupation or body language... those on which we normally rely to form attitudes or base decisions of trust.

As well as presenting the empirical work the results in this document serve as a reminder of the importance of trust in online distance learning environments and highlight the need to keep on studying the influence of trust within this process.

It also illustrates that even with minimal technological conditions it is possible to ensure a successful online distance learning environment. It indicates that it is possible to implement online distance learning in a reliable and sustainable module in a developing country.

However minimal conditions have to be established which do not always concern the technological conditions, but also concern the institution, teachers and students willing to teach and learn at a distance.

As indicated earlier besides the technology, people's social context and their willingness to participate, a solid and structured virtual learning environment are also important factors to ensure the success of an online distance education process.

¹¹Further information regarding face-to-face education and distance education is available in chapter 5

11.4 Closing remarks

This chapter acknowledges the distinctive nature of this research context and describes and discusses results from this empirical study.

It reflects on the understanding of the concept of trust and possible influences and implications for the design of online distance learning and pedagogy.

Chapter 12

Summary and future work

12.1 Theoretical landmarks

With today's development of the Internet, distance education as we know it has changed. Within such a context new education paradigms have emerged.

Those paradigms imply a reorganisation and a renewal of the distance education environment and its context.

Within the online context, the immediate and frequent communication is mediated by the online technology.

Today, online technology help to increase school knowledge, as it offers major support in communication, on presentation or for access to information.

Contrary to earlier distance education, online distance education brings us closer to the communication characteristics of face-to-face education. Unfortunately this is close enough to promote a sense of deceptive familiarity which sooner or later threatens the distance teaching and learning process.

Teaching and learning at a distance is different from face to face teaching and learning. Here students, besides learning their subject matter for the program, have to learn how to use the technology to communicate because in this case both are separated in time and sometimes in space.

It is then important to develop an online distance education instructional design methodology which may overcome isolation. The importance of social interaction online and the development of a supportive online learning community is fundamental to teach and learn online.

If such online communication is not well cared for it leads to a lack of

character, personality, familiarity, in the sharing of system values, gender, age, people's roles, social status... those dimensions which we normally rely on to determine people's attitudes or decisions based on trust.

Students need to feel safe, accepted in their learning community group, to be able to engage in a mutual dialogue with the teacher and their colleagues.

An online distance learner has to be highly motivated and capable of self-actualisation.

Promoting trust within those learning environments is an important aspect for online learning as it helps to support learners activities. A trustful communication environment increases the human will to communicate, interact, cooperate and support each other as a community.

Those communications among community members represent the process of exchanging ideas and thoughts based on relationships with a particular history of trust, varied motives, mistakes and forgiveness that has to be created and maintained.

This is especially so in online distance learning communication where users hardly establish an eye or gestural contact.

12.2 Empirical approach

Apart from all conceptual and theoretical landmarks, this document also provides a description of an empirical approach conceived to understand the interaction between trust and performance in online distance learning.

The first research stage – the trust factor survey chapter 8 – identified the main trust factors relevant in online distance learning.

To accomplish this goal a survey was conducted. Results gathered identified three main trust factors in online distance learning. Together with this trust factor identification, the survey results also enabled the understanding of the trust distribution of *Universidade Jean Piaget de Cabo Verde* undergraduate students.

The goal of the second research stage characterised the relation between trust and performance in online distance learning. It explored the relation from two distinct approaches, a quantitative approach and a qualitative approach.

The quantitative approach – Trust and performance experience, chapter 9 – explores the relation between trust and performance in online distance

learning. The qualitative approach – Online module usage appreciation, chapter 10 – evaluates students' trust related appreciation of the **Information and Communication Technologies Online** module study environment provided by *Universidade Jean Piaget de Cabo Verde*.

Students were motivated to learn and work actively in their **Information and Communication Technologies Online** module throughout the entire lapse of time, in spite of the frequent technical and communication problems found.

Such technical difficulties lead students to frequent anxiety and frustration. Even so, most students considered positively their online distance learning experience and were willing to experiment again.

Results also indicate that there is a relation between trust and performance although students' high trust beliefs tend to correlate with students' low academic performance and vice versa.

12.3 Future work

Trust has become one of the main subjects of study within the information society technologies. These new online environments, procedures, interactions and communications depend on peoples' trust and confidence in them.

Providing online interactivity and knowledge are not enough in today's online learning communities. Trust is also an important element, the question is to find out how trust is built in those environments and how it can be maintained.

Trust is a complex and dynamic feature and there is no simple answer or solution for its development or support within those online societies.

Today the use of information and communication technology to teach and learn at a distance has modified people's trust beliefs towards learning.

Following these first steps and within those online learning communications, futures possibilities include the need to understand how,

- the use of information and communication technology to communicate influences people's trust beliefs, expectations and motivations towards learning;
- the fast and continuous evolution of these online information societies

influence people's trust beliefs and how those can affect their performance;

- this young and recent distance communication technology still needs to be adapted to people's social relations, needs and trust beliefs; and finally how,
- these new online social communications and interactions may have influenced people's past trust beliefs.

A collaborative online learning environment is built up throughout online community interaction and people's will to co-operate with each other being supported by a trustful environment. Within those social virtual environments people will be able to exchange ideas, thoughts and learn with each other.

Usually people rely on non-verbal cues and past experience to establish their trustful relations. However this online learning social environment makes it difficult to exchange non-verbal cues and represents a new experience for most learners when compared with the face-to-face learning environment. It is then necessary to understand,

- How teachers and learners trust within their online learning community and how do their trust beliefs influence their online interactions; and
- How do learners' expectations and trust beliefs influence online interactions and their academic performance.

This document's work provides an initial step for the understanding of the influence of people's trust beliefs in an online distance learning environment and its relation with students' academic performance. However, results indicated that high levels of trust lead students to decrease their performance.

Therefore, more research has to be done in those areas so as to understand,

- What level of trust is needed to support and create a collaborative learning environment which may increase learners' performance; and

- What degrees of trust do influence students' motivation towards learning and what prevents it.

To ensure the adequate level of trust among its community, a collaborative online distance learning environment must account for trust indicators. It is thus necessary to understand:

- How these collaborative environments are designed and operated;
- If trust needs touch and if it implies the need for face-to-face contact to provide trustful online learning environments; and
- If trust can be related to the frequency of synchronous and asynchronous interactions between online teachers and learners.

Further, one must always account for different experiences and cultural background as well as for distinct learning and working styles.

One other issue that needs to be addressed is the relation between different teaching and learning paradigms, trust and performance.

Finally, even with the unexpected results, it still is my belief that trust is a relevant factor when addressing online distance learning environments and that these research questions are worth pursuing in order to fully grasp the impact of online distance learning environments.

12.4 Closing remarks

All work summarised and proposed in this chapter relies on the research carried out in this study. Thus, as a further challenge, it is suggested that research needs to be developed to explore various additional forms of trust influence in online distance learning. Especially relevant are those aspects which are related to people's social relations and whether or how much such aspects can influence their learning performance.

Overview

The appendixes herein included account for:

- A brief presentation of Cape Verde;
- The presentation of the the **Information and Communication Technologies Online** module, an online distance learning module designed, developed and deployed at *Universidade Jean Piaget de Cabo Verde*;
- A translation, from the Portuguese original, of the **Information and Communication Technologies Online**'s student guide distributed to students when the empirical study was undertaken; and
- A selection of the empirical study's materials.

A CD-ROM is additionally included in the back cover of this document which includes all the materials of the reported empirical study.

Appendix A

Cape Verde

13This appendix briefly presents Cape Verde.

A.1 Geography

The Republic of Cape Verde is an archipelago located in the North Atlantic Ocean about 500 km west of Senegal in western Africa. Praia is the capital.

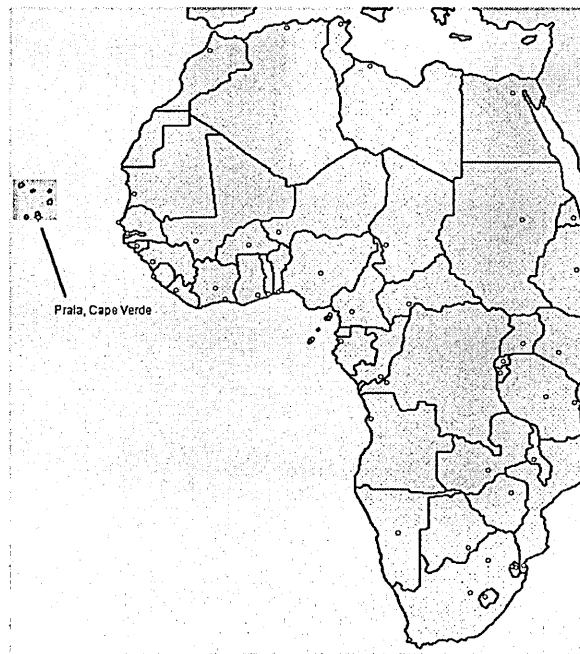


Figure A.1: Cape Verde (<http://cape.africa-atlas.com/>).

Cape Verde consists of ten islands of which one is uninhabited. It covers a land area of 4033 square kilometres (see the map in figure A.1).

As shown in figure A.2, Cape Verde's archipelago is geographically divided into two groups:

Barlavento or windward islands in the north – Santo Antão, São Vicente, Santa Luzia, São Nicolau, Sal and Boa Vista.

Sotavento or leeward islands, to the south – Maio, São Tiago, Fogo and Brava.

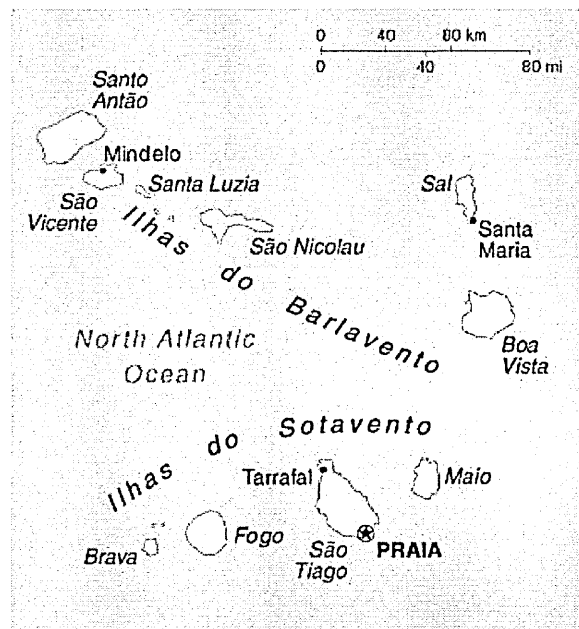


Figure A.2: Map of Cape Verde (<http://cape.africa-atlas.com/>).

This is an archipelago of volcanic origin similar to other islands of the Macaronesia group (*i.e.*, Azores, Canaries and Madeira). Sal, Boa Vista and Maio islands are extremely flat while the rest of the archipelago is mountainous.

Located in the Sahel zone, the Cape Verde is an extension of the Sahara characterized by several geographic and historical particularities.

While it is the coolest nation in West Africa, it has a history of long droughts although the southwest monsoon can bring rain between August

and October. Rainfall is sporadic and not always certain and the occurrence of droughts has had terrible consequences for Cape Verde, resulting in starvation during the past. Droughts are also one of the causes for large-scale emigration.

A.2 History

Uninhabited upon their discovery in 1456, the Cape Verde islands became part of the Portuguese empire in 1495. A majority of today's inhabitants are of mixed Portuguese and African ancestry, as it was used as a slave trade brought from the African mainland.

Positioned on the great trade routes between Africa, Europe and the New World, the islands became a prosperous center for the slave trade but suffered an economic decline after the slave trade was abolished in 1876. In the 20th century, Cape Verde served mainly as a shipping port.

In 1951, Cape Verde's status changed from a Portuguese colony to an overseas province, and in 1961 the inhabitants became full Portuguese citizens.

Around the same time, an independence movement led by the African Party for the Independence of Guinea-Bissau (another former Portuguese colony) and Cape Verde (PAIGC) was founded in 1956. Following the 1974 coup in Portugal, after which Portugal began abandoning its colonial empire, the islands became independent in July 5th 1975.

On January 13, 1991, the first multiparty elections since independence resulted in the ruling African Party for the Independence of Cape Verde (PAICV) losing its majority to the Movement for Democracy Party (MPD). The MPD candidate, Antonio Monteiro, won the subsequent presidential election, and was easily reelected in 1996.

In an effort to take advantage of its proximity to cross-Atlantic sea and air lanes, the government has embarked on a major expansion of its port and airport capacities. It is also modernising the fishing fleet and enhancing its fish processing industry. These projects are being partly paid for by the European Union and the World Bank, making Cape Verde one of the largest per capita aid recipients in the world.

Although, disenchantment with the government's privatisation program, continued high unemployment and widespread poverty helped defeat the

MPD in elections held in January 2001. The PAICV swept back into power and José Maria Neves became prime minister.

A.3 Demography

Cape Verde's national language is Creole (*Kriolu*), spoken by practically the entire population. Creole dates back to the 15 th century and is derived from old Portuguese and languages spoken in the coastal areas of West Africa. Although, Portuguese is the official language, it is used in schools and publications.

Cape Verde is a founding member of the Comunidade dos Países de Língua Portuguesa, the formal organization of Portuguese-speaking nations. Although, around one third of the population is comfortable with Portuguese while over half understands it.

A portion of the population, particularly the educated, is also conversant in French due to until recently, use of French as a second language in school, study abroad, proximity to francophone Africa and the availability of French radio and television broadcasting.

Along with Guinea-Bissau and São Tome and Principe, Cape Verde is one of three lusophone members of the Organisation Internationale de la Francophonie.

English is understood by some, due to relatives abroad and overseas studies. English is also increasingly chosen as a second language at school.

Life expectancy is higher than in Brazil by almost two years. The majority of Cape Verde population is young, with over 42 per cent under the age of 14 and only six per cent over the age of 64. The average Cape Verdean is 17.3 years old.

Many Cape Verdeans have emigrated and though estimates vary, there are at least as many Cape Verdeans abroad as in the country.

There is much anecdotal evidence that there are more Cape Verdeans living abroad than in the country but few hard statistics. One problem is that some Cape Verdeans may be living abroad illegally and therefore not showing up in official statistics.

The country with the most Cape Verdean descendants is the United States of America and Portugal.

The main two reasons for high emigration level in Cape Verde that are

the country dry conditions and a shortage of institutions of higher learning has forced students in search of education to go abroad, some of whom never return home.

Nevertheless, Cape Verde ranks 91 st out of 162 in the United Nations Development Program's Human Development Index (HDI), placing the country in the middle of the medium human development category

Its literacy rate — at some three quarters of the adult population — is respectable and a reflection of the government's emphasis on education over the last decade. The focus now needs to be on increasing literacy among older adults.

The secondary school enrolment rate is 46 per cent. Although there is a shortage of higher education facilities constrains tertiary enrolment, where the rate is only 4.2 per cent.

The last decade has been characterised by an increased emphasis on education and efforts to invest in future generations.

The government recognises that an educated and flexible population and work force will be able to respond to the country's social and economic needs. There has been remarkable progress in establishing and expanding the primary and secondary education system. Efforts to develop the human resource base of the nation and to modernise the educational system today include the use of Information and Communication Technologies (ICT).

In the area of higher education, the nation suffers from a lack of institutions and shortage of qualified teachers. There are just five institutes of higher education and one recently established university.

There are five institutes of higher learning and one recently opened university. There are an estimated 1500 higher education students in Cape Verde. Most students pursuing higher studies must go abroad due to a lack of facilities in Cape Verde. The government, often in cooperation with donors, provides scholarships for overseas studies. Around 2000 Cape Verdeans are pursuing tertiary studies abroad, primarily in Brazil and Portugal.

In short, these are the main indicators:

National name – República de Cabo Verde

President – Pedro Pires (2001)

Prime Minister – José Maria Neves (2001)

Capital and largest city (current estimate) – Praia, 99,400;

Other large city – Mindelo, 66,100;

Languages – Portuguese, Criuolo;

Ethnicity/race – Creole 71%, African 28%, European 1%;

Religion – Roman Catholic (infused with indigenous beliefs), Protestant (mostly Church of the Nazarene);

Literacy rate (current estimate) – 77%;

Population (current estimate) – 418,224 (growth rate: approximately 0.7%).

- Birth rate: 25.3/1000;
- Infant mortality rate: 47.8/1000;
- Life expectancy: 70.5;
- Density per sq mi: 269

Transportation Railways : none;

Highways (current estimate) : total: 1,100 km; paved: 858 km;
unpaved: 242 km;

Waterways : none;

Ports and harbours : Mindelo, Praia, Tarrafal;

Airports : 9.

A.4 Economy

Although was classified as a Least Developed Country, Cape Verde level of economic development places it into a lower middle-income nation rather than low income.

Despite Cape Verde's economic growth, their currency — the *Escudo* — and economy still are fragile. The country has few natural resources and limited agricultural possibilities. Food imports are critical, accounting for about a fifth of imports in 2000. The economy is heavily dependent on foreign assistance and overseas worker remittances.

Reduction of poverty is a priority for the government. According to data from the early 1990s, about a third of the country lives in poverty, of which 14 per cent are classified as very poor.

Tourism holds considerable potential, with its world famous music, stunning landscape and historical sites. It represents the majority of foreign investment has been in this sector.

Fishing is an important source of livelihood in Cape Verde, yet its full potential has not been achieved.

Much fishing is carried out on a smallscale basis and techniques could be improved through access to information. One way is through wider dissemination of information about efficient, appropriate and self-sufficient fishing techniques.

The Food and Agricultural Organization has a project in Cape Verde to improve fish catches, by using low-cost, technologically appropriate fish aggregating devices. The devices attract mackerel, tuna and other fish in the Cape Verdean waters and the catch has doubled at locations equipped with the device. Information about building the device is on the web and if more fishers had access to the Internet, it could help improve their livelihood.

A.5 Media

Access to mass media in Cape Verde is high considering the underdevelopment of the sector and a lack of electricity in some locations.

Over 90 per cent of adult males and around 70 per cent of females read a newspaper, listened to the radio, or watched television in 1998. This is due in part to the nation's relatively high level of literacy and education. Exposure to mass media rises sharply with education.

While in 1998 two thirds of adult females with no education were not exposed to any form of mass media, this figure drops to four per cent for those with a secondary education.

Although, Cape Verde has no daily newspaper published, there are two weekly and several monthly newspapers, all published in Portuguese.

Although, newspapers in Cape Verde face a number of obstacles. One is the high cost of newsprint, making newspapers expensive for many people. Another is the dispersed geographic situation of the nation, which necessitates delivery by air and adds to costs.

There is also, a nationwide coverage of radio and TV broadcasting although there are areas of poor reception, especially in the mountainous regions.

There is no local cable television. Thirst for multi-channel television is met by using satellite dishes for those that can afford them, some people access Portugal's *TV Cabo* digital satellite service.

Finally, some indicators:

Radio broadcast stations (current estimate) – Radios: 100,000;

Television broadcast stations (current estimate) – Televisions: 15,000.

A.6 Telecommunications

Cape Verde's first telephones were installed in 1919. Cape Verde telecommunications goes back to 1874, as a landing point for the first telegraph submarine cable installed between Europe and Brazil.

However, for the next half century not much was done to expand telecommunications

A.6.1 Telephony

In 1960, there were only 188 telephones in the whole nation and the first automatic telephone exchange was only installed a year later. Since independence in 1975, things have changed. Network growth has been spectacular and today Cape Verde has over 70,000 land lines in use together with over 30,000 cellular mobile signatures.

Nowadays, the telecommunication infrastructure features:

- Fully digitized local exchanges;
- National and international fiber optic links;
- ISDN services, and
- A second-generation GSM mobile cellular network.

Unfortunately, the telecommunication services in Cape Verde are a legal monopoly of Cabo Verde Telecom with the concession running until 1 January 2021 and that represents higher service costs.

A.6.2 Internet

Cape Verde's entry into cyberspace was relatively late — it was the 29th African country to get connected to the Internet — which is surprising considering the rapid expansion it had made in other telecommunication areas.

The Internet developed differently in Cape Verde than in many other nations.

In most countries, the Internet started as an initiative of the academic community or a development assistance project. In Cape Verde it was the incumbent telecommunication operator, Cape Verde Telecom (CVT), who first introduced the Internet.

An experimental network was launched by CVT in October 1996 with a 64 kbps connection to Telepac in Portugal. The service was commercialised a year later.

In 2002, the Internet was hardly visible in Cape Verde. There were few Internet cafés, and the existing ones are difficult to locate.

At December 2001, there were an estimated 12,000 Internet users in the country or 2.8 per cent of the population.

A comparison based on users would probably find Cape Verde somewhat behind since it probably has fewer users per subscriber than other developing countries due to a lack of public access outlets.

Billboards or other signs advertising web sites or email addresses are rare and information about obtaining a *.CV* domain name is not easily available. Nonetheless, there is a Cape Verdean cyberspace with a significant amount of information about the country on the Internet.

Even so, this scenario has been changed every year, nowadays there is more Internet cafés and even more *.CV* domain in Cape Verde. The most popular applications are e-mail and information retrieval. There are a number of government databases and plans to develop online government applications.

Connectivity

Although legally the Internet market is open, CVT is currently the only Internet Service Provider (ISP).

There is limited broadband access to the Internet in Cape Verde. Digital

Subscriber Line (DSL) and cable modem access are not available.

The former is not available because CVT claims the demand is not there and the latter because cable television does not exist in the country. Higher speed lines are either provided via Integrated Services Digital Network (ISDN) or leased circuits. ISDN is available with either basic rate (64 kbps) or primary rate interface (128 kbps). The highest leased circuit speed available is 256 kbps¹.

At the end of 2001, there were 550 basic rate and 23 primary rate subscribers. Many of these are using their ISDN line for Internet access. There were also 159 leased circuits though it is not known how many are used for Internet access.

However, Internet access is available from any location with a telephone line and PC with a modem and charged at local call rates. However, rural telephone lines are lacking. In addition, Internet cafés are not widespread.

All institutes of higher learning have some kind of Internet access. One third of secondary schools are connected to the Internet (9 out of 27). A few primary schools are connected. By the end of 2000, all ministries were connected through the government Intranet. Connectivity at the local administrative level is less. Few businesses are connected to the Internet let alone have web sites. There is limited connectivity in the health sector.

Pricing

Dial-up Internet pricing plans in Cape Verde are fairly limited and do not encourage heavy surfing and Internet penetration is no higher due to its costs.

CVT's entry level Internet package amounts to around 12 per cent of per capita income. To this one must add a telephone line subscription, telephone usage charges and a PC, an amount clearly beyond the reach of most Capeverdeans.

There are three monthly plans based on the volume of usage:

- less than 15 hours;
- between 15 and 20 hours; and
- between 20 and 30 hours.

¹Today *Universidade Jean Piaget de Cabo Verde* has a 512 Kbps leased line together with three 1 Mbps digital subscriber lines — at the time the study herein reported was conducted, the university's Internet access was only a 128 Kbps ISDN line.

The price per hour drops marginally for each higher plan. Also, if a user exceeds the hour quota in the plan, each additional hour is charged at a relatively high price.

There are no pay-as-you-go, flat rate or pre-paid pricing plans. In addition to the Internet access charge, dialup users are charged telephone usage charges. Users are charged this regardless of whether they are on-line for one or three minutes.

Another reason that there are not more Capeverdeans using the Internet is awareness. Many may not be aware of the Internet's benefits or existence particularly since Internet advertising is almost non-existent in Cape Verde and Internet cafés are scarce and hard to locate.

Considering that the Internet market has significant potential, efforts to lower tariffs and increase public access could yield significant growth in users.

One reason may be uncertainty over interconnection and the use of leased circuits. That was the main reason for University attempt to install a Internet satellite dish was not accomplished. It appears that CVT has a legal monopoly over international connections preventing potential ISPs from establishing their own international gateways.

A.7 Information and communication technologies

Initially, ICT adoption strategy in Cape Verde started to be delineated in 1995 and in October of 1999 was presented a draft plan which identified the following future iCT Cape Verdean vision.

The Cape Verde government is probably the country's major Internet user. In 1999 few computers within the government had a dial-up Internet connection but since then Information Communication Technology (ICT) had developed quickly. ICT is starting to have an impact in the way government works.

RAFE or *Reforma da Administração Financeira do Estado* which stands for the *Public Finance Management Reform Group* have been one of the major ICT driving forces in the government.

The ICT absorption strategy for Cape Verde started to be delineated in 1995 and by the end of 1999 a draft plan which identified Cape Verde's vision for ICTs was presented. Such plan outlines a number of general and

specific objectives for ICT in the nation:

- A country equipped with infrastructure and modern ICT at the service of development and cultural, technological and economic integration;
- A country equipped with a strong and dynamic productive sector having as its base new technologies; and
- A country equipped with endogenous competency in the field of ICT.

It identified national needs in a number of different areas including policy, education and training, communications, health, private sector and public administration and contains specific projects in those areas.

A.7.1 Education

Despite the efforts the Cape Verdean government has made to promote the educational sector and the success it has had in improving the basic and secondary school system, there are no concrete plans to supply all schools with PCs or connection to the Internet. There is also a lack of coordination between projects in the educational sector.

Some secondary schools offer basic ICT courses but these courses, where available, remain optional. One problem the schools face is the lack of technical know-how. While some schools cannot exploit PCs because they do not know how to use the basic applications, other schools have problems with the configuration and basic maintenance. Many schools also have problems with viruses.

As said before, unlike other nations, the introduction and nurturing of the Internet did not spring from the academic sector.

Distance learning

Education at the tertiary level is limited and was not enough to meet demand, and consequently many students went abroad for higher education.

ICTs could help alleviate the shortage of higher education options through distance learning. Cape Verdean tertiary institutions are starting to enhance their information technology situation. All now have Internet access and a couple have web sites.

This could also overcome the geographic discontinuity of the nation by making cyber education widely available from across the archipelago. Although there have been some initiatives to develop distance education in Cape Verde, none have borne fruit. The failures of these initiatives have not been analysed so it is not clear what the problems were.

The successful experiences of other countries in this area suggest that if applied appropriately, distance learning could be of immense benefit for Cape Verde.

Distance education has great potential, specially in a country that is geographically separated and divided into several islands and that have a relatively under-developed tertiary educational system. Although, distance education projects do not seem to have been successful and information about the experiences is lacking. This area merits further study to see what the barriers are to implementing distance education in the country and how they can be overcome.

A.7.2 Health

The use of Information and Communication Technologies (ICT) within the Cape Verdean health sector is relatively basic. While the Ministry of Health makes use of computers and the Internet, particularly email, ICT are not yet widespread tools for the improvement of health. Since the Ministry does not have its own web site, it cannot provide online information or applications.

The country's two biggest and most modern hospitals are in Mindelo (on the island of São Vicente) and in the capital, Praia (on the island of São Tiago). Both have Internet access. There are plans to computerise the hospitals' and eventually the clinics' medical records and set up a database with the medical history of every patient.

Cape Verde does not have its own medical school. The government provides scholarships for students to study overseas. Cuba has been a popular destination for medical studies due to low tuition. On the other hand nurses do not need to go abroad for training since there are two nursing schools in Cape Verde.

A.7.3 Commerce

For all intents and purposes, e-commerce does not exist in Cape Verde as no Cape Verdean Web site has the capability to process credit card payments.

Another major barrier to ecommerce is the high Internet access costs and PCs prices, which are perceived as prohibitive for most Cape Verdean companies, the majority are Small and Medium Enterprises.

Regarding credit cards, they are difficult to obtain and few people have them, It seems that visa credit card use is right now on an experimental phase.

Regarding debit cards, since 2000 Vinti4 (24) is Cape Verde's answer to the debit card.

It can be used to purchase goods in gas stations and shops that have the necessary Point of Sales equipment with the amount directly debited from the user's account. Up today, Vinti4 (24) integration in Cape Verde market had function rather well, we only hope that the same happens with credit card use.

A.8 Closing remarks

This appendix is mainly a synthesis of a number of reports on Cape Verde and the reader is advised to refer to specialized bibliography for more accurate and updated information if required.

Appendix B

The Information and Communication Technologies Online module

This appendix presents the **Information and Communication Technologies Online** module, an online distance learning module designed, developed and deployed at *Universidade Jean Piaget de Cabo Verde*¹.

The university choose this module as its first graduation level online module to foster students' self-sustained distance learning and ICT skills as the ICT module is part of every curricula.

Designing such a module to be delivered online and at a distance implied:

- Enabling an easy and transparent integration of the online distance learning module with every curricula;
- Designing of a sound instructional strategy;
- Identifying, specifying the profile and catering for the needs of all actors involved;
- The acknowledgment of the university's affordances and constrains;
- The choice of a learning management system; and
- Developing the enabling content for the **ICT Online** module.

¹From now on *Universidade Jean Piaget de Cabo Verde* will be referred to just as the university.

In this context, this appendix's sections are:

Design – Which caters for a presentation and short discussion of the underlying teaching, learning and instruction design strategies and options;

Implementation – This section presents the chosen learning management system discussing underlying options and providing a general overview of its features together with the university's affordances and constraints. This section also provides the reader a comprehensive understanding of a selection of content development issues;

Deployment – Short description of the module's *first run*; and

Running samples – Finally, the reader is provided with a handful of running samples and a small set of instructions enabling live online appreciation of the learning management system.

B.1 Design

A face-to-face version of the ICT module, implemented on 2001 and 2002 academic years, provided initial data regarding the students' ICT usage and knowledge profiles. These indicators enabled understanding of the university's and students' environment.

Three post-graduation level online distance learning modules also enabled to test, evaluate and explore, in a more restrict environment, several teaching and learning options as well as the university's suitability to such an initiative.

Based on those above experiences, designing the **ICT Online** module main concerns included:

- The university's student population, as there were indicators that students had very little or none ICT knowledge and skills and also the only a small number of students own a computer or had Internet facilities; and
- The irregularity of the electric power supply and the quality and bandwidth of the available Internet connection which tended to endanger the successful deployment of the **ICT Online** module.

With the above issues in mind, initial decision included:

- To provide strong technical support on using the learning management system through a specialized help desk physically available at the university;
- To provide enough access point at the university campus as few students would have computer with Internet access at their homes;
- To foster the inclusion of online learning measures in the university's rules and regulations;
- To increase online learning awareness throughout the university's community through small seminars and presentations; and
- To design a deployment process as fluid as possible in order to minimize change resistance.

B.1.1 Teaching and learning strategy

The main paradigm behind the development of the **ICT Online** module is *self-study* in which learning objects supports a predetermined learning purpose, mainly composed of learning activities and supporting contents.

To develop a sound educational strategy, special attention was also given to both individual and environmental discriminative attributes and a model was adopted which also catered for collaboration opportunities, formative and sumative assessment as well as for pedagogical and technical support.

As for most students, the **ICT Online** module was their first online learning experience, an additional students' motivation session was prepared to be provided before the beginning of the module. Its goal was to elucidate the students on online distance learning and the foreseeable benefits of attending a module with this one's features.

Finally, a very detailed student guide was added to the module's teaching and learning strategy life support line for both students and teacher.

B.1.2 Instructional design strategy

This module mainly based his instructional design strategy in goal oriented learning activities in which students' are requested to perform specific weekly tasks and assessed feedback assessed was to be provided every two weeks.

Instructional strategy includes text-based content with exercises, multimedia illustrations and interactive graphics, assessment feedback tasks and asynchronous and synchronous online conversations areas. All communication between students or between students and teachers was to be computer-mediated, with asynchronous and synchronous communications.

Those task assignments aimed to guide students throughout the module, but simultaneously respecting student's different learning styles, needs and opportunities.

The **Information and Communication Technologies Online** module uses a combination of:

- Learning activities
 - Interactive content;
 - Exercises;
- Assessment tasks
 - Formative;
 - * Synchronous communication sessions
 - Sumative;
 - * Questionnaires;
 - * Small projects;
 - * Final exam (both over theory and practice)
- Pedagogical support
 - Real-time study guide
 - Synchronous communication sessions
 - Asynchronous message exchanging
- Technical support
 - Face-to-face and over the phone

Each learning activity content was hierarchically organized. Content materials were written in a simple way using small text or multimedia chunks.

A printable alternative was also available. Asynchronous interactions were balance with synchronous moments.

Figure B.1 provides a diagram that attempts to illustrate this module's instructional design strategy.

The module runs over a fifteen week period as do all other graduation level modules at the university. Bars represent continuously available items whereas diamonds represent isolated tasks.

Face-to-face and online time-lapses are also identified at the top of the diagram.

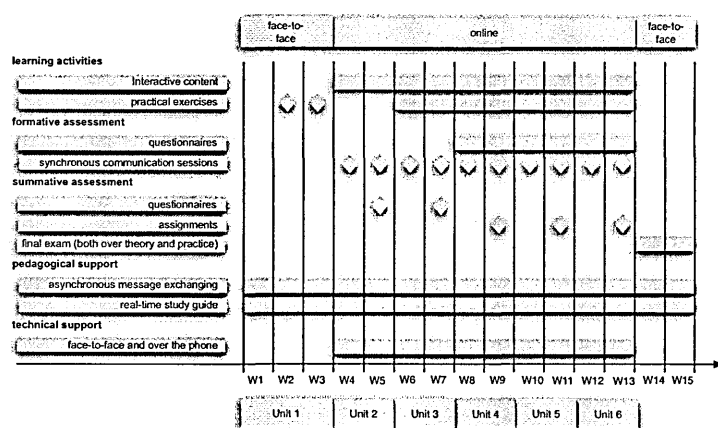


Figure B.1: ICT Online module instructional design strategy

Actors

In this online module, the main actors are:

Students – The online students;

Instructors – Teachers and tutors; and

Help desk – The technical support who catered for the needs of the students and instructors at this level.

Additional actors during the design phase were the domain specialists (the ICT teachers) who helped define the instructional strategy and provided the necessary learning and assignment tasks' contents.

Additional actors during the implementation phase of the preparation of this module was *PT Inovação*, the developers of the adopted learning management system, and a multimedia programmer as well.

Figure B.2 provides a schematic illustration of the foreseeable intervention of the main actors in the module's execution.

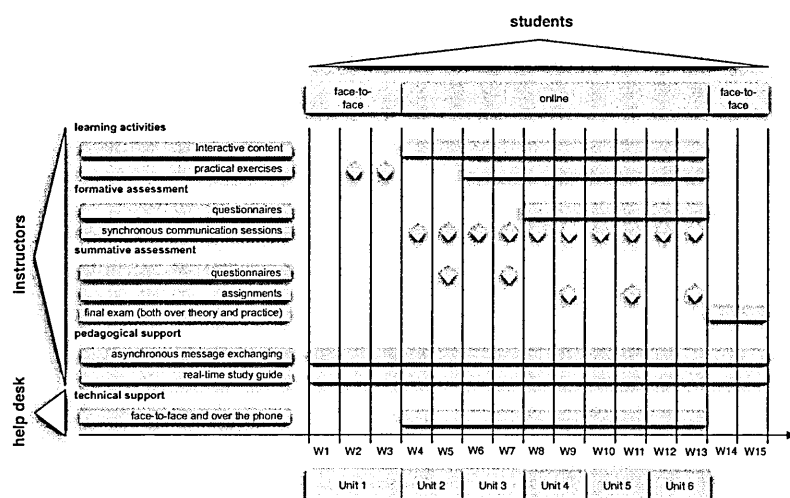


Figure B.2: Actors involved during the execution of the **ICT Online** module

B.2 Implementation

After studying a number of options, the university's choice fell on *Formare*, a Portuguese built e-learning platform developed by *PT Inovação* (British closest would be *BT*).

Contents were developed mainly as web pages (HTML) or digital documents (PDF) all compliant with SCORM².

²The Sharable Content Object Reference Model (SCORM) defines a Web-based learning *Content Aggregation Model* (CAM) and *Run-Time Environment* (RTE) for learning objects. In essence, the CAM defines how to aggregate, describe and sequence learning objects and the RTE defines the run-time communication and data to be tracked for learning objects. SCORM is a collection of specifications adapted from multiple sources to provide a comprehensive suite of e-learning capabilities that enable interoperability, accessibility and reuse of Web-based learning content.

B.2.1 Learning Management System

*Formare*³ operates since 1996. Initially developed as a corporate online distance training platform, to provide a lifelong learning infrastructure to Portuguese companies, currently operates with a vast number of Portuguese private and public institutions, for example:

- Portuguese Ministry of Education for as an online distance training platform, see Santos (2002).
- The Justice Department ⁴.
- The mail company ⁵.
- Portuguese entrepreneurship association ⁶, among others.

As shown in figure B.3, it includes reliable content management mechanisms, synchronous and asynchronous communications tools, assessment instruments, collaboration support tools and record keeping mechanisms:

Contents management – It is SCORM compliant and enables structured knowledge domain modeling, usage tracking, content embedded assessment and individual note taking. It also provides a coherent content access interface across all modules, using a tree navigation metaphor.

Synchronous and asynchronous communication – Synchronous and asynchronous communication with several interaction privileges ranging from simple text to multipart video conferencing.

Collaboration support – Through embedded group work tools.

Assessment tools – Such as:

- Questionnaire and query authoring; and
- Deliverables management.

Record keeping mechanisms – Supporting from as simple as a student form or record to complex and thorough academic record keeping.

³Please see <http://www.formare.pt/> for more details.

⁴Conselho Distrital de Lisboa da Ordem dos Advogados e Centro de Formação de Oficiais de Justiça.

⁵CTT, or *Correios de Portugal*.

⁶AEP or *Associação Empresarial de Portugal*.

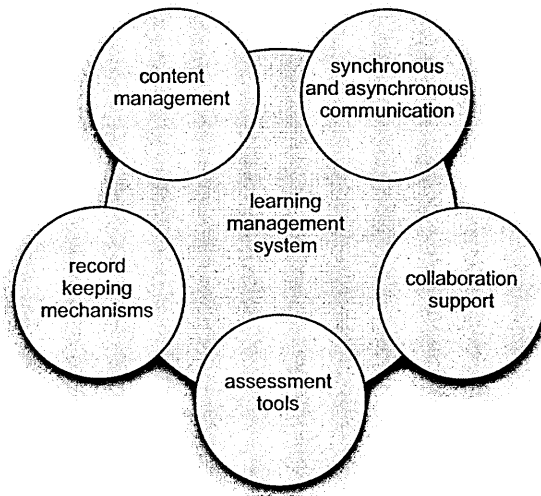


Figure B.3: *Formare* main components

Several reasons contributed to the adoption of *Formare* by the university as its learning management system.

First and foremost, it was a Portuguese solution with simplified students' usage as it was in Portuguese and built around common cultural metaphors and seemed quite complete as a learning management system.

Another decision factor was its high level of access and usability such as devised by the university.

Adding to that, *Formare* team was available to collaborate with the university on the development of this project. *Formare* as a partner, helped the university design its online learning scenario and helped to launch a plan which accounted for teachers' as well as instructional designers' training as well as a technical feasibility assessment (which resulted in the improvement of the university's electrical and Internet conditions).

An initial work and continuous discussion between both, *Formare* team and University team was and still is maintained.

Such joint forces from both teams contributed towards an analysis, study and implementation of basic *Formare* changes to create a more personalised university's learning management system. As a consequence of such teamwork, exchange of knowledge and joint experiences between both the university and the *Formare* team was enabled.

By January of 2003, the university had already acquired their competencies and skills in developing dynamic contents and instructional design. By that time, three post-graduation level modules were already designed, implemented and deployed with the help of the *Formare* team. These were used as a pilot test for the **ICT Online** module design, implementation and deployment.

B.2.2 The university's affordances and constraints

By the time this project started, in September 2002, the university's Internet connection was only an ISDN 64 Kbps line, the campus' electricity supply was inadequate and unstable and the computer labs didn't have any kind of air conditioning which helped to increase technical problems.

Nowadays, some of those problems are solved, in six months electricity supply was stabilized, all computer labs were equipped with fans and air conditioning and the Internet connection went from an ISDN with 64 Kbps capacity to a leased line with 128 Kbps, then 256 Kbps and 3.5 Mbps bandwidth has of 2004.

B.2.3 Content development

The **Information and Communication Technologies Online** content instructional content was developed by a knowledge specialist and further worked upon by a multimedia programmer. Other instructional components were developed with the learning management system tools.

All content further tailored to be SCORM compliant using an hierarchical structure which accounted for modules, units and learning activities with an estimate total duration of 4 hours of student work.

Normalised content

The next lines below presents a sample of the **ICT Online** module's SCORM code:

```
<?xml version="1.0" encoding="iso-8859-1" standalone="no"?>

<manifest identifier="II" version="1.1"
  xmlns="http://www.imscproject.org/xsd/imscp_rootv1p1p2"
  xmlns:adlcp="http://www.adlnet.org/xsd/adlcp_rootv1p2"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
```

```

xsi:schemaLocation=
  "http://www.imsproject.org/xsd/imscp_rootv1p1p2 imscp_rootv1p1p2.xsd
  http://www.msglobal.org/xsd/imsmd_rootv1p2p1 imsmd_rootv1p2p1.xsd
  http://www.adlnet.org/xsd/adlcp_rootv1p2 adlcp_rootv1p2.xsd"
<metadata/>
<organizations default="MOD2">
  <organization identifier="MOD2">
    <title>Introducao aos computadores</title>
    <item identifier="Aula4" identifierref="SCO_4">
      <title>Aula 4</title>
      <item identifier="Seccao_1" identifierref="SCO_41">
        <title>1 Introducao</title>
      </item>
      <item identifier="Seccao_2" identifierref="SCO_42">
        <title>2 Objectivos</title>
      </item>
      <item identifier="Seccao_3" identifierref="SCO_43">
        <title>3 O computador</title>
      </item>
      <item identifier="Seccao_4" identifierref="SCO_44">
        <title>4 Histria e gera\c{c}\~oes de computadores</title>
      </item>
      <item identifier="Seccao_5" identifierref="SCO_45">
        <title>5 Notas finais</title>
      </item>
      <item identifier="Seccao_6" identifierref="SCO_46">
        <title>6 Bibliografia</title>
      </item>
    </item>
    <item identifier="Resumo2" identifierref="SCO_R2">
      <title>Resumo</title>
    </item>
  </organization>
</organizations>
<resources>
  <resource type="webcontent" identifier="SCO_4" adlcp:scormtype="sco"
href="Aula4/frame.htm">
    <file href="Aula4/frame.htm"/>
    <file href="Aula4/top.htm"/>
    <file href="Aula4/sumario.htm"/>
    <dependency identifierref="RES_CSS"/>
    <dependency identifierref="RES_LED"/>
    <dependency identifierref="RES_API"/>
  </resource>
  <resource type="webcontent" identifier="SCO_41" adlcp:scormtype="sco"
href="Aula4/1Intro/frame.htm">
    <file href="Aula4/1Intro/frame.htm"/>
    <file href="Aula4/1Intro/menu.htm"/>
    <file href="Aula4/1Intro/1Pag.htm"/>
    <dependency identifierref="RES_CSS"/>
    <dependency identifierref="RES_LED"/>
  </resource>

```

```

        <dependency identifierref="RES_API"/>
    </resource>
    <resource type="webcontent" identifier="SCO_42" adlcp:scormtype="sco"
href="Aula4/20bj/frame.htm">
        <file href="Aula4/20bj/frame.htm"/>
        <file href="Aula4/20bj/menu.htm"/>
        <file href="Aula4/20bj/1Pag.htm"/>
        <dependency identifierref="RES_CSS"/>
        <dependency identifierref="RES_LED"/>
        <dependency identifierref="RES_API"/>
    </resource>
    <resource type="webcontent" identifier="SCO_43" adlcp:scormtype="sco"
href="Aula4/3Comp/frame.htm">
        <file href="Aula4/3Comp/frame.htm"/>
        <file href="Aula4/3Comp/menu.htm"/>
        <file href="Aula4/3Comp/1Pag.htm"/>
        <file href="Aula4/3Comp/2Pag.htm"/>
        <file href="Aula4/3Comp/3Pag.htm"/>
        <file href="Aula4/3Comp/4Pag.htm"/>
        <dependency identifierref="RES_CSS"/>
        <dependency identifierref="RES_LED"/>
        <dependency identifierref="RES_API"/>
    </resource>
    ...
</manifest>

```

Figure B.4 illustrates a hierarchical content tree provided by the SCORM compliant normalised data.

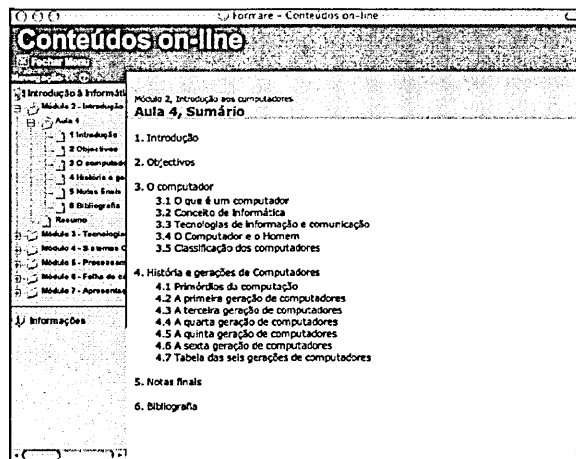


Figure B.4: The ICT Online hierarchical electronic content

The next lines presents a code sample used for to register the students'

progress throughout the **Information and Communication Technologies Online** digital content.

```

/*****
**
** FileName: LEDfunctions.js
**          DAEFA - Universidade Jean Piaget de Cabo Verde
**          Laboratorio de Educacao a Distancia (LED)
**
*****/

// alert("LEDfunctions.js");
// genaral variable of session begining
    var inicio;
// Show the page number and total number of pages
    var pagina;
    var totpag;

function LEDloadLesson()
{
    LMSInitialize();
    // student name
    var nome = LMSGetValue("cmi.core.student_name");
    // time reading
    var tempo_total = LMSGetValue("cmi.core.total_time");
    return;
}

function LEDunloadLesson()
{
    LMSFinish();
    return;
}

/*****
**
** Function: LEDloadSubLesson()
** Inputs:  obj - numero de objectivos da SCO, total numero de paginas
** Return:  Nada
**
** Description:
** Save the time when the user enter the content
**
*****/

function LEDloadSubLesson(obj, tot)
{
    // alert("LEDloadSubLesson(obj)");
    LMSInitialize();
    // Save of the hour of content upload

```



```

    inicio = new Date().getTime();
    // Defio dos objetivos (consulta de cada uma das
    p\'aginas da aula)
    var objetivos = LMSGetValue("cmi.objectives._count");
    // alert("objetivos= " + obj + "n" + "Contagem = " + objetivos);
    var j;
    if ( objetivos != obj ) {
        for ( i = 0 ; i < obj ; i++ ) {
            j = i + 1;
            LMSSetValue("cmi.objectives." + i + ".id", "Pagina_" + (i + 1));
            LMSSetValue("cmi.objectives." + i + ".status", "incomplete");
        }
        LMSCommit();}
    pagina = LMSGetValue("cmi.core.lesson_location");
    if (pagina == null) {pagina = 1;}
    totpag = tot;
    // Se no interessar usar a funo MudaPagina, por
    ex. nos Resumos
    if (tot != -1) {
        MudaPagina(pagina);}
    return;
}

/*****
**
** Function: LEDunloadSubLesson()
** Inputs:   obj - numero de objetivos ou paginas
** Return:   Nada
**
** Description:
** Save the time when the user leave the content and returns the
** time that he or she spend on it
**
*****/

function LEDunloadSubLesson(obj)
{
    // alert("LEDunloadSubLesson(obj)");
    // Save the time of leaving the content
    var fim = new Date().getTime();
    // get the user time inside the content
    var tempo = ConverteHoras((fim - inicio)/1000);
    // alert("Tempo usado: " + tempo);
    LMSSetValue("cmi.core.session_time", tempo );
    // Verificao da concluso do SCO
    var concluido = true;
    for ( i = 0 ; i < obj ; i++ ) {
        var status = LMSGetValue("cmi.objectives." + i + ".status");
        if ( status != "completed" ){ concluido = false; }}
    if ( concluido != false ) {
        LMSSetValue("cmi.core.lesson_status", "completed");}
}

```

```

// Save the number of the last page seen by the user
LMSSetValue("cmi.core.lesson_location", pagina );
LMSCommit();
LMSFinish();
return;
}
...

```

Figure B.5 shows a sample of a student report accessed by the teacher which contains students' indicators enable by the code sample above used upon of the **Information and Communication Technologies Online** digital content

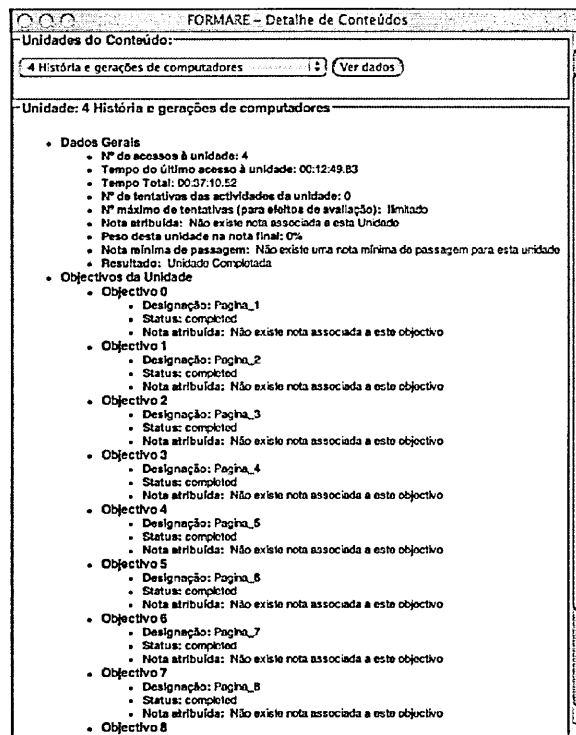


Figure B.5: A sample of a student's report when attending the **ICT Online** module

B.3 Deployment

The **Information and Communication Technologies Online** was first available on the second semester of 2002/2003. It was used by close to hundred

(100) students from three different undergraduate courses:

- Physiotherapy;
- Economics and management;
- Communication sciences;

Their pass rate was over 90% with grades presenting a normal behavior consistent with other modules and courses.

As most students did not have access to a computer at home, computers available at campus were heavily used. In the end, students generally accept learning online, in spite of being biased towards teacher centered classes in which they seat passively waiting for the lecturer to transfer her or his knowledge.

Today, the university is reinforcing its library computers due to demand and impact of the **ICT Online** on way students perceive and use computers and the internet.

Stressful moments occurred together with technical infrastructure difficulties. Specially when such conditions were close or on critical time periods like before assignment delivery dates or just before a scheduled questionnaire. Although, online student's performance improved with time as students became more and more used to study online.

B.4 Running samples

This section illustrates the **Information and Communication Technologies Online** online learning environment.

B.4.1 A typical session of the *Formare* Learning management system

First step to attend our **ICT Online** module is the learning management system login. Figure B.6 shows the *Formare*'s learning management system login window.

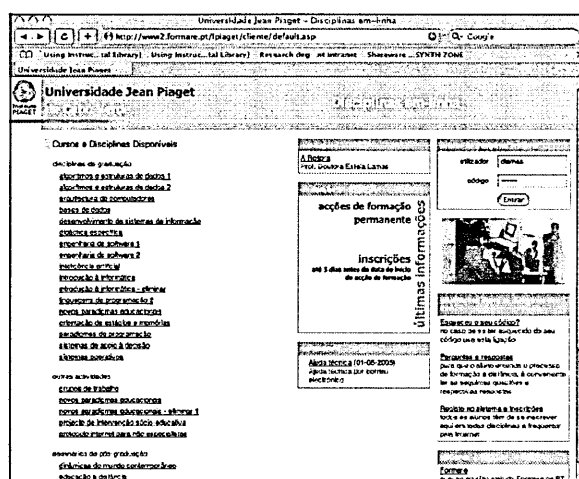


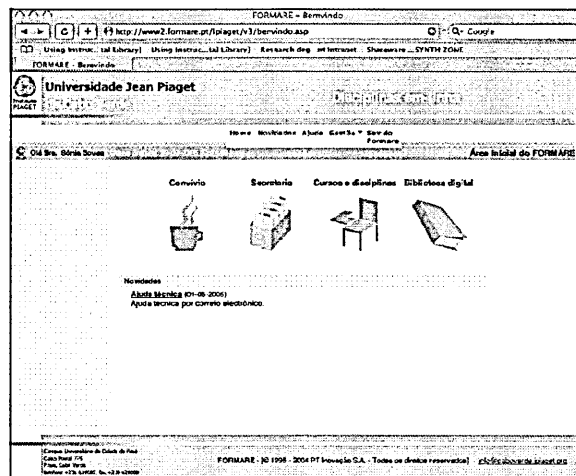
Figure B.6: *Formare's* login window

Then, inside *Formare* we are presented with four main choices at the entrance point:

- A general *Formare's* public area, called "*Convívio*";
- An administrative area, named "*Secretaria*";
- The courses and modules area, called "*Cursos e disciplinas*"; and
- The *Formare* digital library, called "*Biblioteca Digital*".

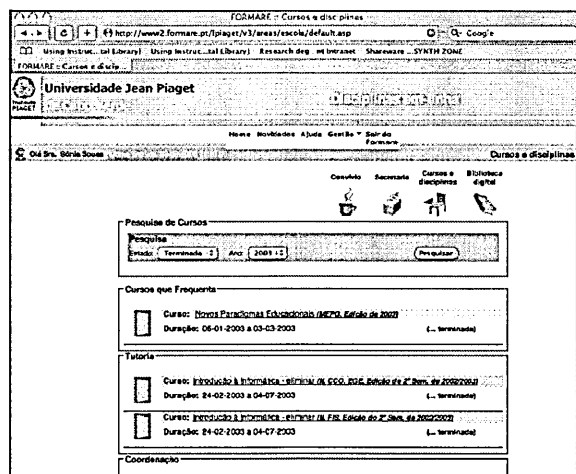
As an option, users may also access directly to a general news area, called "*Novidades*".

Figure B.7 presents *Formare's* entrance hall window described above.

Figure B.7: *Formare's* entry screen

For users to have access to their course or modules, they need to select the *cursos e disciplinas* icon which will lead them to an area where all attended modules are listed, see figure B.8.

Such list allows users to search past, present or future courses or modules in which they are enrolled.

Figure B.8: *Formare's* courses and modules list for a specific student

For users to access to the electronic administrative area, it is necessary to select the *Secretaria* icon. This will allow them to access an area with

personal and *Formare's* administrative data files, see figure B.9.

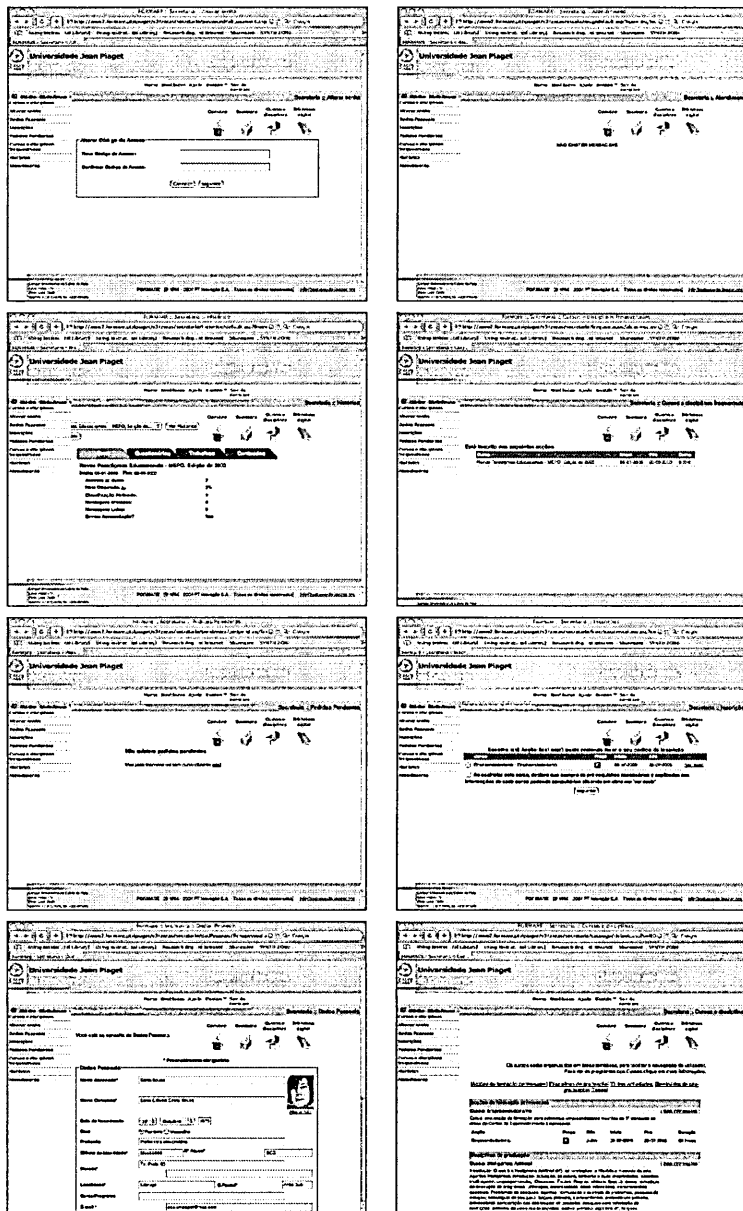


Figure B.9: Sample of *Formare's* administrative area contents

For users to access to the general *Formare's* public area, depicted in figure B.10, it is necessary to select the *Convívio* icon which leads them to asynchronous and synchronous conversation areas as well as to a game

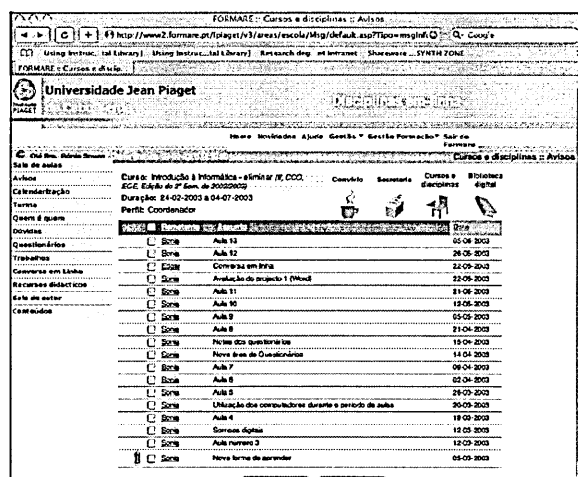


Figure B.13: Announcement's area on the ICT Online module

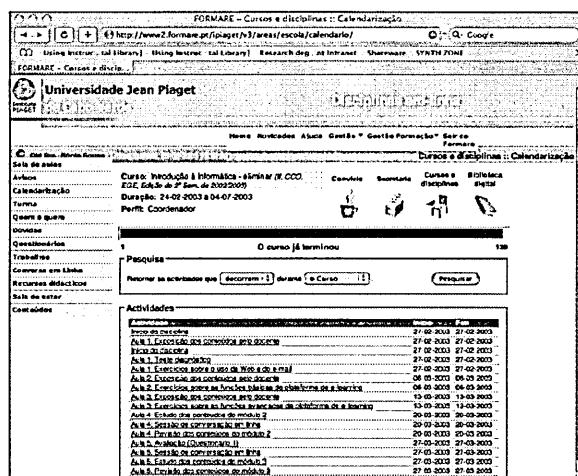


Figure B.14: The ICT Online module agenda and study guide

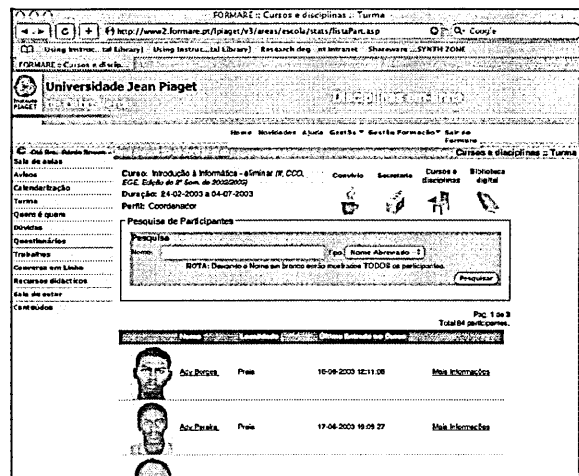


Figure B.15: The module's list of participants

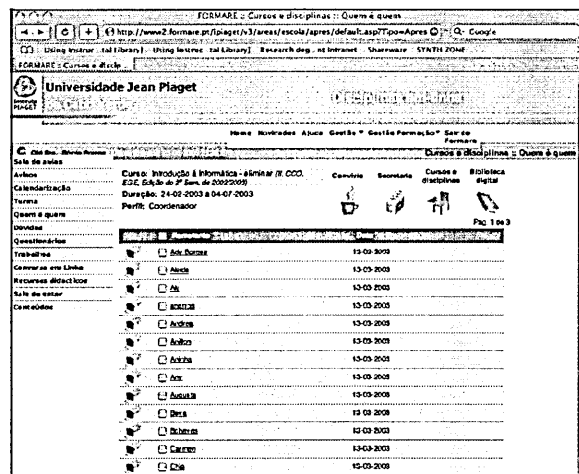


Figure B.16: The student's introduction list

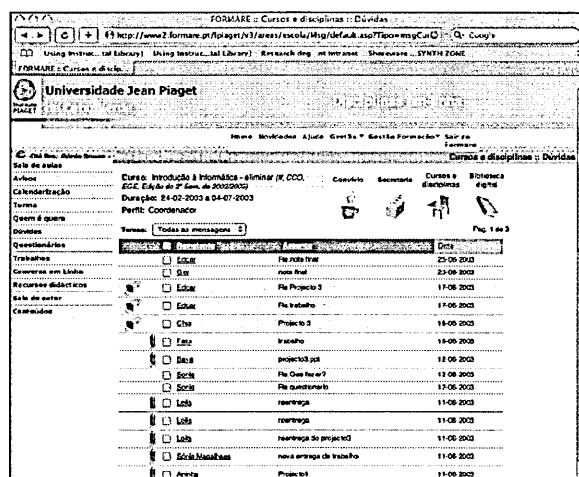


Figure B.17: Questions and answers area

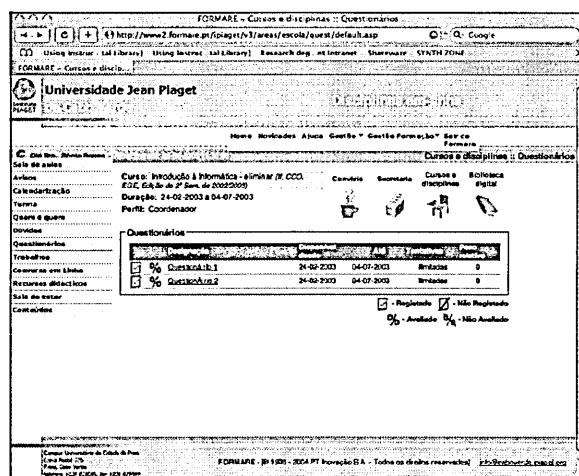


Figure B.18: Quizzes' area

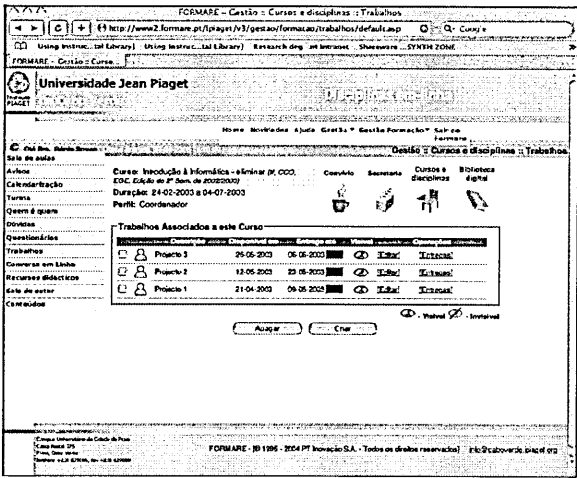


Figure B.19: The project's area

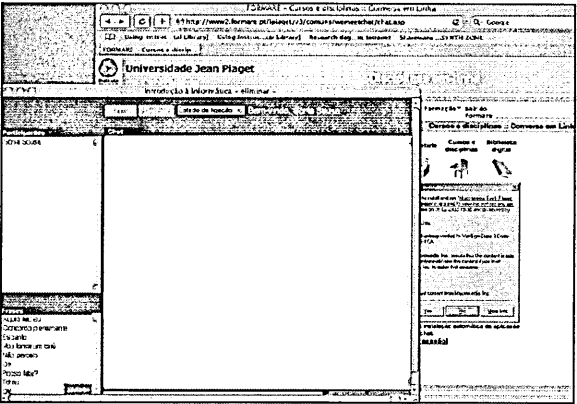


Figure B.20: The ICT Online module's synchronous conversation area

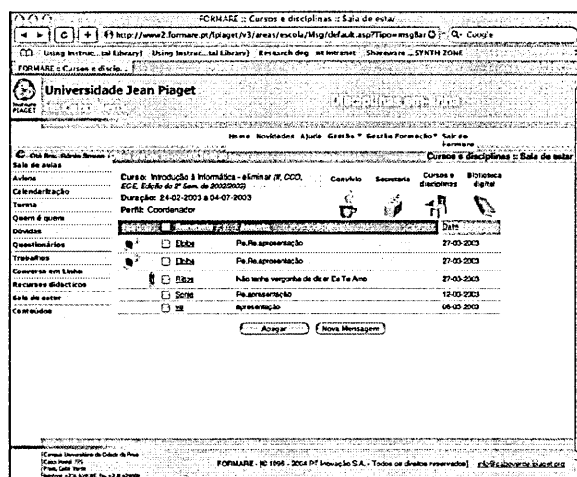


Figure B.21: The asynchronous conversation area

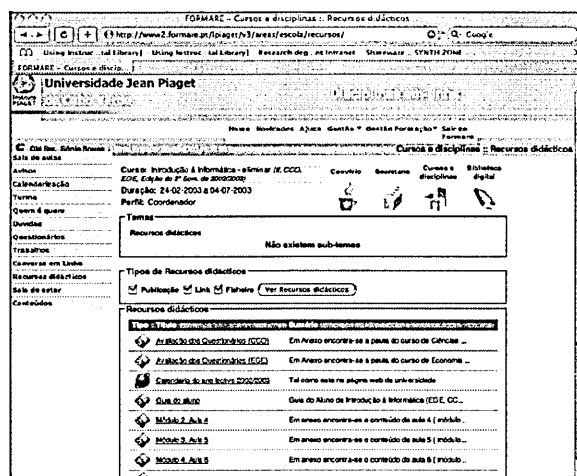


Figure B.22: The module's additional resources window

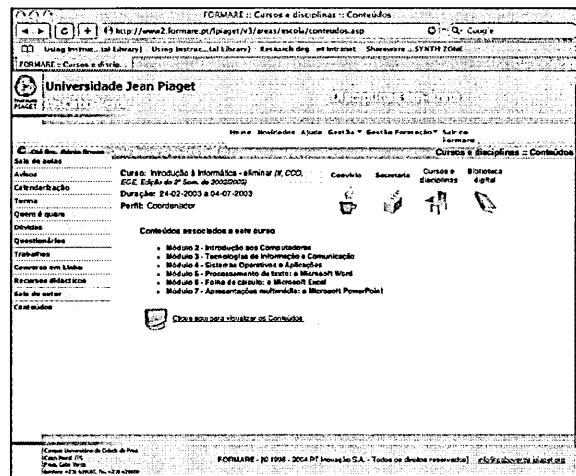


Figure B.23: ICT Online module contents

B.5 Closing remarks

Updated versions of this module are still in use at *Universidade Jean Piaget de Cabo Verde* and other modules and courses took it as a starting point when developing pedagogical their strategies.

Appendix C

ICT Online student guide

This appendix is an English translation, from the Portuguese original, of the **Information and Communication Technologies Online**'s student guide distributed to students when the empirical study was undertaken.

As this translation, the original student guide was comprised of two major sections:

Module description – This section enables an overall awareness of the module's characteristics covering context and goals, synopsis, target audience, pre-requisites, contents, expected work load, foreseen activities and assessment criteria.

Activities schedule – This section provides an enhanced *to-do* list which aims to keep students focused and aware of all issues related to her or his expected activities.

The first instance of the **ICT Online** distance learning module, deployed during second semester of the 2002/2003 academic year, will now be presented.

C.1 Module description

The **Information and Communication Technologies Online** module aims to provide opportunities for students to learn how to work with a personal computer and the Internet.

It includes sixty (60) hours of learning activities. From those, thirty (30) hours regarded theoretical content and the other thirty (30) are dedicated to practical content issues.

This module is divided in six units with at least an expected eight hours workload per unit.

The sixty hours (60) of learning activities are distributed throughout a fifty (15) week semester.

To achieve this module's goals, a student study guide is available which guides students throughout all its contents.

The **ICT Online** module begins with three initial face-to-face lessons where the instructor provides the student's the study guide and the necessary skills to attend their online distance learning module including a brief explanation on how this module works, an explanation of what should be the student's main goals and aims and how to use the *Formare's* learning management system to perform the learning activities.

This module also includes a final face-to-face lesson right in the end of the module, it aims to provide a module close-up and to carry out a final assessment.

All learning activities between the face-to-face lessons are achieved online through the Internet.

C.1.1 Context and goals

As paper and pencils, computers have become important tools. To learn and know how to work with a computer and the Internet are essential skills for today's life.

That is why this module aims to provide *Universidade Jean Piaget de Cabo Verde* student's computer and Internet usage working competences and skills.

This module covers computer history, operating system concepts and usage, Internet information search, exchanging electronic mail, text processing, spreadsheet usage and presentations preparation.

Students' should achieve the knowledge and confidence to use information and communication technologies, such as personal computers and the internet, throughout their courses and professional lives.

C.1.2 Synopsis

With today's widespread use of computers and the internet, it is very important to know how to use them both personally and professionally.

The **Information and Communication Technologies Online** main objectives are:

- To learn how to use the learning management system *i.e.*, the *Formare* environment;
- To grasp general concepts on the evolution of information and communication technology;
- To understand how a personal computer processes information;
- To know how to use the Internet for searching information and exchanging electronic mail; and
- To know how to use a computer's personal productivity tools.

C.1.3 Target students

First year students.

C.1.4 Pre-requisites

Student to attend this module need to:

- Have an email account and know how to use it;
- Know how to use a world wide web browser; and
- know how to use carry out an online synchronous conversation.

This module provides initial face-to-face lessons to help students fulfill the pre-requisites.

C.1.5 Module contents

This module contents includes 7 units:

Unit 0 – Using the Web, electronic mail and the leaning management system (*Formare*);

Unit 1 – Basic computer and internet skills;

Unit 2 – Computer history;

Unit 3 – Operating system usage;

Unit 4 – Word processing;

Unit 5 – Using spreadsheets; and

Unit 6 – Preparing presentation with the computer.

C.1.6 Workload

Sixty (60) hours of learning activities. From those, thirty (30) hours regard for theoretical content and the other thirty (30) to cover the practical content.

C.1.7 Activities

Activities for this module include:

- Perform an entry level assessment;
- Study the units' contents;
- Perform the unit's exercises;
- Pass the assessment questionnaires;
- Attend online conversations;
- Achieve the project tasks; and
- Pass a final exam.

C.1.8 Assessment criteria

According to University rules and regulations, student's are approved in this module if they score a final grade equal or higher than 10 on a 20 points scale.

This module's assessment instruments are now highlighted.

Summative assessment instruments

Students have to:

- Do three assessed and summative practical projects graded on a scale from 0% to 100%;
- Pass two summative assessment quizzes, graded on a scale from 0% to 100%; and
- Pass a practice and theory final exam also marked from 0% to 100%.

The **Information and Communication Technologies Online** module final grade is calculated using this formula:

$$\text{Final grade} = \text{Theory exam} * 0.40 + \text{Practice exam} * 0.20 + \text{Quizzes} * 0.30 + \text{Projects} * 0.10$$

Formative assessment instruments

Formative assessment includes:

- The student's participation on synchronous online conversations;
- One entry level questionnaire to assess the students' initial skills; and
- Two optional theoretical content questionnaires with immediate feedback.

C.2 Activities schedule

Table C.1 provides a sample of the module's activities schedule. The module is divided in units with a predetermine number of learning activities. Each learning activities students' are expected to achieve a number of tasks.

Table C.1: Activities schedule

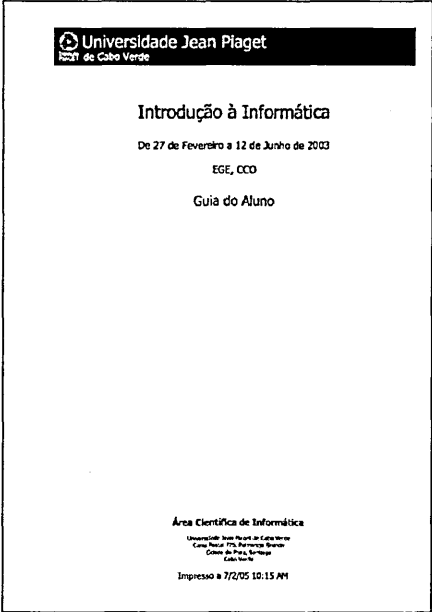
<i>Week</i>	<i>Theme and tasks</i>
Week 01 [27.02.03]	This week's... theme – Computer environment usage. Introduction to the internet, World wide Web and electronic mail. tasks – Fulfill all pre-requisites to attend this module; answer an entry level assessment questionnaire.
Week 02 [14.03.03]	This week's... theme – Learning management system usage. tasks – Continue learning how to use the World wide Web search and electronic mail. <i>Formare</i> usage exercises.
Week 03 [From 17.03.03 to 21.03.03]	This week's... theme – Learning management system usage. tasks – Continuing studying the <i>Formare</i> virtual learning environment; and performing exercises on <i>Formare</i> 's system usage.
Week 04 [From 24.03.03 to 28.03.03]	This week's... theme – Computer history. tasks – Study relevant online contents.
Week 05 [From 31.03.03 to 28.04.03]	This week's... theme – Computer history and first summative assessment. tasks – Study relevant online contents; answer a questionnaire.
Week 06 [From 07.04.03 to 11.04.03]	This week's... theme – Operating system usage. tasks – Study relevant online contents; perform exercises.
Week 07 [From 21.04.03 to 25.04.03]	This week's... theme – Operating system usage. tasks – Study relevant online contents; perform exercises; answer a questionnaire.

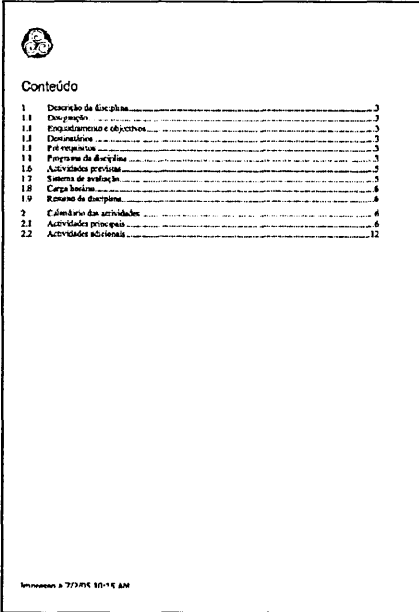
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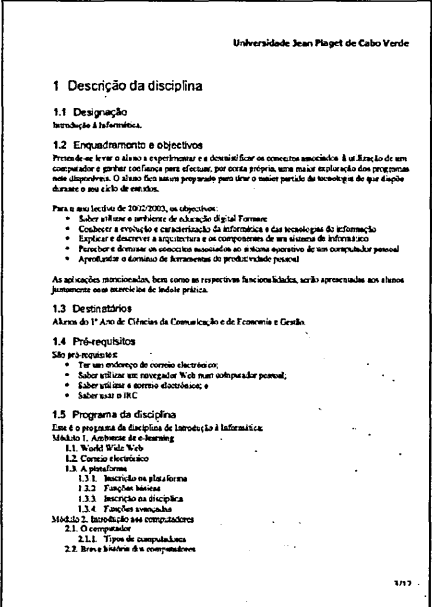
(...continued from previous page)

<i>Week</i>	<i>Theme and tasks</i>
Week 08 [From 28.04.03 to 02.05.03]	This week's... theme – Word processing. tasks – Study relevant online contents; perform exercises.
Week 09 [From 05.05.03 to 09.05.03]	This week's... theme – Word processing. tasks – Study relevant online contents; perform exercises; prepare a small project; participate in an online conversation.
Week 10 [From 12.05.03 to 17.05.03]	This week's... theme – Spreadsheets. tasks – Study relevant online contents; perform exercises.
Week 11 [From 19.05.03 to 23.05.03]	This week's... theme – Spreadsheets. tasks – Study relevant online contents; perform exercises; prepare a small project; participate in an online conversation.
Week 12 [From 26.05.03 to 30.05.03]	This week's... theme – Preparing presentations. tasks – Study relevant online contents; perform exercises.
Week 13 [From 02.06.03 to 30.06.03]	This week's... theme – Preparing presentations. tasks – Study relevant online contents; perform exercises; prepare a small project; participate in an online conversation.
Week 14 [From 02.06.03 to 06.06.03]	Practical exam.
Week 15 [12.06.03]	Theoretical exam.

Figures C.1, C.2 and C.3 provide a glimpse of the original, printable, student study guide.







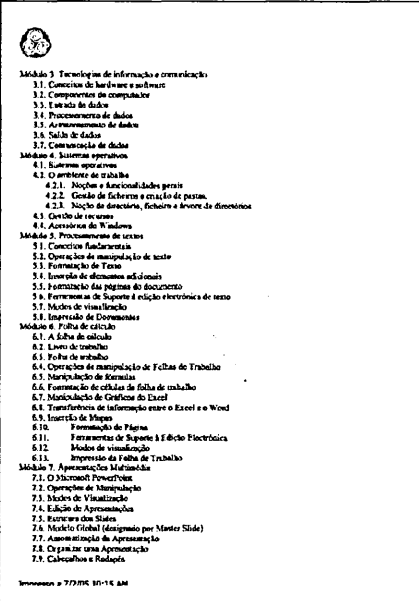


Figure C.1: Student study guide, pages 1 through 4

Universidade Jean Piaget de Cabo Verde

2.10. Instrumentos de Avaliação

1.8 Atividades previstas

O modelo pedagógico é o de aprendizagem colaborativa e as atividades previstas incluem:

- Usar fontes eletrônicas
- Exercício de conclusões
- Realização de exercícios
- Questionários
- Serviços de conservação em linha
- Projetos
- Uma prova prática
- Um exame final presencial

1.9 Sistemas de avaliação

O formato de avaliação adotado para esta disciplina baseia-se na avaliação contínua e ...

- Contribui para a avaliação formativa – um teste diagnóstico e as atividades de conservação em linha
- Contribui para a avaliação sumativa – os questionários, os projetos, a prova prática e o exame teórico final.

São aprovados os alunos que obtiverem a nota final igual ou superior a 10 valores no prejuízo para o diploma ao ser acrescentado da unidade.

1.1.1 Sessões de conversação em linha

Antecedem-se durante toda as aulas on-line e no seu plano participam parte que aprendizagem para integrar no tempo real em o discussões colaborando de forma e participando em discussões.

1.1.2 Projectos

São vão propostos de participação obrigatória e abrangendo de 0% a 100%. São todos de entrega obrigatória.

1.1.3 Questionários

São vão questionários de perguntas e respostas finais de 0% a 100%.

1.1.4 Prova prática

A prova prática é presencial e de participação obrigatória em um última aula do semestre. A sua classificação é de 0% a 100%.

Cada falta e um momento de avaliação não convertida numa classificação de 0 valores para efeitos de média final.

1.1.5 Exame final

O exame final é presencial e de participação obrigatória. A classificação é de 0% a 100% e corresponde a 60% da nota final.

O exame final será realizado num localidade numa prova escrita presencial. Esta prova tem as seguintes a seguir indivíduos

- Exame, realizado na época normal, ao final do semestre
- Exame, realizado na época de recesso

11/19

Universidade Jean Piaget de Cabo Verde

Pêlo doente Insetos sapos e peixes de água doce	Transmissão propaga pela doença	Transmissão	Sinais
--	---------------------------------	-------------	--------

☐ Não fita ou diagnóstico
☐ Não inclui o diagnóstico
☐ Não fita os exercícios

2.1.2. Aula 2
 Aula presencial obrigatória nos laboratórios de informática.


Data	Atividade	Recursos	Competências	Bibliografia
Quinta-feira 29/01/23	Esquematizar uma transmissão pelo doente	Aula presencial, apresentada pelo docente	Transmissão	Ferramentas - Insetos ou peixes de água doce FERRAMENTAS Insetos e peixes de água doce
	Esquematizar sobre as funções dos elementos da transmissão de doenças	Ferramentas presentes pelo docente	Transmissão	

☐ Não inclui o diagnóstico
☐ Não fita os exercícios

2.1.3. Aula 3
 Aula presencial obrigatória nos laboratórios de informática.

Data	Atividade	Recursos	Competências	Bibliografia
Quinta-feira 29/01/23	Esquematizar uma transmissão pelo doente	Aula presencial, apresentada pelo docente	Transmissão	Ferramentas - Insetos ou peixes de água doce FERRAMENTAS Insetos e peixes de água doce
	Esquematizar sobre as funções dos elementos da transmissão de doenças	Ferramentas presentes pelo docente	Transmissão	

☐ Não inclui o diagnóstico
☐ Não fita os exercícios



A Classificação final não é determinada de acordo com o seguinte: Fórmula:

Nota Final = Exame final + 0,20 + Prova prática + 0,20 + Exercícios + 0,20 + Projetos + 0,10

Os alunos que obtiverem a nota final igual ou superior a 10 (dez) pontos são desclassificados e aprovados à disciplina. Os alunos que obtiverem a nota final inferior a 10 (dez) pontos, consideram-se reprovados e a disciplina é repetida necessariamente no exame de forma de recovery.

18 Carga horária

O curso das aulas práticas é desenvolvido ao longo de 14 aulas semanais (de 4 horas cada quando presencial). No total estuda-se cerca de 40 horas de trabalho efetivo.

19 Resumo da disciplina

A cronometragem das atividades de aprendizagem e a transformação de informações e experimentos nas ferramentas de uso cotidiano, que sejam o papel e o lápis.

Permite-se assim proporcionar aos alunos conhecimentos básicos sobre a construção, funcionamento e avaliação das computadores, aplicação do Internet e as estruturas servidos por ele. Proporcionar assim que os alunos possam a entender a história dos computadores, os conceitos fundamentais e os seus componentes de funcionamento como o sistema de I/O, o sistema de armazenamento e de processamento de recursos associados à utilização de um computador. Gerando assim condições para efetuar, por conta própria, suas mais exigências do programa nos dispositivos. O aluno faz assim preparação para fazer a maior parcela da utilização de que dispõe durante o curso de sua vida.

2. Calendário das atividades

Esta é a calendarização das atividades previstas para a disciplina e introduzida à informação. Não é necessariamente definitiva e a programação da disciplina ao longo do período escolar para a sua realização.

Os textos e os materiais documentais são disponibilizados em tempo de evolução da disciplina nos locais onde os alunos dispõem para fazer o curso.

Todas as atividades são planejadas e realizadas exclusivamente nos dias previstos.

Todas as atividades são planejadas e realizadas em tempo de trabalho no último dia da semana e que devem ser realizadas.

Permite-se com esta calendarização facilitar o trabalho do aluno e assim estabelecer a realização das atividades previstas.

21 Atividades principais

2.1.1 Aula 1

Atividade principal obrigatória nos laboratórios de informática.

Data	Atividade	Previsão	Realização	Sucesso
1989-02-27	Atividade principal	Realização de uma prova prática	Realização e avaliação	Nota de 10,0
	Atividade principal	Atividade principal realizada no período	Não realizada	

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2.1.5 Aula 4

Aula para internet nos laboratorios de Informática con presencia obligatoria.

Fecha	Actividad	Reservar	Compartir	Borrado
Quinto día 19/01/18	Realiza dos cuestionarios de módulo 1	Realiza los cuestionarios de reserva en la zona de cuestionarios de la disciplina. En primer lugar seleccionamos el módulo 1 y después el aula 1, que es el momento de ir a realizar los cuestionarios.	Nada	Compartir los cuestionarios. Tipos de cuestionarios e hacer los de cada asignatura.
	Realiza dos cuestionarios de módulo 2	Realiza los cuestionarios de reserva en la zona de cuestionarios de la disciplina. En primer lugar seleccionamos el módulo 2 y después a la materia "Estructura".	Reservación de aulas	

☐ Si asistí o asistí a esta Internet

☐ Si me vi con los cuestionarios por Internet

2.1.5 Aula 5

Aula para internet nos laboratorios de Informática con presencia obligatoria.

Fecha	Actividad	Reservar	Compartir	Borrado
Quinto día 19/01/18	Realiza dos cuestionarios de módulo 3	Realiza los cuestionarios de reserva en la zona de cuestionarios de la disciplina. En primer lugar seleccionamos el módulo 3 y después a la aula 1, que es el momento de ir a realizar los cuestionarios.	Nada	Compartir los cuestionarios de las asignaturas. Cuestionarios de la disciplina.
	Realiza dos cuestionarios de módulo 4	Realiza los cuestionarios de reserva en la zona de cuestionarios de la disciplina. En primer lugar seleccionamos el módulo 4 y después a la materia "Estructura".	Reservación de aulas	Procesamiento de datos. Automatización de datos. Sistema de datos. Comunicación de datos.
	Reservar un cuestionario en módulos 1 a 3	Realiza los cuestionarios de reserva en la zona de cuestionarios de la disciplina. En primer lugar seleccionamos el módulo 1 y después a la materia "Estructura".	Reservación de aulas	Procesamiento de datos. Comunicación de datos. Sistema de datos. Comunicación de datos.

☐ Si asistí o asistí a esta Internet

☐ Si me vi con los cuestionarios por Internet

☐ Si respondí los cuestionarios sobre un módulo 1 a 3

2.1.6 Aula 6

Aula para internet nos laboratorios de Informática con presencia obligatoria.

Fecha	Actividad	Reservar	Compartir	Borrado
Quinto día 19/01/18	Realiza dos cuestionarios de módulo 5	Realiza los cuestionarios de reserva en la zona de cuestionarios de la disciplina. En primer lugar seleccionamos el módulo 5 y después a la aula 1, que es el momento de ir a realizar los cuestionarios.	Nada	Compartir los cuestionarios. Cuestionarios de la disciplina. Cuestionarios de la asignatura.

Impresión a 772/916 10/1/18

Figure C.2: Student study guide, pages 5 through 8

Universidade Jean Piaget de Cabo Verde

☐ **2.1.7 Aula 7**
Aula pela Internet nos laboratórios de informática com presença obrigatória.

Data	Atividade	Recursos	Comentários	Sumário
Quarta-feira 2003-04-10	Trabalho de grupo das atividades de módulo 4	Consultar material disponível na área de conteúdos de disciplina no Internet sobre conteúdos de módulos 4 e 5 e depois a seguir para "Trabalho 4"	Nenhuma	Conteúdo de disciplina e atividades de trabalho.
	Realização de exercícios de avaliação	Consultar material disponível na área de conteúdos de disciplina no Internet sobre conteúdos de módulos 4 e 5 e depois a seguir para "Trabalho 4"	Resumo de aula	
	Resumo de aula disponível no site	Resumo de aula disponível no site	Resumo de aula disponível no site	

☐ **2.1.8 Aula 8**
Aula pela Internet

Data	Atividade	Recursos	Comentários	Sumário
Quarta-feira 2003-04-11 e 2003-04-12	Trabalho de grupo das atividades de módulo 4	Consultar material disponível na área de conteúdos de disciplina no Internet sobre conteúdos de módulos 4 e 5 e depois a seguir para "Trabalho 4"	Nenhuma	Conteúdo de disciplina e atividades de trabalho.
	Realização de exercícios de avaliação	Consultar material disponível na área de conteúdos de disciplina no Internet sobre conteúdos de módulos 4 e 5 e depois a seguir para "Trabalho 4"	Resumo de aula	
	Resumo de aula disponível no site	Resumo de aula disponível no site	Resumo de aula disponível no site	

☐ **2.1.9 Aula 9**
Aula pela Internet

Data	Atividade	Recursos	Comentários	Sumário
Quarta-feira 2003-04-13	Trabalho de grupo das atividades de módulo 4	Consultar material disponível na área de conteúdos de disciplina no Internet sobre conteúdos de módulos 4 e 5 e depois a seguir para "Trabalho 4"	Nenhuma	Conteúdo de disciplina e atividades de trabalho.
	Realização de exercícios de avaliação	Consultar material disponível na área de conteúdos de disciplina no Internet sobre conteúdos de módulos 4 e 5 e depois a seguir para "Trabalho 4"	Resumo de aula	
	Resumo de aula disponível no site	Resumo de aula disponível no site	Resumo de aula disponível no site	

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☐ **2.1.10 Aula 10**
Aula pela Internet

Data	Atividade	Recursos	Comentários	Sumário
Quarta-feira 2003-04-12 e 2003-04-13	Trabalho de grupo das atividades de módulo 4	Consultar material disponível na área de conteúdos de disciplina no Internet sobre conteúdos de módulos 4 e 5 e depois a seguir para "Trabalho 4"	Nenhuma	Conteúdo de disciplina e atividades de trabalho.
	Realização de exercícios de avaliação	Consultar material disponível na área de conteúdos de disciplina no Internet sobre conteúdos de módulos 4 e 5 e depois a seguir para "Trabalho 4"	Resumo de aula	
	Resumo de aula disponível no site	Resumo de aula disponível no site	Resumo de aula disponível no site	

☐ **2.1.11 Aula 11**
Aula pela Internet

Data	Atividade	Recursos	Comentários	Sumário
Quarta-feira 2003-04-14 e 2003-04-15	Trabalho de grupo das atividades de módulo 4	Consultar material disponível na área de conteúdos de disciplina no Internet sobre conteúdos de módulos 4 e 5 e depois a seguir para "Trabalho 4"	Nenhuma	Conteúdo de disciplina e atividades de trabalho.
	Realização de exercícios de avaliação	Consultar material disponível na área de conteúdos de disciplina no Internet sobre conteúdos de módulos 4 e 5 e depois a seguir para "Trabalho 4"	Resumo de aula	
	Resumo de aula disponível no site	Resumo de aula disponível no site	Resumo de aula disponível no site	

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Figure C.3: Student study guide, pages 9 through 12

C.3 Closing remarks

This guide was available online, integrated in the learning management system database, as well as in a digital document format, ready to be downloaded and printed.

A hardcopy was given to every student the first time students and teachers meet.

Appendix D

Empirical study materials

This appendix contains the empirical study's¹ relevant materials including:

Task protocols – Task protocols form all data collection activities apart from the fulfillment of the observation diaries;

Consent forms – Consent forms use prior to data collection;

Data collection instruments – Questionnaires, observation diaries and interview scripts used throughout the empirical study;

Collected data – This section accounts for collected data although most quantitative data is available in electronic format only due to the amount of data items; and

Intermediary data – An intermediary data table used to build the trust factors.

Apart from the above materials, included in this appendix, a CD-ROM located at the back cover of this document also contains all data, documents and all the **ICT Online** module materials.

¹presented and discussed in chapters 8, 9 and 10

D.1 Task protocols

D.1.1 Motivation session

The following lines provide a translation of the initial motivation session² attended by **Information and Communication Technologies Online** module future students.

1. Thank students for attending.
2. Explain that I am there to talk about the **Information and Communication Technologies Online** module students will attend in the second semester.
3. Read the next lines: *Instituto Piaget* and the university are spread all over the world (Portugal, Brasil, Cape Verde, Angola e Mozambique and in the future Timor)...
Instituto Piaget wishes to strengthen the cohesion of its community providing all its students the opportunity to share the same experiences and knowledge and to acquire equal skills and competencies.
Instituto Piaget aims to achieve this goal through an online distance learning program
 This class, and two others, will be the first attending online classes and as such we ask you to engage in this process with an open mind and a willingness to help us achieve our common goals.
 Your feedback is very important as it will shape future initiatives and your present and future support is appreciated.
4. Explain that the **ICT Online** module is at a distance, but they will meet face-to-face their distance teachers.
5. Explain that teachers will extensively present the module and will always be available throughout its duration.
6. Present future online teachers.
7. Thank the students for their participation.
8. Say goodbye.

D.1.2 [Q0] Trust factors questionnaire

The following lines provide a translation of the trust factors questionnaire protocol.

[Q0] Questionnaire protocol

1. Thank students for participating.
2. Have students read and sign consent form.

²The motivation sessions were carried out before the commencement of the online module with the presence of the university's vice-rector.

3. Read the this introduction: This questionnaire aims to assess your opinions, feelings and beliefs regarding distance education and the Internet use.

All information gathered here would be private and confidential.

It is hoped that results gathered will benefit the university and its community. The data gathered will only be used for this purpose.

Please read the instructions and answer the questions sincerely.

4. Explain how yo fill-in the questionnaire: This questionnaire has two kinds of questions - yes/no questions and likert scale questions. The likert scale questions represent grades of agreement rated from one to seven.

- (a) means that you completely disagree with the sentence;
- (b) means that you disagree with the sentence;
- (c) means that partially disagree with the sentence;
- (d) means that you neither disagree nor agree with the sentence;
- (e) means that you partially agree with the sentence;
- (f) means that you agree with the sentence;
- (g) means that you completely agree with the sentence.

Please, try not to give neutral answers.

If you need to correct your answer, use a circle to mark the wrong answer use a cross to select the new correct answer, as shown on the form.

5. Ask if students have any questions.
6. Recommend students to call me if they have any questions.
7. Handout the questionnaire.
8. Collect the questionnaire.
9. Thank the students for their participation.
10. Double-check if there are any missed answers and if so, please ask them to be filled. Thank him or her again.

D.1.3 [Q1 through Q7] Trust and performance and other questionnaires

The following lines provide a generic³ translation of questionnaires Q1 through Q7.

[Q1 through Q7] Questionnaire protocol

1. Thank students for participating.
2. Have students read and sign consent form.
3. Read the this introduction: This questionnaire aims to...
 All information gathered here would be private and confidential.
 It is hoped that results gathered will benefit the university and its community. The data gathered will only be used for this purpose.
 Please read the instructions and answer the questions sincerely.
4. Explain how yo fill-in the questionnaire: This questionnaire has three kinds of questions - yes/no questions, multiple-choice questions and likert scale questions. The likert scale questions represent grades of agreement rated from one to seven.
 - (a) means that you completely disagree with the sentence;
 - (b) means that you disagree with the sentence;
 - (c) means that partially disagree with the sentence;
 - (d) means that you neither disagree nor agree with the sentence;
 - (e) means that you partially agree with the sentence;
 - (f) means that you agree with the sentence;
 - (g) means that you completely agree with the sentence.

Please, try not to give neutral answers.

If you need to correct your answer, use a circle to mark the wrong answer use a cross to select the new correct answer, as shown on the form.

5. Ask if students have any questions.
6. Recommend students to call me if they have any questions.
7. Handout the questionnaire.
8. Collect the questionnaire.

³Generic as the introduction must change from questionnaire to questionnaire

9. Thank the students for their participation.
10. Double-check if there are any missed answers and if so, please ask them to be filled. Thank him or her again.

D.1.4 Module appreciation interviews

The following lines provide a translation of the module appreciation .

Interview protocol

1. Thank students for participating.
2. Have students read and sign consent form.
3. Ask students the questions on the interview script.
4. Thank the students for their participation.

D.2 Consent forms

D.2.1 Trust factors survey

Figure D.1 presents a translated copy of the trust factor survey consent form.

Distance education and the use of Internet

Thank you for our collaboration.

Dear volunteer,

Thank you for your Collaboration in this research project.

This questionnaire aims to infer your trust opinions, feelings and beliefs regarding distance education and the Internet use.

All Information gathered here would be private and confidential.

It is hoped that results gather will benefit the University and those involved.

This research is to be accessed only for Jean Piaget University of Cape Verde examinations proposes only.

Once more, thank you for your collaboration.

The student (Name) _____, number _____.

Signature _____, date _____.

Figure D.1: Trust factors survey consent forms (translated)

D.2.2 Trust and performance study

Figure D.2 presents a translated copy of the trust and performance study consent form.

Distance education and the use of Internet

Thank you for our collaboration.

Dear volunteer,

Thank you for your Collaboration in this research project.

This questionnaire aims to infer your Initial ICT abilities and opinions, feelings and beliefs regarding distance education and the Internet use.

All Information gathered here would be private and confidential.

It is hoped that results gather will benefit the University and those involved.

This research is to be accessed only for Jean Piaget University of Cape Verde examinations proposes only.

Once more, thank you for your collaboration.

The student (Name) _____, number _____.

Signature _____, date _____.

Figure D.2: Trust and performance study consent form (translated)

D.2.3 Online module usage appreciation interview

Figure D.3 presents a translated copy of the online module usage appreciation interview consent form.

Distance education and the use of Internet	
Thank you for our collaboration.	
Dear volunteer,	
Thank you for your Collaboration in this research project.	
This questionnaire aims to infer your opinions, feelings and beliefs regarding your ICT online distance education.	
All information gathered here would be private and confidential.	
It is hoped that results gather will benefit the University and those involved.	
This research is to be accessed only for Jean Piaget University of Cape Verde examinations proposes only.	
Once more, thank you for your collaboration.	
The student (Name)	number
Signature	date

Figure D.3: Online module usage appreciation interview consent form (translated)

D.3 Data collection instruments

D.3.1 [Q0] Trust factors questionnaire

Figure D.4 bellow provides an copy of the original trust factors questionnaire.

Educação à distância utilizando a Internet

Marque obrigatoriamente um dos valores da escala para cada item, de acordo com o seu grau de concordância com a afirmação. Por favor, responda sinceramente às perguntas.

Por favor, classifique as seguintes afirmações de acordo com o seu grau de concordância com a afirmação. Por favor, marque um dos valores da escala.

Marque obrigatoriamente um dos valores da escala para cada item, de acordo com o seu grau de concordância com a afirmação. Por favor, responda sinceramente às perguntas.

Se necessário, marque a afirmação, anule a classificação com um círculo e assinale novamente a classificação correta com uma cruz. Por exemplo: 1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1101-1102-1103-1104-1105-1106-1107-1108-1109-1110-1111-1112-1113-1114-1115-1116-1117-1118-1119-1120-1121-1122-1123-1124-1125-1126-1127-1128-1129-1130-1131-1132-1133-1134-1135-1136-1137-1138-1139-1140-1141-1142-1143-1144-1145-1146-1147-1148-1149-1150-1151-1152-1153-1154-1155-1156-1157-1158-1159-1160-1161-1162-1163-1164-1165-1166-1167-1168-1169-1170-1171-1172-1173-1174-1175-1176-1177-1178-1179-1180-1181-1182-1183-1184-1185-1186-1187-1188-1189-1190-1191-1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-1222-1223-1224-1225-1226-1227-1228-1229-1230-1231-1232-1233-1234-1235-1236-1237-1238-1239-1240-1241-1242-1243-1244-1245-1246-1247-1248-1249-1250-1251-1252-1253-1254-1255-1256-1257-1258-1259-1260-1261-1262-1263-1264-1265-1266-1267-1268-1269-1270-1271-1272-1273-1274-1275-1276-1277-1278-1279-1280-1281-1282-1283-1284-1285-1286-1287-1288-1289-1290-1291-1292-1293-1294-1295-1296-1297-1298-1299-1300-1301-1302-1303-1304-1305-1306-1307-1308-1309-1310-1311-1312-1313-1314-1315-1316-1317-1318-1319-1320-1321-1322-1323-1324-1325-1326-1327-1328-1329-1330-1331-1332-1333-1334-1335-1336-1337-1338-1339-1340-1341-1342-1343-1344-1345-1346-1347-1348-1349-1350-1351-1352-1353-1354-1355-1356-1357-1358-1359-1360-1361-1362-1363-1364-1365-1366-1367-1368-1369-1370-1371-1372-1373-1374-1375-1376-1377-1378-1379-1380-1381-1382-1383-1384-1385-1386-1387-1388-1389-1390-1391-1392-1393-1394-1395-1396-1397-1398-1399-1400-1401-1402-1403-1404-1405-1406-1407-1408-1409-1410-1411-1412-1413-1414-1415-1416-1417-1418-1419-1420-1421-1422-1423-1424-1425-1426-1427-1428-1429-1430-1431-1432-1433-1434-1435-1436-1437-1438-1439-1440-1441-1442-1443-1444-1445-1446-1447-1448-1449-1450-1451-1452-1453-1454-1455-1456-1457-1458-1459-1460-1461-1462-1463-1464-1465-1466-1467-1468-1469-1470-1471-1472-1473-1474-1475-1476-1477-1478-1479-1480-1481-1482-1483-1484-1485-1486-1487-1488-1489-1490-1491-1492-1493-1494-1495-1496-1497-1498-1499-1500-1501-1502-1503-1504-1505-1506-1507-1508-1509-1510-1511-1512-1513-1514-1515-1516-1517-1518-1519-1520-1521-1522-1523-1524-1525-1526-1527-1528-1529-1530-1531-1532-1533-1534-1535-1536-1537-1538-1539-1540-1541-1542-1543-1544-1545-1546-1547-1548-1549-1550-1551-1552-1553-1554-1555-1556-1557-1558-1559-1560-1561-1562-1563-1564-1565-1566-1567-1568-1569-1570-1571-1572-1573-1574-1575-1576-1577-1578-1579-1580-1581-1582-1583-1584-1585-1586-1587-1588-1589-1590-1591-1592-1593-1594-1595-1596-1597-1598-1599-1600-1601-1602-1603-1604-1605-1606-1607-1608-1609-1610-1611-1612-1613-1614-1615-1616-1617-1618-1619-1620-1621-1622-1623-1624-1625-1626-1627-1628-1629-1630-1631-1632-1633-1634-1635-1636-1637-1638-1639-1640-1641-1642-1643-1644-1645-1646-1647-1648-1649-1650-1651-1652-1653-1654-1655-1656-1657-1658-1659-1660-1661-1662-1663-1664-1665-1666-1667-1668-1669-1670-1671-1672-1673-1674-1675-1676-1677-1678-1679-1680-1681-1682-1683-1684-1685-1686-1687-1688-1689-1690-1691-1692-1693-1694-1695-1696-1697-1698-1699-1700-1701-1702-1703-1704-1705-1706-1707-1708-1709-1710-1711-1712-1713-1714-1715-1716-1717-1718-1719-1720-1721-1722-1723-1724-1725-1726-1727-1728-1729-1730-1731-1732-1733-1734-1735-1736-1737-1738-1739-1740-1741-1742-1743-1744-1745-1746-1747-1748-1749-1750-1751-1752-1753-1754-1755-1756-1757-1758-1759-1760-1761-1762-1763-1764-1765-1766-1767-1768-1769-1770-1771-1772-1773-1774-1775-1776-1777-1778-1779-1780-1781-1782-1783-1784-1785-1786-1787-1788-1789-1790-1791-1792-1793-1794-1795-1796-1797-1798-1799-1800-1801-1802-1803-1804-1805-1806-1807-1808-1809-1810-1811-1812-1813-1814-1815-1816-1817-1818-1819-1820-1821-1822-1823-1824-1825-1826-1827-1828-1829-1830-1831-1832-1833-1834-1835-1836-1837-1838-1839-1840-1841-1842-1843-1844-1845-1846-1847-1848-1849-1850-1851-1852-1853-1854-1855-1856-1857-1858-1859-1860-1861-1862-1863-1864-1865-1866-1867-1868-1869-1870-1871-1872-1873-1874-1875-1876-1877-1878-1879-1880-1881-1882-1883-1884-1885-1886-1887-1888-1889-1890-1891-1892-1893-1894-1895-1896-1897-1898-1899-1900-1901-1902-1903-1904-1905-1906-1907-1908-1909-1910-1911-1912-1913-1914-1915-1916-1917-1918-1919-1920-1921-1922-1923-1924-1925-1926-1927-1928-1929-1930-1931-1932-1933-1934-1935-1936-1937-1938-1939-1940-1941-1942-1943-1944-1945-1946-1947-1948-1949-1950-1951-1952-1953-1954-1955-1956-1957-1958-1959-1960-1961-1962-1963-1964-1965-1966-1967-1968-1969-1970-1971-1972-1973-1974-1975-1976-1977-1978-1979-1980-1981-1982-1983-1984-1985-1986-1987-1988-1989-1990-1991-1992-1993-1994-1995-1996-1997-1998-1999-2000-2001-2002-2003-2004-2005-2006-2007-2008-2009-2010-2011-2012-2013-2014-2015-2016-2017-2018-2019-2020-2021-2022-2023-2024-2025-2026-2027-2028-2029-2030-2031-2032-2033-2034-2035-2036-2037-2038-2039-2040-2041-2042-2043-2044-2045-2046-2047-2048-2049-2050-2051-2052-2053-2054-2055-2056-2057-2058-2059-2060-2061-2062-2063-2064-2065-2066-2067-2068-2069-2070-2071-2072-2073-2074-2075-2076-2077-2078-2079-2080-2081-2082-2083-2084-2085-2086-2087-2088-2089-2090-2091-2092-2093-2094-2095-2096-2097-2098-2099-2100-2101-2102-2103-2104-2105-2106-2107-2108-2109-2110-2111-2112-2113-2114-2115-2116-2117-2118-2119-2120-2121-2122-2123-2124-2125-2126-2127-2128-2129-2130-2131-2132-2133-2134-2135-2136-2137-2138-2139-2140-2141-2142-2143-2144-2145-2146-2147-2148-2149-2150-2151-2152-2153-2154-2155-2156-2157-2158-2159-2160-2161-2162-2163-2164-2165-2166-2167-2168-2169-2170-2171-2172-2173-2174-2175-2176-2177-2178-2179-2180-2181-2182-2183-2184-2185-2186-2187-2188-2189-2190-2191-2192-2193-2194-2195-2196-2197-2198-2199-2200-2201-2202-2203-2204-2205-2206-2207-2208-2209-2210-2211-2212-2213-2214-2215-2216-2217-2218-2219-2220-2221-22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This questionnaire identifies your opinions, feelings and beliefs regarding distance education and the Internet use.

Please answer sincerely to the questions and read these instructions with attention.

Please, answer the following questions.

- [01] Name or number;
- [02] Where you came from;
- [03] Age;
- [04] Study year;
- [05] Gender;
- [06] Have you computer at home – (Yes/No);
- [07] Have you regular access to a computer – (Yes/No)
- [08] Have you access to the Internet – (Yes/No)
- [09] I already have experience in distance education – (Yes/No)

Please, answer the following sentences using a scale from 1 to 7.

Try not to give neutral answers.

- 1 I strongly disagree with the sentence;
- 2 I disagree with the sentence;
- 3 I partially disagree with the sentence;
- 4 I neither disagree nor agree with the sentence;
- 5 I partially agree with the sentence;
- 6 I agree with the sentence;
- 7 I strongly agree with the sentence.

If you need to correct your answer, use a circle to make the wrong answer null and use a cross to select the new correct answer as shown.

- [10] The computer is easy to use – (1 to 7 scale)
- [11] To use the word processor is easy (for example, Word) – (1 to 7 scale)
- [12] I use very well the spread sheet (for example Excel) – (1 to 7 scale)
- [13] I am very capable of prepare presentation (for example, with PowerPoint) – (1 to 7 scale)
- [14] I am an expert using the Internet – (1 to 7 scale)
- [15] I use the Web very well – (1 to 7 scale)
- [16] I know how to use e-mail very well – (1 to 7 scale)
- [17] I send files by e-mail easily – (1 to 7 scale)
- [18] I often use the chat – (1 to 7 scale)
- [19] It is easy to downloads files from the Internet – (1 to 7 scale)
- [20] I use the web easily to gather information – (1 to 7 scale)
- [21] For me it is very easy to compress files – (1 to 7 scale)
- [22] I know how to expand files – (1 to 7 scale)
- [23] I only trust communicating with someone at a distance if I see their face – (1 to 7 scale)
- [24] In a distance education environment I'll certainly have a better study environment – (1 to 7 scale)
- [25] In a distance education module I will certainly have more support in the administrative area – (1 to 7 scale)
- [26] I believe that an institution with distance education is technological advanced – (1 to 7 scale)
- [27] The computer is a reliable communication tool – (1 to 7 scale)
- [28] I believe that a distance teacher is more qualified – (1 to 7 scale)
- [29] Certainly, I will get better learning results with a distance teacher – (1 to 7 scale)
- [30] The Internet is a hight quality information resource – (1 to 7 scale)

- [31] I believe that is safe to send files through the Internet – (1 to 7 scale)
- [32] Distance education provides equal opportunities for all – (1 to 7 scale)
- [33] With distance education my studding possibilities are higher – (1 to 7 scale)
- [34] In distance education, I would control much better my studding period – (1 to 7 scale)
- [35] A distance education course offers better didactical support – (1 to 7 scale)
- [36] In a distance education module the work is more original – (1 to 7 scale)
- [37] I only trust communicating with someone at a distance if I ear their voice – (1 to 7 scale)
- [38] In a distance education module the distance teacher will certainly be more available – (1 to 7 scale)
- [39] Within a distance education environment I will have all necessary support – (1 to 7 scale)
- [40] The Internet fosters dialogue between colleagues – (1 to 7 scale)
- [41] In a distance education module knowledge will be immediate – (1 to 7 scale)
- [42] I believe that I will work better with a distance teacher – (1 to 7 scale)
- [43] A distance education environment has lower costs – (1 to 7 scale)
- [44] A distance education module provides more personalized tasks – (1 to 7 scale)
- [45] In a distance education scenario the services are always available – (1 to 7 scale)
- [46] I only trust communicating with someone at a distance if I exchange written messages – (1 to 7 scale)
- [47] I trust very much in a distance teacher – (1 to 7 scale)
- [48] I trust that by studding at a distance I will get better results – (1 to 7 scale)
- [49] Learning at a distance to better focus more in what I wont to learn – (1 to 7 scale)
- [50] Providing courses at distance is the trade mark of an technological developed institution – (1 to 7 scale)
- [51] A distance education assessment is certainly more fare and impartial – (1 to 7 scale)
- [52] The computer is a reliable tool – (1 to 7 scale)
- [53] A qualified university must have distance learning – (1 to 7 scale)
- [54] A distance learning environment is very personalised – (1 to 7 scale)
- [55] I believe that the materials in a distance classes is of higher quality – (1 to 7 scale)
- [56] Learning at a distance, I will be able to have more control on my learning methods – (1 to 7 scale)
- [57] In distance education the individual recognition is much higher – (1 to 7 scale)
- [58] I trust in the quality of distance education courses – (1 to 7 scale)
- [59] I believe that learning materials is of a better quality at a distance – (1 to 7 scale)
- [60] Studding through Internet enables me not to depend on my colleagues – (1 to 7 scale)
- [61] By attend a distance education module I will have for certain a more personalised treatment – (1 to 7 scale)
- [62] The Internet is a very interesting mean of communication – (1 to 7 scale)
- [63] The distance education assessment is much more unbiased – (1 to 7 scale)
- [64] I believe that studding at distance facilitates cooperation – (1 to 7 scale)
- [65] I believe that I have more support in distance education – (1 to 7 scale)
- [66] I believe that my relation with a distance teacher is more personal and direct – (1 to 7 scale)
- [67] Distance education is the teaching base of a modern society – (1 to 7 scale)
- [68] Nowadays, teaching demands distance education – (1 to 7 scale)
- [69] I believe that today technology developed demand distance education – (1 to 7 scale)
- [70] Learning at a distance easy – (1 to 7 scale)
- [71] In a distance education module I will have all resources needed – (1 to 7 scale)
- [72] I certainly prefer studding at distance through the Internet – (1 to 7 scale)
- [73] Using digital library is better to learn – (1 to 7 scale)
- [74] Learning with a group at a distance learning is better – (1 to 7 scale)

- [75] The information exchange in a learning management system is more confidential – (1 to 7 scale)
- [76] In a digital library will get better information quality – (1 to 7 scale)
- [77] The Internet is a more efficient mean to Provide administrative support – (1 to 7 scale)
- [78] In distance learning environment our questions are answered more faster – (1 to 7 scale)
- [79] With distance education module it is easier to succeed – (1 to 7 scale)
- [80] I trust very much in distance education logistic support – (1 to 7 scale)
- [81] With distance education I will be able to organise my studies to my rhythm – (1 to 7 scale)
- [82] I believe that a distance education course is better than a face to face – (1 to 7 scale)
- [83] The digital library are a better information font – (1 to 7 scale)
- [84] It will be very easy to work in group trough the Internet – (1 to 7 scale)
- [85] Distance education allows me to better use my time – (1 to 7 scale)

Once more, thank you for your collaboration.

D.3.2 [Q1 through Q4] trust and performance questionnaires

These four questionnaires were presented to student as just one document.

Figure D.5, provides a copy the original form.

The figure displays four distinct questionnaire forms, each with a header section containing a logo and identifying information. The forms are organized into two rows and two columns. Each form contains a series of numbered questions and corresponding response scales. The forms are labeled Q1, Q2, Q3, and Q4, representing different components of the trust and performance assessment.

Figure D.5: [Q1 through Q4] Questionnaires on trust and performance

Translation of the above questionnaires are presented in the next four section of this appendix.

[Q1] Self trust beliefs assessment (before)

Self trust beliefs assessment.

Thank you for our collaboration.

This questionnaire identifies your opinions, feelings and beliefs regarding distance education and the Internet use.

Please answer sincerely to the questions and read these instructions with attention.

Please, answer the following questions.

Please, answer the following sentences using a scale from 1 to 7.

Try not to give neutral answers.

- 1 I strongly disagree with the sentence;
- 2 I disagree with the sentence;
- 3 I partially disagree with the sentence;
- 4 I neither disagree nor agree with the sentence;
- 5 I partially agree with the sentence;
- 6 I agree with the sentence;
- 7 I strongly agree with the sentence.

If you need to correct your answer, use a circle to make the wrong answer null and use a cross to select the new correct answer as shown.

- [1] In a distance education environment I'll certainly have a better study environment – (1 to 7 scale)
- [2] I believe that a distance teacher is more qualified – (1 to 7 scale)
- [3] Certainly, I will get better learning results with a distance teacher – (1 to 7 scale)
- [4] In a distance education module the work is more original – (1 to 7 scale)
- [5] In a distance education module the distance teacher will certainly be more available – (1 to 7 scale)
- [6] Within a distance education environment I will have all necessary support – (1 to 7 scale)
- [7] I believe that I will work better with a distance teacher – (1 to 7 scale)
- [8] I trust that by studding at a distance I will get better results – (1 to 7 scale)
- [9] Learning at a distance to better focus more in what I wont to learn – (1 to 7 scale)
- [10] Learning at a distance, I will be able to have more control on my learning methods – (1 to 7 scale)
- [11] I trust in the quality of distance education courses – (1 to 7 scale)
- [12] I believe that I have more support in distance education – (1 to 7 scale)
- [13] A qualified university must have distance learning – (1 to 7 scale)
- [14] Nowadays, teaching demands distance education – (1 to 7 scale)
- [15] I certainly prefer studding at distance through the Internet – (1 to 7 scale)
- [16] Using digital library is better to learn – (1 to 7 scale)
- [17] In distance learning environment our questions are answered more faster – (1 to 7 scale)
- [18] The internet is a very interesting mean of communication – (1 to 7 scale)
- [19] The digital library are a better information font – (1 to 7 scale)
- [20] The computer is a reliable communication tool – (1 to 7 scale)
- [21] Distance education provides equal opportunities for all – (1 to 7 scale)
- [22] With distance education my studding possibilities are higher – (1 to 7 scale)
- [23] The Internet fosters dialogue between colleagues – (1 to 7 scale)
- [24] The computer is a reliable tool – (1 to 7 scale)
- [25] The Internet is a very interesting mean of communication – (1 to 7 scale)

Once more, thank you for your collaboration.

[Q2] Self ICT expertise assessment

Self ICT expertise assessment.

Thank you for our collaboration.

This questionnaire identifies your opinions, feelings and beliefs regarding distance education and the Internet use.

Please answer sincerely to the questions and read these instructions with attention.
Please, answer the following questions.

- [06] You have computer at home – (Yes/No);
- [07] You have regular access to a computer – (Yes/No)
- [08] You have access to the Internet – (Yes/No)

Please, answer the following sentences using a scale from 1 to 7.

Try not to give neutral answers.

- 1 I strongly disagree with the sentence;
- 2 I disagree with the sentence;
- 3 I partially disagree with the sentence;
- 4 I neither disagree nor agree with the sentence;
- 5 I partially agree with the sentence;
- 6 I agree with the sentence;
- 7 I strongly agree with the sentence.

If you need to correct your answer, use a circle to make the wrong answer null and use a cross to select the new correct answer as shown.

- [01] I know well how computers evolved through time – (1 to 7 scale)
- [02] I understand very well the computer structure
- [03] I feel very comfortable using a computer
- [04] To use the word processor is easy (for example, Word) – (1 to 7 scale)
- [05] I use very well the spread sheet (for example Excel) – (1 to 7 scale)
- [06] I am very capable of prepare presentation (for example, with PowerPoint) – (1 to 7 scale)
- [07] I am an expert using the Internet – (1 to 7 scale)
- [08] I use very well the Web – (1 to 7 scale)
- [09] I know how to use e-mail very well – (1 to 7 scale)
- [10] I send files by e-mail easily – (1 to 7 scale)
- [11] I often use the chat – (1 to 7 scale)
- [12] It is easy to downloads files from the Internet – (1 to 7 scale)
- [13] I use the web easily to gather information – (1 to 7 scale)
- [14] For me it is very easy to compress files – (1 to 7 scale)
- [15] I know how to expand files – (1 to 7 scale)

Once more, thank you for your collaboration.

[Q3] ICT knowledge assessment (before)

Theoretical ICT knowledge assessment.

Please, answer the following questions.

- [01] What is the designation of the computer non-perment memory. (MS-DOS; Hertz; ROM; RAM)
- [02] What is the designation of the unit who measures the central processor unit speed (number of instructions per minute). (MS-DOS; Hertz; ROM; RAM)

[03] Name de device who allows a global network computer communication. (Telephone; Modem; Network interface; Scanner)

[04] The third computer generation come to increase... (The way computer counts, calculates and evaluate; The velocity process and the computer size; Computer sound capacity; Computer costs)

[05] A computer works to... (Count, calculate and evaluate; Spreads information; Print information; Digest information)

[06] Computer can be classified by... (It lightning capacity; Capacity to resist to collisions; Processing capacity; It abstraction capacity)

[07] A modem is... (A language translator; Output device; Input device; Analog to digital translator)

[08] A computer work like... (A mechanic machine; Automatic data processor (counts, calculates and evaluates); Manual data processor machine (count, calculate and evaluate); Number manager machine)

[09] First computing device made by the man was... (Chinese Ábaco; Shells; Valves; Japanese Ábaco)

[10] A screen can be an output and input device. (Yes/No)

[11] Information can be a set of related data in a given context. (Yes/No)

[12] Secondary memory is a program. (Yes/No)

[13] ASCII is a code use in computers. (Yes/No)

[14] Automatic data processing is called computing. (Yes/No)

[15] An arithmetic Logic Unit (ALU) is used for arithmetic operations, but not for comparisons. (Yes/No)

[16] The sixth computer generation is the most recent generation. (Yes/No)

[17] Transistors replaced the electronic valves on second generation computers. (Yes/No)

Once more, thank you for your collaboration.

[Q4] ICT skills assessment (before)

Practical ICT knowledge assessment.

Please, answer the following questions.

[01] What is the nowadays main concern in the development of an operating system? (Processing maximum users information; Administrate data bases; Developed an intuitive user environment; Have lot's of text)

[02] What is the purpose of the windows toolbar? (None; Inform the user about the computer features; Allows minimize or maximize windows; Allows windows switch)

[03] A double click on the mouse allows... (Change the screen color; Shut down the computer; Activate a program; Switch on the computer)

[04] The mouse right button... (Activates the contextual functions menu; Starts up an application; Opens a file; Changes the windows size)

[05] A program who translate user instructions in computer actions is... (Interpreter; Operating system; Information system; Control program)

[06] What is the generic name assigned to diskette or hard disk storage device? (Primary storage; Secondary storage; Diskette; Hard disk)

[07] The operative system used at the university is... (MS-DOS; MacOS; Linux; Windows)

[08] One of the main operative system goals is to control the hardware. (Yes/No)

- [09] Computer processor velocity is measure in MegaBytes. (Yes/No)
- [10] In My Computer icon we can find all secondary stores devices. (Yes/No)
- [11] Selection is a procedure more used in nowadays computers. (Yes/No)
- [12] A shortcut is an icon who redirects you to a file or program. (Yes/No)
- [13] One of the main computer goals is to understand the surround environment. (Yes/No)
- [14] We belong to a graphic interface operative system generation. (Yes/No)
- [15] Is not possible to move files between folders. (Yes/No)
- [16] Mouse is one device who lost importance in the last computer generation. (Yes/No)

Once more, thank you for your collaboration.

D.3.3 [Q5] ICT knowledge assessment (after)

This questionnaire includes the questions and assertions made on questionnaire Q3, see section D.3.2 for a translation and fifteen additional questions and assertions.

These questions aimed to assess the students' ICT knowledge after attending the **Information and Communication Technologies Online** module.

The figure shows three pages of a questionnaire titled 'Universidade Nova de Lisboa' and 'Faculdade de Engenharia'. The pages are numbered 2/3, 3/3, and 1/3.

Page 2/3:

- Questions 1-4 and 10-12.
- Question 1: Qual a nome que se dá à unidade mínima de informação num sistema informático? (MS DOS, Word, Excel, RAM)
- Question 2: Como se chama a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 3: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 4: A unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 10: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 11: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 12: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)

Page 3/3:

- Questions 5-9 and 13-15.
- Question 5: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 6: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 7: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 8: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 9: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 13: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 14: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 15: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)

Page 1/3:

- Questions 16-20 and a diagram of a computer system.
- Question 16: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 17: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 18: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 19: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Question 20: Qual a unidade que armazena dados e é responsável por dar acesso a estes dados? (ROM, HD, RAM, CPU)
- Diagram: A block diagram of a computer system showing the flow of data between various components.

Figure D.6: [Q5] ICT knowledge assessment (after) questionnaire

D.3.4 [Q6] ICT skills assessment (after)

This questionnaire carries the same questions as questionnaire Q4, see section D.3.2 for a translation. And eighteen additional questions and assertions.

These questions aimed to assess the students' ICT skills after attending the **Information and Communication Technologies Online** module.

The figure shows three pages of a questionnaire titled 'Instituto Superior de Engenharia de Lisboa' and 'Questionário 1 de 3 (total de 3 perguntas)'. The first page (274) contains questions 1-10. The second page (275) contains questions 11-20. The third page (276) contains questions 21-34. The questionnaire is in Portuguese and assesses various ICT skills and knowledge.

Page 274:

- 1) Informação e Sistema Operativo: qual o significado, porquê...?
- 2) Para que serve o sistema operativo?
- 3) O que é o sistema operativo?
- 4) Qual o papel do sistema operativo?
- 5) Qual o papel do sistema operativo?
- 6) Qual o papel do sistema operativo?
- 7) Qual o papel do sistema operativo?
- 8) Qual o papel do sistema operativo?
- 9) Qual o papel do sistema operativo?
- 10) Qual o papel do sistema operativo?

Page 275:

- 11) Qual o papel do sistema operativo?
- 12) Qual o papel do sistema operativo?
- 13) Qual o papel do sistema operativo?
- 14) Qual o papel do sistema operativo?
- 15) Qual o papel do sistema operativo?
- 16) Qual o papel do sistema operativo?
- 17) Qual o papel do sistema operativo?
- 18) Qual o papel do sistema operativo?
- 19) Qual o papel do sistema operativo?
- 20) Qual o papel do sistema operativo?

Page 276:

- 21) Qual o papel do sistema operativo?
- 22) Qual o papel do sistema operativo?
- 23) Qual o papel do sistema operativo?
- 24) Qual o papel do sistema operativo?
- 25) Qual o papel do sistema operativo?
- 26) Qual o papel do sistema operativo?
- 27) Qual o papel do sistema operativo?
- 28) Qual o papel do sistema operativo?
- 29) Qual o papel do sistema operativo?
- 30) Qual o papel do sistema operativo?
- 31) Qual o papel do sistema operativo?
- 32) Qual o papel do sistema operativo?
- 33) Qual o papel do sistema operativo?
- 34) Qual o papel do sistema operativo?

Figure D.7: [Q6] ICT skills assessment (after) questionnaire

D.3.5 [Q7] Self-trust beliefs assessment (after)

This questionnaire carries the same questions as questionnaire Q1 (see section D.3.2 for a translation). These questions aimed to assess the students' self-trust beliefs after attending the **Information and Communication Technologies Online** module.

Universidade Nova de Lisboa
Questionnaire Q7
12 de Junho de 2020

Artigo e turma: _____
Nome e N.º de matrícula: _____

O seu curso:

1. Este curso é muito relevante e de estudar e tem relevância para a minha vida profissional e pessoal.

2. Este curso é muito relevante e de estudar e tem relevância para a minha vida profissional e pessoal.

3. Este curso é muito relevante e de estudar e tem relevância para a minha vida profissional e pessoal.

4. Este curso é muito relevante e de estudar e tem relevância para a minha vida profissional e pessoal.

5. Este curso é muito relevante e de estudar e tem relevância para a minha vida profissional e pessoal.

6. Este curso é muito relevante e de estudar e tem relevância para a minha vida profissional e pessoal.

7. Este curso é muito relevante e de estudar e tem relevância para a minha vida profissional e pessoal.

8. Este curso é muito relevante e de estudar e tem relevância para a minha vida profissional e pessoal.

9. Este curso é muito relevante e de estudar e tem relevância para a minha vida profissional e pessoal.

10. Este curso é muito relevante e de estudar e tem relevância para a minha vida profissional e pessoal.

11. Este curso é muito relevante e de estudar e tem relevância para a minha vida profissional e pessoal.

12. Este curso é muito relevante e de estudar e tem relevância para a minha vida profissional e pessoal.

13. Com o conhecimento dos alunos é possível aprender um pouco mais sobre o mundo.

14. Os professores e a forma de ensinar é muito boa e de qualidade.

15. Aprender sobre os temas de estudo de programação com um professor é melhor.

16. Não sou capaz de aprender os temas de estudo de programação sozinho.

17. Não sou capaz de aprender os temas de estudo de programação sozinho.

18. O professor é bom e de ensinar e tem relevância para a minha vida profissional e pessoal.

19. Não sou capaz de aprender os temas de estudo de programação sozinho.

20. Não sou capaz de aprender os temas de estudo de programação sozinho.

21. Não sou capaz de aprender os temas de estudo de programação sozinho.

22. Não sou capaz de aprender os temas de estudo de programação sozinho.

23. Não sou capaz de aprender os temas de estudo de programação sozinho.

24. Não sou capaz de aprender os temas de estudo de programação sozinho.

25. Não sou capaz de aprender os temas de estudo de programação sozinho.

Figure D.8: [Q7] Self-trust beliefs assessment (after) questionnaire.

D.3.6 Module usage observation diaries

Figure D.9 present the original observation diary form.

Relatório_CCO_10_4.doc

Relatório
CCO 10-4-02 16:30-20:30
Atividade 7

Breve resumo
Os alunos são pontuais. Internet está a funcionar, mas caiu um momento as 4:50, e por isso muitos têm de entrar de novo. Eles trabalham bem com o conteúdo e exercícios. Botão de rato muda, a imagem de ecrã, janelas ficam abertas, diminuídas e fechadas. E no paint faz-se o desenho.
16 Alunos fizeram teste dentro sala 2

Problemas gerais
1. run time error 13.1.1.1, 12.1
2. 13.2 problemas com screen, 1.2 problemas rato+mail, 16.2 não funciona, 5.1 não tem em linha, 7.3 internet fraco.
3. Sala da aula não consegue mostrar Microsoft VBS-script runtime error '800a000f' Type mismatch: 'ubound' /ip: get/v3/acess/escola/formacao.asp, line 66
4. Penso que a conteúdo e exercícios da aula funciona bem. Pequenas problemas:
Uma aluna estava expor de usar de flash no cap. 3.2, mas não entendeu por que ela estava a fazer.
Para criar uma pasta dentro 4.1, muitos tiveram com problemas por que eles abra My Computer e não My Documents, e dentro MC não é possível criar uma pasta.

Atitude geral
Bom

Reclamações
Muitas máfrias

Metodicamente

Ideias

Figure D.9: Online module usage appreciation observation diary

D.3.7 Module appreciation interview scripts

This interview script was used to assess the **Information and Communication Technologies Online** module usage appreciation as described in chapter 10.

Figure D.10 present the original interview script.

Educação à distância utilizando a Internet

Seu objetivo é avaliar a sua experiência com o curso de Educação à Distância. Para isso, precisamos que você responda às perguntas abaixo. As respostas são apenas para fins de pesquisa e não serão divulgadas.

Selecione a opção que melhor descreve a sua experiência com o curso de Educação à Distância. Marque com um X.

[71] Qual a sua avaliação geral do curso de Educação à Distância?

Por favor, marque a opção que melhor descreve a sua experiência com o curso de Educação à Distância.

1 2 3 4 5

1 Muito ruim 2 Ruim 3 Regular 4 Bom 5 Muito bom

[72] Qual a sua avaliação da carga horária do curso de Educação à Distância?

Por favor, marque a opção que melhor descreve a sua experiência com o curso de Educação à Distância.

1 2 3 4 5

1 Muito pouco 2 Pouco 3 Regular 4 Muito 5 Muito mais

[73] Qual a sua avaliação da qualidade do curso de Educação à Distância?

Por favor, marque a opção que melhor descreve a sua experiência com o curso de Educação à Distância.

1 2 3 4 5

1 Muito ruim 2 Ruim 3 Regular 4 Bom 5 Muito bom

Laboratório de Educação à Distância

Projeto de Pesquisa em Educação à Distância

Laboratório de Educação à Distância

Projeto de Pesquisa em Educação à Distância

[74] Qual a sua avaliação da estrutura do curso de Educação à Distância?

Por favor, marque a opção que melhor descreve a sua experiência com o curso de Educação à Distância.

1 2 3 4 5

1 Muito ruim 2 Ruim 3 Regular 4 Bom 5 Muito bom

[75] Qual a sua avaliação da carga horária do curso de Educação à Distância?

Por favor, marque a opção que melhor descreve a sua experiência com o curso de Educação à Distância.

1 2 3 4 5

1 Muito pouco 2 Pouco 3 Regular 4 Muito 5 Muito mais

[76] Qual a sua avaliação da qualidade do curso de Educação à Distância?

Por favor, marque a opção que melhor descreve a sua experiência com o curso de Educação à Distância.

1 2 3 4 5

1 Muito ruim 2 Ruim 3 Regular 4 Bom 5 Muito bom

Laboratório de Educação à Distância

Projeto de Pesquisa em Educação à Distância

[77] Qual a sua avaliação da experiência com o curso de Educação à Distância?

Por favor, marque a opção que melhor descreve a sua experiência com o curso de Educação à Distância.

1 2 3 4 5

1 Muito ruim 2 Ruim 3 Regular 4 Bom 5 Muito bom

Laboratório de Educação à Distância

Projeto de Pesquisa em Educação à Distância

Figure D.10: Online module usage appreciation interview script

The following lines provide a translation of the interview script presented above.

Interview questionnaire

Thank you for our collaboration.

This questionnaire tries to feel your opinions, feelings and beliefs regarding online distance learning.

Please read these instruction and answer the questions sincerely. Your sincere answers will be vital for the understanding of distance learning at the university.

Please, answer the following questions using a scale from 1 to 6.

If you need to correct your answer, use a circle to mark the wrong answer use a cross to select the new correct answer, as shown.

[01] Classify, using a six likert scale of relevance, the importance of the following persons during the module you attended.

- Distance teacher importance online. Please explain why.
- Teaching assistant importance in class. Please explain why.
- Colleagues importance online. Please explain why.

[02] Classify, using a six likert scale of relevance, how much did you appreciated the **ICT Online** interactive contents. Please explain why?

[03] Classify, using a six likert scale of relevance, your experience in this online distance learning. Please write down why you would choose that classification.

[04] Do you trust in your distance teacher? Choose one or more answers bellow who suit you best:

- No, I could never trust him/her
- Yes, because I have to.
- Yes, because he/she is a knowledge expert in this subject.
- Yes, because I meet him/her face-to-face.
- Yes, because I like this module's content.
- Yes, because he/she is friendly.
- Yes, because her/she answered whenever I needed.
- Yes, I trust her/him since the first time we exchanged messages.
- Yes, because I could communicate with she/he right away.
- Other... (please specify)

[05] If you had to work again with someone at a distance (teacher, colleague or employer) would you find it easy to trust him/her. Why?

[06] Classify, using a six likert scale, your trust degree in...

- The teacher/student relation.
- The University capacity to teach at a distance.
- The capacity to exchange ideas and knowledges online between colleagues.

- The relation with the face-to-face pedagogical support assistants.
- The relation with the face-to-face technical support assistants.

[07] Are there any other issues regarding this module you wish to address. If so, please explain why.

Once more, thank you for your collaboration.

D.4 Collected data

The next sections present or locate all collected data.

D.4.1 Quantitative data

Due to the amount of collected quantitative data items they cannot be usefully printed here. All collected quantitative data can be found in the CD-ROM on the back cover of this document.

D.4.2 Qualitative data

The following sections enclose a sample of observation diaries and online conversation transcriptions as well as *Formare* data gathered during the **ICT Online** procedure. This data was used in the online module usage appreciation presented on chapter 10.

Observation diary transcriptions

The following lines are a sample of an observation diary kept by the instructors. More can be found on the CD-ROM on the back cover of this document. This particular one reports on observation registered on March the 20th 2002 from 16:30 to 20:30.

This observation diary report reports on this group of students' first online learning experience.

Resumo: A Internet e todos computadores estao a funcionar e os alunos chegam quase todos na hora marcada. Dois alunos da sala 205 foram para sala 206 por falta de computadores.

Os alunos trabalham com o conteudo pela primeira vez. Eduindo e um ajudante muito activo e mostra o sistema de navegacao. Que bom.

Muitos alunos copiam o conteudo para imprimir/ler na casa e muitos anotam no pape (especialmente as meninas).

Tambem estao com duvidas sobre o modulo estar disponivel na Internet para ler mais tarde. Quase todos ficam ate no fim das aulas.

Problemas gerais:

- *Codigo de aceso
- *Eles nao se lembram e nao conhecem maiusculas. As maiusculas fazem a diferenca.
- *Janelas - alguns fecham a Universidade Virtual quando trabalham com os conteudo

e nem todos sabem como mover uma janela

- * Microsoft debugger mostra alguns erros de javascript, que fecham internet explorer
- * A sessao fecha por causa de se passar muito tempo no conteudo
- * Duas pessoas sem computador proprio
- * O sol do fim da tarde da nos olhos
- * Nao e possivel ver a turma no entrada do sistema

Comportamento geral: Activo e concentrado mas um pouco menos do que a turma de manha (EGE).
Aprendem tambam muito sobre Internet. Por exemplo, um rapaz esta a ver o jogo de FC Porto directo. Nao ha muito conversa. Alguns ouvem musica.

Observacoes: E um pouco dificil ver se todos alunos assinam a hora de saida. Nao anotei todos e nao sei se perguntaram ao Dino

Ideias: Recomendar ter conversa em-linha aberta sempre da mais conversa.

Online conversation transcriptions

The following lines are a sample of an online conversation maintained between students and instructors. More can be found on the CD-ROM on the back cover of this document.

```
Log file opened at: 2003.03.20 16:34:49
#PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272}: scsousa @Edgar
*** End of /NAMES list.
*** Mode is +
*** Channel created at Thursday, March 20, 2003 15:40:08
[1] scsousa: ola
*** helio (helio@195.8.13.15) has joined channel
#PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272}
[2] Edgar: Viva Helio
*** lene (lene@195.8.13.15) has joined channel
#PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272}
[3] lene: ol pessoal
[4] Edgar: viva Lene
[5] lene: manera
[6] Edgar: Vieram directamente para a conversa em linha, ou leram algumas
mensagenms antes?
[7] lene: por acaso eu li
[8] Edgar: Alguma dvida para as tarefas a realizar na Aula 4 (havia uma
mensagem sobre isto)?
[9] lene: sim
[10] lene: para ir aos contedos
[11] lene: e ler
[12] lene: estou mesmo a ver isso
[13] Edgar: Marlene, ser dificil ler?
*** fernanda (fernanda@195.8.13.15) has joined channel
#PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272}
```

[14] lene: como sabes que sou a marlene
 [15] lene: no dificil ler
 [16] Edgar: Viva Aleida
 *** A00641 (A00641@195.8.13.15) has joined channel
 #PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272}
 [17] Edgar: Viva Monica.
 [18] A00641: Ola Edgar
 [19] Edgar: Marlene, j conseguiste ver aos contedos?
 [20] A00641: sera que nao te conheo
 [21] lene: j quase todos
 [22] A00641: es de que curso?
 [23] lene: estou a ver historias e geraes
 [24] Edgar: Monica, sou o professor, estive convosco a semana passada.
 [25] Edgar: Ok Marlene. Podes ver quase tudo ao mesmo tempo, a conversa em linha e os conteudos.
 [26] A00641: desculpe,pensei que fosse um colega de um outro curso

(...)

[268] Edgar: Claro. Podes escrever sempre que quiseres.
 [269] Edgar: At para a semana Elsa.
 *** Signoff: chia (Leaving)
 [270] emoniz: tchau pessoal
 [271] Edgar: Thau.
 [272] emoniz despede-se da turma.
 *** Signoff: emoniz (Leaving)
 *** Signoff: gmb (Leaving)
 *** gmb (gmb@195.8.13.15) has joined channel
 #PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272}
 *** gmb1 (gmb@195.8.13.15) has joined channel
 #PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272}
 *** gmb2 (gmb@195.8.13.15) has joined channel
 #PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272}
 [273] Edgar slaps gmb2 around a bit with a large trout
 *** Signoff: fernanda (Leaving)
 *** joseluis (joseluis@195.8.13.15) has joined channel
 #PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272}
 [274] Edgar: Viva Jos Luis
 [275] Edgar: Jos Luis, J est resolvido o teu correio electronico?
 *** Signoff: joseluis (Read error to joseluis[195.8.13.15]: Connection reset by peer)
 [276] Edgar: Graciano, tens 3 vezes o teu nome na conversa em linha.
 *** gmb2 has been kicked off channel
 #PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272} by
 Edgar (Edgar)
 *** rasmus is rasmus@195.8.13.15 (Rasmus Froman)
 *** rasmus is on channels
 #PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272}
 *** rasmus is on IRC via server formare.ptinovacao.pt ([127.0.0.1] PT Inovacao SA)
 *** rasmus has been idle for 45 seconds

```

*** rasmus signed on at Thursday, March 20, 2003 19:38:08
[277] --> rasmus oi
[278] --> rasmus j podemos ir
[279] *rasmus* tudo
[280] --> rasmus ha mas podes vir embora
*** Signoff: rasmus (Leaving)
*** gmb1 has been kicked off channel
#PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272} by Edgar
(Edgar)
*** gmb has been kicked off channel
#PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272} by Edgar
(Edgar)
[281] scsousa: by at amanha
*** Edgar has been kicked off channel
#PIAGETPIAGET{575AECB1-C08E-4ACE-B3CF-579777996272} by Edgar
(Edgar)
Log file closed at: 2003.03.20 20:31:47

```

Learning management system student data

The following lines are a sample of a student record as generated by the learning management system. More can be found on the CD-ROM on the back cover of this document.

Aluno: xxx
 Curso: Int. Informatica - II, CC0, EGE, Edicao do 2o Sem. de 2002/2003

Acessos ao curso: 41
 Classificacao Atribuida: 0
 Mensagens enviadas: 0
 Mensagens Lidas: 19
 Enviou Apresentacao? Sim

Questionarios	Designacao	Nota Atribuida	No de Tentativas
Questionario 1		0	
Questionario 2		0	

Trabalhos	Designacao	Entregue	Validado	Nota
Projecto 3	Sim			100
Projecto 2	Sim			99
Projecto 1	Sim			90

Conteudos	Designacao	Nota Atribuida	Acessos as Unidades
Modulo 2 - Introducao aos Computadores	N/A	11	
Modulo 4 - Sistemas Operativos e Aplicacoes	N/A	12	
Modulo 6 - Folha de calculo: o Microsoft Excel	N/A	6	
Modulo 7 - Apresentacoes multimedia: o Microsoft PowerPoint	N/A	0	
Modulo 5 - Processamento de texto: o Microsoft Word	N/A	8	

Modulo 3 - Tecnologias de Informacao e Comunicacao N/A 8

Modulo 2 - Introducao aos Computadores N/A 11

Aula 5

Unidade: 1 Introducao

Dados Gerais

No de acessos a unidade: 1

Tempo do ultimo acesso a unidade: 00:01:35.23

Tempo Total: 00:01:35.23

No de tentativas das actividades da unidade: 0

No maximo de tentativas (para efeitos de avaliacao): Ilimitado

Nota atribuida: Nao existe nota associada a esta Unidade

Peso desta unidade na nota final: 0%

Nota minima de passagem: Nao existe uma nota minima de passagem para esta unidade

Resultado: Unidade Completada

Objectivos da Unidade

Objectivo 0

Designacao: Pagina_1

Status: completed

Nota atribuida: Nao existe nota associada a este objectivo

Actividades da Unidade

Nao existem actividades associadas a esta unidade

Unidade: 2 Objectivos

Dados Gerais

No de acessos a unidade: 1

Tempo do ultimo acesso a unidade: 00:00:49.69

Tempo Total: 00:00:49.69

No de tentativas das actividades da unidade: 0

No maximo de tentativas (para efeitos de avaliacao): Ilimitado

Nota atribuida: Nao existe nota associada a esta Unidade

Peso desta unidade na nota final: 0%

Nota minima de passagem: Nao existe uma nota minima de passagem para esta unidade

Resultado: Unidade Completada

Objectivos da Unidade

Objectivo 0

Designacao: Pagina_1

Status: completed

Nota atribuida: Nao existe nota associada a este objectivo

Actividades da Unidade

Nao existem actividades associadas a esta unidade

Unidade: 3 O computador

Dados Gerais

No de acessos a unidade: 3

Tempo do ultimo acesso a unidade: 00:08:28.48

Tempo Total: 00:29:17.68

No de tentativas das actividades da unidade: 0

No maximo de tentativas (para efeitos de avaliacao): Ilimitado

Nota atribuida: Nao existe nota associada a esta Unidade

Peso desta unidade na nota final: 0%

Nota minima de passagem: Nao existe uma nota minima de passagem para esta unidade
 Resultado: Unidade Completada
 Objectivos da Unidade
 Objectivo 0
 Designacao: Pagina_1
 Status: incomplete
 Nota atribuida: Nao existe nota associada a este objectivo
 Objectivo 1
 Designacao: Pagina_2
 Status: completed
 Nota atribuida: Nao existe nota associada a este objectivo
 Objectivo 2
 Designacao: Pagina_3
 Status: completed
 Nota atribuida: Nao existe nota associada a este objectivo
 Objectivo 3
 Designacao: Pagina_4
 Status: completed
 Nota atribuida: Nao existe nota associada a este objectivo
 Objectivo 4
 Designacao: Pagina_5
 Status: completed
 Nota atribuida: Nao existe nota associada a este objectivo
 Objectivo 5
 Designacao: Pagina_6
 Status: completed
 Nota atribuida: Nao existe nota associada a este objectivo
 Actividades da Unidade
 Nao existem actividades associadas a esta unidade

 (...)

Other learning management system data

The following tables provide additional learning management system data on a specific edition of the **Information and Communication Technologies Online** for the purpose of illustrating the kind of outputs the system is able to generate.

Table D.1: Tutors and local help desk indicators

<i>Instructor</i>	<i>Module accesses</i>	<i>Last access</i>	<i>Sent messages</i>	<i>Read messages</i>
Rasmus	33	6/11/03 17:27	0	29
Edgar	66	18/06/03 18:38:14	10	99
Sónia	98	14/06/03 15:04:49	34	158

Table D.2: Global indicators

<i>Parameter</i>	<i>Count</i>
Total students	17
Total messages sent	44
Total messages read	507
Total extra resources available	11
Total of projects	3
Projects' average score	94,37%
Total questionnaires	2
Questionnaires' average score	94,08%
Total module contents	6

Table D.3: A student's activity indicators

<i>Access data</i>	<i>Last access</i>	<i>Total access</i>
14/03/03	19:48:40	5
17/03/03	18:17:13	31
24/03/03	17:39:03	2
4/7/03	17:12:25	3
14/04/03	18:33:56	5
28/04/03	18:37:04	9
5/5/03	18:50:56	1
5/12/03	18:41:49	4
26/05/03	17:15:49	7
6/2/03	18:33:15	2
6/9/03	18:45:36	2

D.5 Intermediary data

The following table⁴ presents a varimax rotation analysis table of three components witch led to the construction of the three main trust factors.

It results from data gathered from *Universidade Jean Piaget de Cabo Verde* students', as described in chapter 8 using the questionnaire presented in section D.3.1 in this appendix.

The extraction method was principal component analysis and the matrix was transformed with a varimax rotation with Kaiser Normalization.

Table D.4: Factor analysis table (varimax rotation analysis table of three components)

<i>Rotated component matrix</i>			
<i>Question</i>	<i>Component 1</i>	<i>Component 2</i>	<i>Component 3</i>
Q23	,133	,136	-6.58E+01
Q24	,564	4.15E+01	9.44E+01
Q25	,452	9.42E+01	,140
Q26	,481	,238	,139
Q27	,208	-9.58E+01	,572
Q28	,637	7.55E+01	3.23E+01
Q29	,709	,168	5.15E+01
Q30	9.43E+01	9.94E+01	,461
Q31	,191	5.04E+01	,397
Q32	,223	,227	,509
Q33	,210	,176	,503
Q34	,479	,250	,259
Q35	,450	,133	,217
Q36	,526	,271	,275
Q37	,245	,261	-8.28E+01
Q38	,633	,181	,119
Q39	,522	,203	,313
Q40	1.34E+01	,191	,522
Q41	,467	,175	,158
Q42	,687	,251	,151
Q43	8.78E+01	,309	,306
Q44	,379	,161	,450
Q45	,389	,297	,227
Q46	,168	,348	1.19E+01
Q47	,467	8.82E+01	,388
Q48	,596	,329	,131

(continues next page...)

⁴In this table, Q23 through Q85 refer to the question on the original questionnaire

(...continued from previous page)

<i>Rotated component matrix</i>			
<i>Question</i>	<i>Component 1</i>	<i>Component 2</i>	<i>Component 3</i>
Q49	,582	,244	,280
Q50	,199	,195	,244
Q51	,282	,397	,332
Q52	9.48E+01	1.73E+01	,540
Q53	,162	,507	,308
Q54	,313	,249	,486
Q55	,488	,306	,417
Q56	,619	,305	,292
Q57	,403	,276	,335
Q58	,503	,269	,390
Q59	,481	,379	,325
Q60	,197	,484	,231
Q61	,443	,449	,206
Q62	-8.14E+01	,213	,511
Q63	,292	,395	,321
Q64	,350	,263	,301
Q65	,585	,461	,112
Q66	,470	,293	,114
Q67	,254	,487	,198
Q68	,170	,516	8.92E+01
Q69	8.39E+01	,487	,207
Q70	,145	,447	,152
Q71	,412	,391	,303
Q72	,193	,592	,106
Q73	,173	,532	,128
Q74	,372	,475	,208
Q75	,268	,325	,422
Q76	-1.65E+01	,428	,368
Q77	8.91E+01	,337	8.88E+01
Q78	,304	,512	,121
Q79	,247	,550	,108
Q80	,340	,347	,371
Q81	,269	,428	,375
Q82	,461	,475	-6.82E+01
Q83	8.27E+01	,584	,153
Q84	,271	,433	,174
Q85	,134	,485	,431

D.6 Closing remarks

If you are reading the printed version of this document, you can find all of the empirical study's materials on a CD-ROM located at the back cover. Otherwise, all files are available, on request, from the author.

Appendix E

Published work

The following lines enumerates the published work related with this research.

A copy of this publications can be found on the CD-ROM on the back cover of this document.

E-Learn 2005 : Exploring the relation between trust and academic performance in on-line distance learning: early results.

Paper presented at E-Learn 2005 – World Conference on E-Learning in Corporate, Government, Healthcare, & Higher Education – Vancouver, Canada.

ICDE 2004 : Trust and Performance in On-line Distance Learning.

Paper presented at ICDE 2003 – 21st ICDE World Conference on Open Learning and Distance Education – Hong Kong.

ICOOL 2003 : A Research Project over Trust and Performance in On-line Distance Learning.

Paper presented at ICOOL 2003, International Conference on Open & Online Learning, Mauritius.

ELHE 2003 : Trust and Performance in On-line Distance Learning.

Paper presented at ELHE 2003, Erasmus Intensive Program Seminar, Riga, Latvia.

SITE 2003 : Understanding e-Learning: Towards an Understanding of Trust and Performance in On-line Distance Learning.

Paper presented at SITE 2003, Society for Information Technology and Teacher Education International Conference, Albuquerque, New Mexico.

ED-MEDIA 2003 : A Study on the Understanding of the Relation between Trust and Performance in On-line Distance Learning.

Paper presented at ED-MEDIA 2003, World Conference on Educational Multimedia, Hypermedia & Telecommunications, Honolulu, Hawaii.

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All \TeX and \LaTeX software and some of the documentation is available at <http://www.tex.ac.uk/>.

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