Integrating e-learning into postgraduate radiotherapy and oncology education: a case study

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Title: Integrating e learning into Postgraduate Radiotherapy and Oncology Education: A case study.

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Senior Lecturer and research co-ordinator for the Radiotherapy and Oncology subject team within the Faculty of Health and Wellbeing. Teaching focuses on research methods at post graduate level and breast cancer oncology and radiotherapy. Research covers both interest areas (breast cancer radiotherapy and e learning). Current research includes an evaluation of audio feedback (using mp3 files) compared with traditional word-processed (written) feedback concentrating on student satisfaction with feedback, quality of feedback provided and staff time required to produce both methods. In the field of breast cancer current research involves an investigation of patient preferences for different health states and quality of life based on a trade off or standard gamble techniques.

Abstract

Training health professionals within University environments has traditionally focused on face-to-face methods. Practitioners working within the UK National Health Service (NHS) have found it difficult to gain leave from work to attend for study due to the demands of the NHS and staff shortages. In response, we developed a distance e learning course to match our current traditional taught programme.The first e learning module (a research methods module) was comparable in content to the traditional taught module, and developed to incorporate a formative assessment design throughout; embodying the Constructivist approach and the principle of assessment for learning. We evaluated student experiences with the e learning module using a pre and post module questionnaire, with the taught cohort used as a comparison. We tested the importance of support, levels of information technology (IT) skills, preferences for e learning and intrinsic motivation. The results identified that highly satisfied e learning students were more likely to report a preference for e learning initially, show higher levels of intrinsic motivation and report good support from tutors and fellow students. This article discusses the development and evaluation of the pilot module and some of the lessons learned from providing e learning to health workers.

INTRODUCTION

Radiotherapy and Oncology courses at Sheffield Hallam University cover both undergraduate and post graduate education. The post graduate MSc in Radiotherapy and Oncology has been running successfully for number of years facilitating masters level study primarily for radiation therapists, but also oncology nurses, medical physics technicians and with some oncology registrars in training also accessing modules. Interest from students at sites geographically remote to the University, oversubscription on some modules, and staff shortages in the UK made it difficult for working practitioners to secure study leave (even though we run a part-time course on Saturdays in partial response to this), making physical attendance during the working week impossible for many individuals. This led to development of an e learning (Distance Learning) mode of the MSc. The advantages of an e-learning module are the opportunity for more flexible study at a time, place and pace more suited to the students other commitments, there is also the possibility of a reduction in resources (from a University perspective) as timetabled rooms do not need to be secured, releasing them for other use. However, while there are clear benefits to e-learning there are also potential barriers to successful implementation, and the achievement of high levels of student satisfaction.

We started by piloting an inter-professional research methods module before widening provision to our cancer specific modules, then to an e-learning based continuous professional development (CPD) provision and subsequently 2 new masters level programmes (Advanced Practice and Supportive & Palliative Care). This paper identifies the principles which influenced the design, organisation and approach to delivery of the modules a preliminary evaluation of the pilot as well as a reflection on our experience to date with e-learning delivery.

PURPOSE

It is important to evaluate student satisfaction with new learning approaches to ensure comparable student experiences are offered. There is valuable work by Wilkinson et al (Wilkinson et al. 2004) that highlighted important characteristics of successful e-learning within post-graduate education for health practitioners. However, this work is limited by a lack of a traditional comparison and so levels of student satisfaction identified are difficult to contextualise.

By evaluating the implementation of an e-learning module in comparison with a standard taught version, valuable evidence can be provided to enhance successful implementation of further e-learning developments across health care education.

The e-learning module that was developed incorporated a formative assessment design throughout, embodying the Constructivist approach and the principle of assessment for learning. Within the inter-professional cohorts students were asked to provide feedback to fellow students as well as participate in discussions, allowing them to act as facilitators of learning as well as students. This case study examines the importance of using the constructivist approach and assessment for learning principles in e-learning in terms of the students' overall satisfaction with the module.

The evaluation of this initiative should add a new dimension to the current understanding of the relative strengths and challenges of electronic distance learning. Crucially the comparative element of this case study allows an analysis of any differences in outcomes for electronic distance learning compared with traditional teaching methods. The evaluation will allow investigation of the influence of the constructivist approach drawing on participants own experiences to augment traditional tutor led presentations and information giving within the context of electronic distance learning.

RELATIONSHIP TO OTHER WORK

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It is clear from the literature that there may be significant barriers to successful distance learning(Hillesheim 1998). Challenges to successful electronic adult learning include: tutor or facilitator support, ability of tutors to facilitate threaded discussions, limited accessibility to materials or tutors, student's feelings of isolation, poor student time management, and confusion over content or structure(Hillesheim 1998;Wilkinson, Forbes, Bloomfield, & Fincham Gee 2004).

Competent information technology (IT) skills has been suggested as a strong predictor of satisfaction with e-learning(Wilkinson, Forbes, Bloomfield, & Fincham Gee 2004), with possibly more senior (experienced) workers tending to demonstrate greater adaptability to the on-line environment (Wilkinson, Forbes, Bloomfield, & Fincham Gee 2004). An evaluation of four web based post graduate (PG) nurse education modules identified positive student ratings for the modules, specifically in relation to achievement of students' learning needs (Wilkinson, Forbes, Bloomfield, & Fincham Gee 2004). This work raised important considerations for electronic course planning and through the qualitative analysis identified potential barriers to successful learning. There are some accepted limitations of this work that constrain the transferability of their conclusions to other e-learning scenarios. The study sample is small and heterogeneous (n=39 with only 28 respondents completing post module questionnaires) limiting the ability to accurately assess differences in levels of satisfaction across levels of practice or IT skills. There was also no traditional taught comparison so levels of satisfaction identified can not be truly evaluated. Performance as a result of the mode of delivery was not assessed and other uncontrolled variables (i.e impact of different tutors, difference in subject matter across the modules) further limited the generalisability of the results.

It has also been acknowledged that the design of the electronic media and specifically the underlying pedagogical principles may have an important impact on learning outcomes and levels of satisfaction (Govindasamy 2001;Hamid 2001).

Specifically it has been identified that the use of a Constructivist approach maybe important in creating quality e-learning encounters (Hamid 2001;Rovai 2004). Constructivism, in contrast to transmission models of cognitive development, emphasise active (rather than passive) learning based on reflection and construction of knowledge drawing on personal experience and prior knowledge(Good & Brophy 1990). Key to the Constructivist approach is the belief that knowledge is socially constructed and that learning is greatest where individuals engage in prolonged debate. The conviction that knowledge is situated through social experiences, can be translated in University learning through the use of authentic tasks(Good & Brophy 1990;Rovai 2004). While Constructivism may be utilised in traditional delivery it may be particularly relevant to the electronic environment. As e-learning provides a flexible virtual classroom students can return to discussion forums and add new thoughts as they arise, thus benefitting students who are reflectors by nature who would shy away from providing an instant response in a face to face setting. Within the traditional classroom, discussions maybe constrained by timetabled sessions and the rigidity of room timetabling. Utilising a mandatory formative element to the module design requires that on-line students are required to post reports to the discussion forum to demonstrate compliance with the module requirements, hence each individual is required to contribute to the discussion enhancing the opportunity for learning and developing feedback and peer review skills. With well-directed discussions students can act as both students and facilitators maximising skill enhancement (Rovai 2004). In a classroom situated discussion some students may opt not to contribute leaving the discussion to the more confident students and to those they perceive as more able ('free rider' effects) limiting the overall learning potential. Furthermore, within an inter-professional setting allowing students to draw on and share personal experiences and real-life situations thereby socially constructing knowledge allowing the opportunity for the development of inter-professional understanding.

Despite some research to identify the views of the learner on distance learning courses (McCarten 2000a;Wilkinson, Forbes, Bloomfield, & Fincham Gee 2004) and some attempts to evaluate the views of staff to the introduction of e-learning (McCarten 2000b) or the students views of the tutor support and facilitation provided by different instructors(Hillesheim 1998) there remain some critical areas that require further evaluation for developers of e-learning modules. For example, can comparable levels of learner satisfaction and performance be achieved for e-learning and traditional delivery methods? What are the key predictors of satisfaction with online learning? Is learner performance and satisfaction of e-learning influenced by the Constructivist approach to e-learning module design? What are the factors that influence tutors ability to adapt to online teaching? What are the resource and training implications for the Institution with the implementation of e-learning approaches? This case study will attempt to clarify and expand on current knowledge in this field by reviewing our experience of moving to an online learning approach for our masters degree in Radiotherapy and Oncology.

DESIGNING THE PILOT

The first e-learning module was designed to be comparable in content to the traditional taught module and divided into three sections with formative tasks assigned to each study section.

Primarily students are UK based but the e-learning module accepts students from across the globe and has included practitioners from Canada, Chile, Malta and Saudi Arabia. The pilot e-learning module was delivered totally electronically via the Blackboard electronic platform. Students on the e-learning module were not required to attend for orientation but were sent information about how to access the platform and instructions on initial socialising once the module started. A traditional taught delivery ran at the same time with a different cohort of students. Those attending the taught

delivery attended four full days over a period of six weeks with additional reading material given in the non-attending weeks.

Three formative tasks were designed (one for each section of the module) to engage the distance learning students and to augment the constructivist approach to the e-learning design. In the e-learning environment these tasks are called E-tivities (based on the work by Gilly Salmon (Salmon 2004)) and students were required to post reports on an asynchronous discussion forum within small groups (maximum of 10 students per group). The E-tivities required students to respond and comment to fellow student reports and discussions were facilitated by a group e-moderator (again based on the Gilly Salmon approach to e-moderating(Salmon 2004)). Within the taught delivery students underwent the same formative tasks in both the classroom and online environment in a blended way. In addition, within the e-learning module synchronous discussions are used to support understanding of a range of topics and to further enhance the opportunity for collaborative working and sharing of experiences.

METHOD FOR EVALUATING THE PILOT MODULE

The module evaluation initially drew on the work of Wilkinson et al (Wilkinson, Forbes, Bloomfield, & Fincham Gee 2004) which identified that student levels of IT skills were important in explaining module completion and outcome, and that e-learning was not suitable for all students. The evaluation aimed to analyse student satisfaction of both traditional and electronic delivery based on a modified version of the pre and post module questionnaire developed by Wilkinson et al (Wilkinson, Forbes, Bloomfield, & Fincham Gee 2004).

All students enrolled on to the e-learning and taught modules over two semesters were invited to complete pre and post module questionnaires to assess levels of satisfaction. During this period a total of 75 students enrolled onto both forms of the module with a limited number completing pre and post module evaluations (pre module

n= 50, post module n=25). A total of eight scales were constructed as identified in Table .I.

The scales for orientation to the module and research skills had slightly low Cronbach alpha scores and therefore these were not used in the module evaluation.

RESULTS OF THE PILOT EVALUATION

The pre module questionnaire identified similarities in IT skills between the two cohorts of students (e-learning group mean IT score = 33.4, taught group mean score = 33.6). As expected those students that chose the e-learning mode showed slightly greater preference for this method of learning compared with those on the taught module (mean scores 31 and 28.9 respectively). Preference towards e-learning was correlated with IT confidence (r=0.4 p=0.002) and the e-learning students demonstrated higher scores for intrinsic motivation (mean difference -2.5, 95% CI -5.4 to 0.4).

Following completion of the module there was no identifiable difference in the mean assignment scores between the two delivery modes (e-learning mean = 51.1% taught students mean = 55.3% mean difference = 4.2% 95%CI -3.9 to 12.2%). Of course comparable assignment scores can say little about achievement levels without clearer information about the individual student profiles, but it may allow some limited confidence (in addition to the results from other scales) that the different delivery methods provide comparable student experiences in terms of overall outcomes. Similarly there was no identifiable difference in completion rates between the two delivery modes (85% completion for e-learning and 91.4% for those on the taught module p>0.4) despite this being a concern for online study. Age was the only significant factor related to completion rate; with younger students identified as more likely to complete the module. Mean scores for module evaluation identified similarity in experience between the two delivery modes (mean score for taught students 23.9 compared with 23.1 for the e-learning students, mean difference 0.8 95% CI -2.6 to 4.2).

When considering the e-learning students alone, three main areas seemed to demonstrate an influence on the module evaluation, these are identified in Table .II. below. For those students studying via the traditional delivery positive module evaluations were not correlated with levels of support or intrinsic motivation.

Discussion with a tutor undertaking online facilitation of asynchronous discussion (e-moderation) for the first time identified some key challenges for new online tutors. For successful e-moderation the tutor needs to have in-depth knowledge of the content across the entire module. In addition, on an inter-professional module the e-moderator must be cognisant with a range of professional terms in order to make sense of arguments or scenarios presented online. In particular, as students are asked to draw on professional experiences it is likely that idiosyncrasies of different professions will arise and the e-moderator needs to find a balance between encouraging participants to talk about unique experiences without too much professional jargon making the information impenetrable to those outside that professional group. In a classroom discussion profession specific terms can be clarified quickly. In contrast, within the online environment if discussion threads contain professional language that is alien to either participant or tutor the participant may instantly disengage (a problem that the tutor needs to respond to), or the tutor may feel disempowered. Untangling important knowledge from the professional language in which it may be housed can be too burdensome for busy tutors or students.

IMPLICATIONS OF THE FINDINGS

The pilot identified that levels of student satisfaction with an e-learning module were comparable with satisfaction from a standard taught delivery. This can allow tutors to develop e-learning modules with the confidence that when designed using a Constructivist approach, utilising an e-moderator to support online activity, students can gain as much from their studies as those students on traditional taught options. In particular, it has identified that for the students studied, support from fellow students

and the e-moderators was a significant contributor to positive evaluation on completion of the e-learning module. Introducing new tutors to online facilitation is not without its challenges, especially within an inter-professional context where professional language can inhibit the ease with which tutors respond to discussions. Building tutor confidence is essential for many new to this form of teaching and in addition to formal professional development activities (such as the use of online learning courses for facilitators) this can be facilitated by mentoring tutors early online activities and ensuring they have access to the activity of more experienced tutors from which they can develop their own moderating skills. This provides a form of succession planning (and peer review) as more DL modules are rolled out.

There are some limitations to this work that reduce the ability to draw further conclusions. For example:

- A low response rate was achieved particularly for post module questionnaires. Hence responding students maybe those motivated to respond and hence possibly those less satisfied, with levels of satisfaction from non-responders remaining unknown.

- Levels of satisfaction identified through the student evaluation reflect student perceptions of their experience and say little about equality of outcomes such as the development of relevant skills. Assignment scores give some indication of comparable endpoints but without closer identification of individual student profiles this data can be meaningless. Assessment of outcomes needs to be ascertained through a further follow up evaluation to identify whether students have utilised the skills developed on the module in their clinical practice.

LESSONS LEARNED

1. E-moderation requires a different set of facilitating skills including how do deal with 'lurkers' (those that hover around the discussion forum but don't engage in discussions (Salmon 2004)) and 'weaving' discussion forum threads

(summarising key points from participants and highlighting areas for further consideration or additional learning (Salmon 2004)).

2. Building an online community requires substantial effort by the tutor in the early stages and this time commitment should not be underestimated. Quick wins are important from a student perspective. An early activity with swift response and feedback rewarding engagement are important in creating the climate of trust and support we aim to engender.

3. Students must be clear about what is expected of them. Establishing the rules early on for how frequently students should engage with the materials and discussion forums enhances student engagement. Where possible this should be clear within any marketing for the course so students are aware of the commitment they are expected to make.

4. Examples used within the learning materials must be relevant to the students' world experience. Where the course covers a multi-professional audience we found using a range of examples helped maintain student engagement.

5. Over use of discussion forums leads to superficial postings and overload for students. It can be tempting when designing an online course to ask students to reflect on numerous topics and then discuss this with the group using the asynchronous discussion forums. However, this may be counter productive and a balance needs to be developed between maintaining student engagement with the materials and the rest of the group and complete disengagement due to overload. We have found that the design of e-tivities is important in that where possible tasks should be integrated that incrementally build and move students towards submission of their summative assessment; where this is overt to the students there is the potential for greater student engagement with formative e-tivities.

6. Assessments need to consider the online environment and need to reflect relevant skills students want to gain (for example, writing for publication, developing PowerPoint presentations etc). Low stakes assessments (with rapid feedback) throughout the course using a variety of methods will encourage not only participation but will also allow the student to build up skills in an 'assessment for learning' type approach. Thus preparing for summative assessment and subsequent study of other e-learning modules.

7. Presentation of learning materials requires significant adaptation from taught resources. Again the time required to prepare online materials should not be underestimated.

8. At times the quality of discussions online has exceeded that experienced in the taught mode due to time for considered reflection in asynchronous exchanges.

"Teaching at a distance is not just about using technology, it is also about perfecting a pedagogical art for effective online learning" (Rovai 2004 p90).

We have found using both the Constructivist approach and the Gilly Salmon 5-stage model to online learning (Salmon 2004) helpful in delivering a quality online experience for students. Figure .1. below identifies some additional aspects to the 5-stage model developed through our experience of online learning with a constructivist design.

WIDENING THE PROVISION : FURTHER CHALLENGES

Widening our provision provided some further challenges especially for the module 'Psychology of Cancer Care'. Changing everything over to an electronic format took considerable time and some activities previously undertaken within the traditional taught delivery did not translate to an e-tivity format. Using a video of a patient experience helped to promote reflection and group discussion and could explain how many of the aspects it highlighted would be addressed in more depth throughout the

module. In the first run through a video used in the taught delivery was converted to DVD and sent out to students to minimise the size of file that students needed to download from the virtual learning platform. The creation of manageable 'nuggets' were linked to specific learning outcomes to increase relevancy for students and reduce overall download time of videoed patient scenarios. Student feedback has been positive and having International students studying the module has enhanced the module with sharing of good practice.

CONCLUSIONS

Levels of student satisfaction with e-learning can be comparable to those achieved on traditional taught courses, particularly where a constructivist design is employed in the e-learning environment. Completion rates and achievement levels comparable to standard delivery methods can also be achieved and this may be a reflection of the levels of both student and tutor support and input provided throughout the module. Moving from a traditional taught delivery to an online delivery is not without its challenges for tutors. Development of materials for e-learning requires considerable preparation and the time required for this activity should not be underestimated. This may offset possible gains on room costs, e-learning is not a cheap option, but does provide an opportunity to continually update materials in response to developments in the field, but this can also be a challenge for tutors. Depending on the topic area some cancer specific modules may require innovative approaches to delivering content in an online format. Staff development and support for online tutors is key in relation to production of materials suited for the online environment and application and enhancement of facilitation skills from a classroom to a virtual learning environment.

E-learning also provides the opportunity to utilise a range of technological approaches and we are currently evaluating the effectiveness of audio feedback as a replacement to standard textual feedback systems to augment skill development.

References

Good, T. & Brophy, J. (1990), "Cognitive and constructivist views of learning," in T. Good & J. Brophy, (eds). *Contemporary Educational Psychology*, Fifth edition, Longman Publishers, USA.

Govindasamy, T. (2001) "Successful implementation of e-learning: Pedagogical considerations", *The Internet and Higher Education*, vol. 4, no. 3-4, pp. 287-299.

Hamid, A. (2001) "e-learning is it the 'e' or the learning that matters?", *The Internet and Higher Education*, vol. 4, no. 3-4, pp. 311-316.

Hillesheim, G. (1998) "Distance learning:Barriers and strategies for students and faculty", *The Internet and Higher Education*, vol. 1, no. 1, pp. 31-44.

McCarten, A. (2000a), "Use of IT in a post-graduate distance learning course: Part 1: Student perspectives", *Innovations in Education and training International*, vol. 37, no. 3, pp. 181-191.

McCarten, A. (2000b) "Use of IT in a post-graduate distance learning course: Part 2: Staff perspectives", *Innovations in Education and training International*, vol. 37, no. 3, pp. 192-198.

Rovai, A. (2004) "A constructivist approach to online college learning", *The Internet and Higher Education*, vol. 7, no. 2, pp. 79-93.

Salmon, G. (2004), *E-moderating: The key to teaching and learning online*, second edition, Routledge Falmer.

Warr, P. (2002) "The study of well-being, behaviour and attitudes," in P. Warr, (ed.) *Psychology at work*, 5th edition, Penguin, London, pp. 1-25.

Wilkinson, A., Forbes, A., Bloomfield, J., & Fincham Gee, C. (2004) "An exploration of four web-based open and flexible learning modules in post-registration nurse education", *International Journal of Nursing Studies*, vol. 41, no. 4, pp. 411-424.

Scale	Minimum Score Achievable	Maximum Score Achievable	Cronbach Alpha
IT use and confidence in IT skills	8 – low confidence	40	0.8
Preference for e-learning	9- prefers classroom teaching	45	0.8
Orientation to the module	3- only doing the module because it is compulsory for their course	15- the module is important for their work.	0.6
Research skills	5- minimum skills developed	25	0.6
Support throughout the module	8- perceived level of support low	40	0.7
Quality of learning materials	5- poor quality materials	25	0.82
Intrinsic Motivation (based on the work by Warr et al[10]	6	35 high intrinsic motivation	0.8
Evaluation of the module	7- unsatisfied with the module	35	0.8

Table .I. Scales Used in the Evaluation.

Scale	Correlation	Significance Level	Comments
Preference for e-learning	r=0.8	0.03	Those that demonstrated a preference for e-learning were more likely to give favourable module evaluations for the e-learning module.
Support	r=0.8	0.001	Those that felt they had been supported well by other students and the tutor were more likely to give favourable module evaluations.
Intrinsic Motivation	r=0.64	0.03	Those that scored high for intrinsic motivation also tended to score the module evaluation positively.

Table .II. e learning Student Scores that were Positively Correlated with a

Favourable Module Evaluation.

Figure .1. Experiential learning from utilisation of the constructivist approach.

Adapted from Gilly Salmon's 5 stage model of e-moderation(Salmon 2004). Italicised comments based upon our experience.

Stage 5- Development
Supporting, responding
More individual activity as assessment deadline approaches, Utilisation of skills in other contexts. Individualisation of content to meet personal needs

Stage 4- Knowledge Construction
Facilitating process
Ownership of learning increases, collaborative learning becomes embedded as students openly exchange experiences and share knowledge.

Stage 3- Information Exchange
Facilitating tasks and supporting the use of the learning materials
e-tivities facilitate the sharing of practice and ideas ,peer-review and feedback on postings, sharing of pivotal incidents.

Stage 2-Online Socialisation
Familiarisation and providing a bridge between cultural, social and learning environments.

Establishing this is a 'safe community' for learning, developing trust. Vital stage for tutor input, rapid response and encouragement to questions and problems.

Stage 1- Access and Motivation
Welcoming and encouraging
Creating the climate, 'rules of engagement' and inducting learners, what are the training and support needs? Encouraging learners to identify their own development needs.

Completion of module

Start of module