Using the Internet to deliver higher education: A cautionary tale about achieving good practice

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Profile of the authors

Dr Steven Coombs has wide experience of information technology curriculum development in the context of flexible and distance learning programmes at a range of institutions including: Nanyang Technological University, Plymouth University and the Centre for the Study into Human Learning, based at Brunel University. Steven also has experience of working with rurally located businesses in Cornwall, UK, jointly setting up St Austell's Local Collaborative Project in which employers' training needs for this region were identified. Steven is the author and tutor of the University of Plymouth's Integrated Masters Program module 'IT for Personal Development and Project Management', which this project conducted in a telematic-assisted format. He also previously worked as an Assistant Professor in the Division of Instructional Science, School of Education, National Institute of Education, Nanyang Technological University in Singapore. In Singapore he coordinated the country's IT module for all secondary teacher trainees and worked on a distance learning videoconferencing project to link up practicum teachers based in schools with their university campus-based supervisors. Steven is now working as an Assistant Professor of Educational Technology at Sonoma State University in Northern California.

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Key Words

Telelearning, telematics, webministration, cyber-protocols, cybervoid, action research, synchronous and asynchronous communications systems, technical and pedagogic protocols.

Abstract

This article reviews the development and delivery of a Higher Education course module as part of a large European University's Integrated Masters Program operating through a regional network of Rural Area Training and Information Opportunities (RATIO) telematic centres. The aim of the project was to provide remote learners living in the southwest of England with computer-supported solutions to access higher education as part of a technology-assisted distance education programme. The module represented a shift from traditional educational delivery systems by using instructional courseware *via* an Internet Website. Personal communications with module participants was conducted with the use of email and videoconferencing information technology (IT) resources. Out of the original sixteen participants who enrolled in this Masters course module, four actually completed the learning sessions and two submitted final assignments. This article considers the key lessons learnt from this attrition rate and shares the mainly positive experiences of the remote tutor and the students engaged in this initiative. The implications regarding the use of the Internet for delivering higher education course modules through online distance learning are discussed in the light of cautions learnt from this research project and important practical recommendations for future practice are made.

Overview of the project

The key purpose of this research project was to take advantage of the opportunities offered by the Rural Area Training and Information Opportunities (RATIO) initiative and create

an experimental Website through which to offer a UK Masters degree module. Because it was considered that students who were interested in IT might be attracted to such a format, it was decided to develop a module that already contained a high IT content. Thus, 'IT for Personal Development and Project Management' was chosen as an appropriate module for conversion into telematic courseware. Telematics is a European word constructed from the terms 'Telecommunications' and 'Informatics' to express this new form of IT-assisted telelearning. This IT module was therefore considered to be suited for development as a distance learning programme *via* a telematic platform that provides dissemination and assessment services through interactive student participation. Participants would have access to appropriate IT facilities located at the selected adult education RATIO centres across the southwestern region of the UK that have been setup from European Union (EU) funds. Careful development of both *technical* and *pedagogic protocols* that underpin the delivery of telematic-assisted higher education programs were identified and summarized in Table 3. These protocols were needed to establish the effective use of such technology for remote learners following the academic task criteria for all Masters modules. These tasks require learners to acquire academic skills covering the following five assessment areas:

1. critical review of a body of knowledge;
2. data collection and analysis;
3. developing practice through a project;
4. reflecting on practice; and,
5. making an argument.

All of these areas are underpinned by deep criteria where the learner is expected to demonstrate abilities covering personal skills that involve:- research and investigation;

organization and preparation; appropriateness of medium and process; practical competence; coherence; legibility; inventiveness and independence of thought; understanding of relevant historical, critical and cultural contexts; and, critical evaluation.

The challenge of this pilot project was to ensure that the technology-assisted module developed was capable of fulfilling the learning requirements outlined above through action research field-testing of the telematic resources developed with a small group of remote learners. The experiences of these remote learners were collected in order to evaluate the effectiveness of the technology adopted and the online distance education delivery systems implemented. Qualitative analysis of these action research findings was used to determine whether the professional development learning needs of the participants, relative to achievement of the five tasks, were achieved, and, if not, what lessons could be learnt regarding future improvements. As this project represented a first attempt to integrate learning technologies into the main thrust of the Integrated Masters Programme, its development has been initially restricted to the creation of Website courseware for one module. Academic communications support has been provided in the form of *synchronous* videoconference seminars and tutorials and *asynchronous* reflective activities, such as the use of email. It is intended, however, to eventually explore the educational potential offered by other telematic-assisted learning systems, such as satellite broadcast television.

This project has attempted to find solutions towards two key problems affecting higher education needs in the southwest UK region, these being:

1. greater accessibility to higher education professional development opportunities for life-long learning students who are otherwise disadvantaged through geographic isolation, full-time employment pressures, family and other social commitments; and,

2. an increase in participation rates for professional skills updating through distance education, in order to create a better-educated and more flexible workforce.

The project therefore impacted upon a clear set of regional social needs, satisfying the common aspirations of both the EU RATIO initiative and the university's higher education focus. This telematic-based distance education solution envisaged developing a balance between the university's learning resources available over the Internet and live-audience interactive learning experiences through RATIO and other videoconference centres across the UK southwest region.

The identification, development and testing of a Webpage authoring kit, suitable for practical university staff development, represented an original contribution. It also achieved viable solutions to some of the Information and Learning Technology (ILT) issues highlighted in the UK government's Higginson (Further Education Funding Council, 1999) report, regarding the difficulties of getting staff to implement flexible distance education through information technology learning curricula and superhighway learning resources. Indeed, the report recommends that priority be given to learning materials development and that proper arrangements are made to provide staff with support, information and advice in all ILT areas of development, including solving the funding issues arising from delivering pedagogy in this manner. These ILT implementation and delivery issues have also been recognised in the European Union's white paper on education and training, leading to the funding of a wide range of telematic-assisted learning applied research projects (European Union, 1995). The UK government's Dearing Report (1997) into higher education also considers the importance that information and communication technologies will play in widening access opportunities. The Times Higher Education Supplement (THES) (1997) summarized a key recognition from

Dearing that "Over the next ten years the delivery of some course materials and much of the organisation and communication of course arrangements will be conducted by computer" (p. 1). However, the THES also reports Dearing's cautions for the proper management of such learning technologies and cites the need for "educational intervention and support structures [that are] sensitive to the needs and practices of lecturers and students [and asks] how educational technologies can be most effectively deployed" (p. 1). This implies the need for university online course designers and planners to identify the instructional pedagogic and technical protocols involved in delivering quality higher education programs in this particular format and learning style.

This project was a small, but important, part of the EU's overall telematic program. Our purpose was to experiment with our telematic-assisted distance learning module throughout the southwest UK RATIO economic development region and determine a pedagogic model of good practice for future expansion both nationally and internationally. Information and communications technology media resources, such as the Internet, have allowed for such a vision to take place. However, the pedagogic communications patterns for collaborative telelearning constitute a radically different educational delivery process when compared to conventional learning systems (Aviv & Golan, 1998). The existing Masters delivery model offered by the university had already attracted a large number of students and this new distance education program was considered to be one way of providing additional recruitment opportunities. This project has therefore explored one solution towards solving an access problem that often prevents expansion in higher education owing to both financial and geographical constraints. An appropriate policy that can overcome these problems and enable the flexible delivery of higher education distance learning was thought to provide one way of optimizing the university's organization of human and financial resources. Success in telematic-assisted distance learning

potentially offers a new delivery extension to the Integrated Masters Program, leading to a wider and more diverse range of courses.

Aims

The specific aims of the project were:

1. to develop a university Internet Website facility, capable of delivering flexible Masters courses *via* this telematic platform;

2. to pilot and determine the pedagogic processes and necessary support requirements underpinning the conversion of the module 'IT for Personal Development and Project Management' into such a flexible distance learning package;

3. to develop flexible distance learning synchronous IT communications solutions for seminars, tutorials etc., through RATIO videoconference centres across the region; and,

4. to evaluate the effectiveness of the flexible online distance learning solutions developed in terms of key findings gleaned from involved staff and distance education participants, and, further, to identify the significant lessons learnt with consequent implications for teaching and learning in higher education.

The implementation of the project

The development activity associated with the preparation and production of an online distance learning module is not the key focus of this article, however, the need for a clear staff development support process for all intending remote tutors was identified. The pedagogic protocols listed in Table 3 suggest the process a tutor may follow in converting conventional higher education course modules into a new telematic-assisted distance learning format and explains the type of technical and academic support services required. However, the main focus of this article is to concentrate on the pedagogic implications of actually implementing a remote

learning online module, rather than those of designing it, which was earlier reported by Rodd & Coombs (1997). The delivery process of this module is described in the following three stages: 1) the recruitment of participants; 2) the delivery of the module; and, 3) evaluation of student and tutor experiences.

1. The recruitment of participants

Prospective students were invited to attend an introduction and induction evening prior to accessing the module. At this event the course tutors and administrative staff were available to:- explain the process of delivering, assessing and evaluating the module; discuss any student concerns; assess accessibility and compatibility of the hardware and prospective venue that students intended to use in studying the module; and, identify and discuss students' expectations about – and potential obstacles to – successful completion of the module.

Twenty students attended the introduction and induction evening, from which 16 people were enrolled. All the students had appropriate entry qualifications for enrolment in the Integrated Masters Program and were mature adults who were either involved in, or had previously worked in, education, training and related fields. Difficulties in obtaining access to suitable IT hardware and viable venue sites were the reasons given for the four people who did not enroll. This technological access reason proved to be a common significant factor in later course 'drop-outs'.

During the induction session the sixteen students were asked to complete a short questionnaire to identify previous IT experience, in order to ascertain the likely needs and level of IT support during the module.

[Insert figure 1 here]

2. The delivery of the module

Once enrolled, the 16 students were provided with the module's Website address (see figure 1), user name and password to access the seven learning sessions (see figure 2).

[Insert figure 2 here]

The module was authored so as to allow general public access to some information, but with the key learning sessions and tutor email access protected by a user name and password. Students were asked to signal their participation in the content of the module by submitting an introductory email about themselves for their tutors and peers. Students were then asked to respond to the tutor's email requesting details about their project assignment. An email distribution list was set up to facilitate communication between tutors and students. Students were then required to access and complete the learning sessions in their preferred venue at their own time and pace. The tutors encouraged students to communicate about on-the-job difficulties encountered during the module and distributed email responses to frequently asked questions (FAQs) for all group members. Students were also encouraged to communicate with fellow peers about their experiences encountered while undertaking the module, thereby encouraging the establishment of a support group. The learning sessions needed to be completed in sufficient time for students to prepare and submit an appropriate project assignment by a set date. At least one videoconference session was planned during the delivery of the module. Numerous problems related to the delivery of the module subsequently emerged.

3. Evaluation of student and tutor experience

Project evaluation was carried out through qualitative analysis of the following pedagogic domains:

1. ease and support issues related to developing a flexible distance learning telematics package by remotely located university staff;

2. the extent to which the pedagogic aims of the Masters module were actually achieved through flexible distance learning assessment methods;

3. student attitudes regarding both participation and learning through a flexible distance learning delivery format. Interviews, both personal and email, coupled with post-module evaluation feedback reports were deployed; and,

4. tutor experience of, and attitudes to, teaching and delivering a module in this particular format *via* chronological recording of key on-the-job personal learning events.

Conversational learning encounters between tutors, students and fellow students enrolled in the module were made available through built-in Internet email facilities offered through the Website. Conventional telecommunication support services were offered as a back-up facility, that is, the use of telephone contact numbers, fax etc. In practice, however, these services were rarely employed.

Research findings

Action research data was collected and evaluated on four areas; 1) student attrition, 2) previous experience in using IT, 3) email correspondence, and 4) personal reflections of the tutor.

1. Student attrition

Student attrition was a major issue in the delivery of this distance learning module. In the four weeks following the Introduction and Induction evening, eight of the enrolled students withdrew from the module. The two main reasons cited were; a lack of accessibility to suitable hardware, and the participant's employment pressures. The project was dependent upon the operation of RATIO centres throughout the southwest of England. The delivery and installation of IT equipment for accessing the Internet and to participate in videoconferences ran well behind

schedule, which meant that none of the RATIO centres could be fully used by the students. The remaining students then had to find alternative venues. This task proved extremely difficult and resulted in the loss of another five students. Pressure from employment proved to be another factor in student attrition. A majority of the students worked as trainers in higher or further education UK colleges. These sectors were – and are – experiencing major structural upheaval, which resulted in the loss of a further three students that were obliged to take on additional workload responsibilities in order to retain their jobs. These students would have withdrawn from the module regardless of its mode of delivery, and highlights the impact of employment pressures on adult students.

Over the following four weeks another four students withdrew. Two students considered that their low level of competence with IT would result in their inability to successfully complete the module. One student – who suffered from multiple disabilities – withdrew because the university was finally unable to meet her specific educational needs for a voice-activated computer. The final student withdrew because he was returning early to his home in Cyprus.

The remaining group of four students progressed through the learning sessions over a period of approximately four months. However, of these, only two students completed the module requirement of submitting and passing a work-based action research project assignment. While the other two students had completed the technical requirements of the learning sessions, they failed to submit the rigorous post-graduate project assignment.

2. Survey of previous experience with IT

The original 16 students who enrolled on the module completed a short one-page questionnaire that aimed to identify their previous experience with the type of IT skills on which the module was based. The results are summarized below.

[Insert Table 1 here]

The majority of students reported previous experience of using word-processors, with approximately half of them having prior experience of email and the Internet. The majority of students had not participated in videoconferencing.

In relation to the type of system that the students intended to use, 12 indicated that they would use a standard PC, while 3 reported that they would use a Macintosh, and the final person reported that he would use both systems.

[Insert Table 2 here]

Although the workplace and home were specified by the students as venues where they would be most likely to access the module, 11 indicated that they would probably use both places in order to more fully participate. Given that the RATIO centres were not fully operational during the module, two students had to find other suitable venues.

Finally, the students were asked to rate themselves in terms of their level of confidence for using IT on a four-point scale (very confident, confident, unconfident, very unconfident). Half of the students (8) reported that they felt 'confident', 7 reported feeling 'unconfident' and one student reported feeling 'very confident' in using IT. Interestingly, only two students withdrew because of feelings of incompetence with using IT. The data obtained suggested that adult student attrition was mainly associated with social factors unrelated to any lack of confidence in using IT.

3. Qualitative analysis of email correspondence

Email correspondence (and just four telephone calls) generally connected to technical and academic-related problems. Initial technical problems were related to obtaining the correct URL address for accessing the module Website on the Internet, and incorrect, or changed, email addresses. Unfortunately, following the Introduction and Induction evening – when the module's Website address on the Internet was provided to students – it was subsequently decided by the university's technical support staff to change this address. Although inserting the new address into the home page rectified this problem, it, nevertheless, resulted in considerable student confusion. The change of address was followed almost immediately by the university's computer system 'going down' for a couple of days, a likely situation that the students had not been forewarned about, thus undermining their confidence and increasing their sense of social isolation (Aviv & Golan, 1998). In setting up the module on the Internet, technical staff from two university departments had been involved. It is important that only one department (or agency) be responsible for frequent communications to all systems-users. Coombs (1997) identified this as an essential "Webministration" facility that underpins the technical and administrative support services of any remote learning virtual faculty.

Owing to a lack of any central Webministration service, distance learner *users* were supplied with incorrect email addresses and weren't sufficiently informed of any vital system changes. In the early stage of the module's delivery, one of the tutors took up employment in Singapore, also resulting in a change of email address. Some students, who had a limited understanding about the precise nature of email addresses, provided inaccurate contact details. One student changed her email address during the module and then provided inaccurate contact details. Consequently, the distribution lists became incorrect at frequent intervals, resulting in students not receiving replies to emails or emailed correspondence. After these initial technical

problems were overcome the student group had decreased to four. For this remaining group the type of technical query changed from simple problems – as described above – to a set of more complex IT user problems. These included:- the encoding and decoding of email attachments between incompatible non-standard email software systems; how to access the Integrated Masters Program and other academic-related Websites; creating and saving of graphics as GIF files and word-processed material, so that they can be sent as split text and graphics files as email attachments; and, finally, pedagogic queries related to the setting-up of and preparation for a videoconference seminar session.

All of these problems were trouble-shooted by the remote academic support tutor (now located in Singapore) through the email contact system, and this unforeseen IT user support service added considerably to his burden – contributing to the large 73 online contact hours that were recorded and reported by the tutor. This is to be compared to the conventional delivery of the same module, which was previously delivered in only 30 hours of contact time. These additional hours were divided between the identified three roles of technical, administrative and academic support services. Clearly, it is essential that students have immediate access to technical and administrative support services for such a technology-dependent learning system. However, it is recommended that these two roles should be provided by a centralized tutor-independent Webministration service, with academic module support residing with the tutor. This under-estimation of the essential virtual support services required to effectively deliver and manage a distance learning higher education module has been recognized by Gawith (1998). Gawith maintains that the real costs of telelearning: "… involves not only the direct costs of the telecommunications hardware, software and usage charges, but indirect costs that are, arguably, ultimately more significant" (p. 5). Gawith defines these indirect costs in terms of familiarization time for the teachers to learn how to integrate the technology into their curriculum. This would

include the time required to rethink and redesign these programmes into the new delivery formats required. Hence, in order to deliver the same [sic!] Masters course the tutor spent two working days per week over a four-month period engaged in this instructional redesigning task alone. Other hidden costs include ensuring that the module participants have sufficient prior learning of the technology and information skills in order to attempt the set telematic learning tasks. Gawith also acknowledges that telelearning requires more time than conventionally delivered courses for the monitoring and guiding of student learning - as we found to be the case for distance delivery of an Integrated Masters Program module.

Because of tutor unavailability due to holiday periods and absences related to other academic duties, some students reported concern about delays in responses to emailed correspondence. Tutors also found they could not always contact students, which created uncertainty about their continued participation in the module. It is important that all participants alert group members if they are going to be off-line for any significant period of time. An unexplained off-line period of absence creates a kind of *cybervoid*. This is a communications vacuum that engenders a feeling of anxiety amongst the rest of the participants to the group. Aviv and Golan (1998) recognize this as a negative effect upon the remote learning process and suggest avoiding it through instigating a pedagogic communications protocol that includes a combination of personal support learning services and mutual activities with other participants in the form of collaborative group work projects. Indeed, Suler (1997) recommends that in order to make virtual learning communities work, a clear set of learning principles need to be established. Suler's set of pedagogic and social cyber-protocols include:

1. *Use software that promotes good discussions*
2. *Don't impose a length limitation on postings*
3. *Front-load your system with talkative, diverse people*
4. *Let the users resolve their own disputes*
5. *Provide institutional memory*

6. *Promote continuity*
7. *Be host to a particular interest group*
8. *Provide places for children*
9. *Confront the users with a crisis*

A transparent socio-pedagogic communications protocol linked to Webministration administrative and technical support services, tutor academic support and other distant learner participants are therefore a recommended essential infrastructure for any expansion to this service. Trentin (2000), who suggests that online education systems represent a "third generation distance education", also supports this idea. He links the technology with user interactivity and program quality, suggesting that there is: "a strict link between quality and the capability to manage a learning process based on the active participation of all its beneficiaries" (p. 18).

A range of academic queries was raised in student email correspondence. These related mainly to: definitions of academic terminology; requests for feedback on student work; questions about theoretical and methodological issues; requests for traditional printed resource materials; a request for information about administrative and library matters; and, the use and value of reflection in academic work and other matters directly related to the scholastic content of the module. Where appropriate, the tutor's reply was distributed to all of the group members, as were all relevant suggestions and comments from the students.

Although traditional written end-of-module evaluations could have been undertaken with the completing students, the small number of students made this process redundant. Instead, the two students who successfully completed all seven learning sessions and had submitted an appropriate project assignment were contacted personally to discuss their experiences about the strengths and weaknesses of online distance learning. The general consensus was that there was more time and work associated with undertaking a module in this format than in traditionally delivery modes, which agreed with Gawith's (1998) findings discussed earlier. While the

students thought that they had learned a lot, they described some of the theoretical on-line reading as 'heavy going'. The students thought that two competing demands were made on them: first, the learning of advanced IT skills to enable them to undertake the distance learning module, and second, the learning related to academic content requirements. The students recognized that there were initial 'teething problems' associated with technical aspects of the module, but considered that these were overcome by the regular emails and encouraging personal support offered by the tutors. The lack of face-to-face social interaction with the rest of the group was considered to be a disadvantage. It was understood that this aspect could have been overcome with a more appropriate videoconferencing solution, such as the system suggested by Sharpe, Coombs and Gopinathan (1999), who are encouraging the use of user-friendly and low-cost multipoint desktop videoconferencing (MDVC) equipment on a Broadband Internet service. As it turned out, only one videoconference session was organised, in which only one of the students could participate at the university's venue due to technical and time difficulties. The other student linked-up separately via her school's videoconference resource, but all three venues could only communicate via point-to-point. A multi-point bridge-server was not available between the three venues, so three-way communication was stymied. The tutors recognised that some of the students' problems with the module were associated with their inexperience in authoring appropriately formatted graphics and text files and sending them via email. These technical problems are likely to be overcome in future online distance learning packages.

4. Personal reflective journal of the tutor

The remote tutor identified and recorded a wide range of problems and successes associated with the online delivery of this module. The key pedagogic issues identified were as follows:

1. the lack of a distance learning systems protocol that delineates open support between the three core user areas of; on-line administration services; IT technical services, and academic services. These duties were unanticipated and left to the online module tutor to sort out;

2. the lack of any user-friendly videoconference facility that could easily connect the tutor and the group together for multi-point private conversations, i.e. a technical solution is required along with appropriate *synchronous pedagogic communications protocols* governing its use;

3. the need for a clear web-based 'netiquette' and online protocol from which both distance learners and module tutors can overcome the problems of remoteness and lack of face-to-face contact, i.e. *asynchronous pedagogic communications protocols* are required; and,

4. while the student attrition dropout from the module was high, the quality of the completed projects were excellent and fully met the Integrated Masters Program standards, thereby accrediting community-based action research projects *via* a university online distance learning program.

From these cautionary experiences the tutor has recommended the following pedagogic and technical communications protocols for all future online Masters courses:

1. the creation of a Webministration service to centrally co-ordinate the distance learning support service. That is, both a centralized forum and intermediary service through which the Masters online modules may be administered. The service would include online registrations, dissemination of necessary regulations and user-contact time-credit protocols, and assistance with IT technical problems. The Webministration coordinating

facility would form the academic support infrastructure of an online virtual faculty and could offer global access to the UK Masters program (see Table 3 for more details); and,

2. the 'big' studio-based videoconference facility offered by providers such as PictureTel© Corporation are considered to be inappropriate and inflexible to the distance learner's needs for an easy-access face-to-face solution. Instead, the tutor has recommended a multipoint desktop videoconference solution, such as is being currently offered by the joint research initiative between Cornell University and the CU-SeeMe© Corporation and adopted by Sharpe, Coombs and Gopinathan (1999). This system offers server space for 'bridging' multi-point desktop videoconference sessions *via* the client-users own PC on the Internet. They currently offer an education and business users service. The education service offers videoconference access through their NASA-sponsored Global Schools Network (GSN) initiative. The business service, which includes many university clients, offers paid server access or the possibility for clients to run their own Unix©-based server with the desktop software that runs on both the Windows© 95/98 PC and Macintosh© operating systems. It also offers H.323 international standards compatibility, meaning that desktop multi-point videoconferencing can occur with other systems, i.e. Wideband CU-SeeMe© internet solutions communicating with PictureTel's© ISDN systems.

Outcomes and discussion

Several key benefits and outcomes stemmed from this project and included the following:

1. the development and running of a dedicated Website, which included full interactive student participatory features, such as Internet email, which responded to the mainly asynchronous communications needs and demands of the learners and tutors;

2. the conversion and testing of an existing university masters course module into a suitable flexible distance learning online format;

3. the identification and development of a suitable Web-based editor, which was capable of being used as a staff development authoring tool by the concerned faculty member;

4. the piloting of videoconference resources as a means of satisfying the perceived face-to-face synchronous communications requirements underpinning online delivery of a higher education programme;

5. the development of a suitable format with regards to the assessment and evaluation of flexible distance learning online programs;

6. the involvement of current Masters students in using advanced information technology skills associated with technology-assisted flexible distance learning programs; and,

7. a demonstration of applying telematic systems to the delivery of higher education programs.

Although the final group of students was small, the quality of their submitted responses to the seven learning sessions and assignments demonstrated that the project had a significant impact on the quality of learning. The most important quality-related issue is that of improved student access to postgraduate professional training programs. The students who completed the module would not have enrolled in a traditional delivery mode because of various social commitments. Higher education learning opportunities were therefore realized through the medium of a telematic-assisted flexible distance learning program, offered in a geographically sparsely populated region of the UK.

An important impact on the quality of learning was the creation of a flexible distance learning medium which promoted the ethos of student autonomy with regards to their own learning. This pedagogic concept underpins the aims of effective adult learning and satisfies the deep learning criteria of the Masters program. It also fulfills Trentin's (2000) notion that student empowerment in the form of active engagement in the online medium's process is a measure of its pedagogic quality. Good quality telematic-assisted learning programs, with proper higher education accredited status, can achieve Boud's (1981) vision of developing the educational qualities and personal skills that underpin the successful performance and capability of the autonomous learner. This is further underpinned by Harri-Augstein's and Thomas' (1991) notion of the self-organised learner, whereby an individual's learning capabilities can be enhanced through technology assistants that they refer to as an Intelligent Learning System. Coombs (1995), in his PhD thesis; "Design and Conversational Evaluation of an IT Learning Environment based on Self-Organised Learning", further elaborates this notion of an Intelligent Learning System in terms of a Knowledge Elicitation System. Whereby, information technology-assisted learning is considered in terms of its interactive learning capability with an individual learner. It is therefore understood that the quality of learner-learning with an information technology software system can be explained in terms of the learner being able to systematically manage their own elicitation's in the form of self-organised reflective construing experiences. From this perspective, knowledge is considered as being relative to the user – as learner – via focused information technology-assisted reflections, construed and elicited by the person in the form of meaningful learning conversations. This form of internal knowledge construction from self-managed reflective experiences represents a new learning theory that Coombs and Smith (1998) refer to as "conversational constructivism". They maintain that:

> " IT tools used for activities which encourage, stimulate and focus meaningful reflection can be viewed as knowledge modeling devices that facilitate learning in a social context. This particular paradigm empowers *learner control* of the *learning process* using appropriate conversational tools to achieve one's learning goals and provides a valid learning theory that explains the motivational role and educational value of a conversational learning environment." (p.27).

Given this understanding of how information technology/telematic learning systems may impact upon the personal learning capability of the learner – coupled with the demands of higher education, such as developing the learners reflective skills – it can easily be seen how appropriately designed learning technologies could bring considerable benefits to outreach members of the community participating in a distance education scheme.

Additionally, the personal involvement of the tutor in developing his/her curriculum through an action research project is supported by educational critical thinkers like Stenhouse (1975) and Elliot (1991) who support the notion of teacher as experimenter of his or her curriculum. Evaluation of the on-going curriculum development experiences of the tutor involved in converting a module into a flexible distance learning format was a valuable staff development exercise. An action research reflective learning biography was kept as a means of project management review and self-evaluation of the important lessons learnt as they were experienced on-the-job.

The module chosen as a pilot for this project offered a diverse curriculum range, which embodied the spirit of the central Masters program tasks and its deep criteria, while lending itself towards the use of technology-assisted reflective tools. Clearly, the telematic media adopted, that is, Internet Webpages and PictureTel© videoconference facilities, lent themselves to the central IT ethos of the module itself. This enabled participants to critically appraise advanced

information technology-assisted learning systems in terms of their ability to operate them successfully as knowledge elicitation systems. A central axiom of the module "IT for Personal Development and Project Management" critically appraises IT in terms of its ability to be used as a conversational learning tool that can be employed as a means of personal development. These IT reflective-tools assist participants to carry out a small-scale action research project from within their own social and working environment (Coombs, 1997). This Masters program design issue was raised in the US, with Tom (1999) reporting that: “Teachers dislike these (Educational Masters) programs. They view them as detached from the daily practice of schooling” (p. 245). This suggests the potential merit in implementing a flexible online Master of Education program that addresses professional teacher development needs through accreditation of action research curriculum projects.

Information technology project management techniques for this community-based online Masters course included the use of: -

1. the Internet to research contemporary background information of a participant’s subject/professional development field;

2. email as an asynchronous critical thinking communications medium to share research questions and concerns with project supervisors and other team members;

3. spreadsheets for quantitative data analysis and graphical presentation; and,

4. word-processing facilities to keep a computerized reflective log/account of key project events and submit the final assessment dissertation.

A key part of this Masters module required one-to-one synchronous tutorials to negotiate the participant's work-based project and discuss individual needs and assessment methods best suited to achieving the assessment task. Videoconferencing provided a means of giving this kind of support to distance learners, but in practice proved to be impossible to implement owing to the unwieldy nature of existing studio-based videoconference solutions. However, the PictureTel© ISDN system employed did provide the bonus of sharing an IT task with a distance learner, despite the difficulty of arranging prior access and use. Clearly, it is now possible to conduct interactive synchronous IT software demonstrations and exercises. This IT module involved the conventional use and tutor demonstration of Excel© and SPSS©, which could have been achieved remotely online through a more user-friendly multipoint desktop videoconference system that has an IT task-sharing management facility for interactive participation.

Difficulties Encountered

A number of obstacles to the development and delivery of the module were encountered by the tutor and students. For the tutor; lack of support in the administrative, library and technical areas; inadequate time allocation and resources for the development of the module; and, recognition by the university administration of the needs of a remote and/or home tutor were all identified. For students, the major obstacle was accessing equipment to undertake the module tasks. Contrary to expectation, the RATIO centres were not fully resourced with the equipment necessary for students to undertake the module during the trial period. In addition, a student with multiple disabilities was not able to gain access to equipment that would have enabled her to undertake the module. Where alternative venues were identified, such as colleges, schools or home systems, the capacity of these systems could not always handle the demands of the technology. Some students found that the challenge of mastering the technology was far greater than expected and felt that they could not handle both the technology and content together.

However, most students reported that the major advantage of this module was the opportunity of working in their chosen venue, in their own time and at their own pace.

Conclusion

In conclusion, the key benefits of this project will impact upon those participating students, drawn principally from the southwest of England, who wish to pursue professional development in higher education. Another key benefit is the staff development of all those involved in this project, including the participating project team, through their personal experiences of innovative practice that has lead to new pedagogical knowledge and skills of how to deliver Masters modules through remote learning technologies. As a consequence of cross-institutional collaborative involvement, the RATIO partner institutions will clearly benefit in the future through the perceived enhancement of their reputation as leaders in delivering distance education, despite the setbacks reported in this project. Table 3 summarizes the executive recommendations we would like to make regarding the technical and pedagogic support protocols required for delivering higher education by telematic-assisted distance education. Indeed, Barnard (1997) recognizes the potential to create virtual universities through the combination of Web-based courses with other media technologies, such as satellite TV, CD-ROM and other "video-based avenues". However, Barnard cautions us with some examples of how bad online instructional design of courses has led to poor implementation, with staff concerns and resistance to adopt these new pedagogic practices owing to ill thought-out consequences such as additional workloads. He cites the unfortunate example of a colleague who has to spend between four and five hours per day reading and responding to emails from a class of 50 online students where, clearly, an asynchronous communications pedagogic protocol affecting this kind of course delivery issue is severely lacking.

[Insert Table 3 about here]

The recommendations made in Table 3 attempt to recognize the pedagogic areas affected by setting up a virtual learning faculty for higher education and fully agree with the changing pedagogic roles recommended for ILT tutors in the Further Education Funding Councils (1999) report "Networking Lifelong Learning". They recognize that:

> "the role of the tutor will be transformed to that of a learning coach [with] changing work patterns relating to location, weekly and annual timetable, and learner caseload. The core competencies required for learners, and in which the tutor or coach must specialize, include (as well as conventional core skills):- learning methodology; project management; information analysis and dissemination; problem solving; and, design and presentation." (p. 20).

In addition to the valuable lessons learnt and pedagogic recommendations made by this project, we can see that the future educational profession has much to gain from the new insights and transferability of ideas from this distance learning project. Clearly, it has made an original contribution toward the greater understanding of Web-based pedagogy, impacting upon the management, theory and practice of teaching and learning in higher education.

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Other Website References

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The White Pine CU-SeeMe Website for Web-based multipoint desktop videoconferencing (MDVC) software solutions: (http://www.wpine.com/).

Figures and Tables

The following figures and tables are camera ready and should be inserted into the text where already indicated.

Figure 1. Main activities menu for IMP distance education module

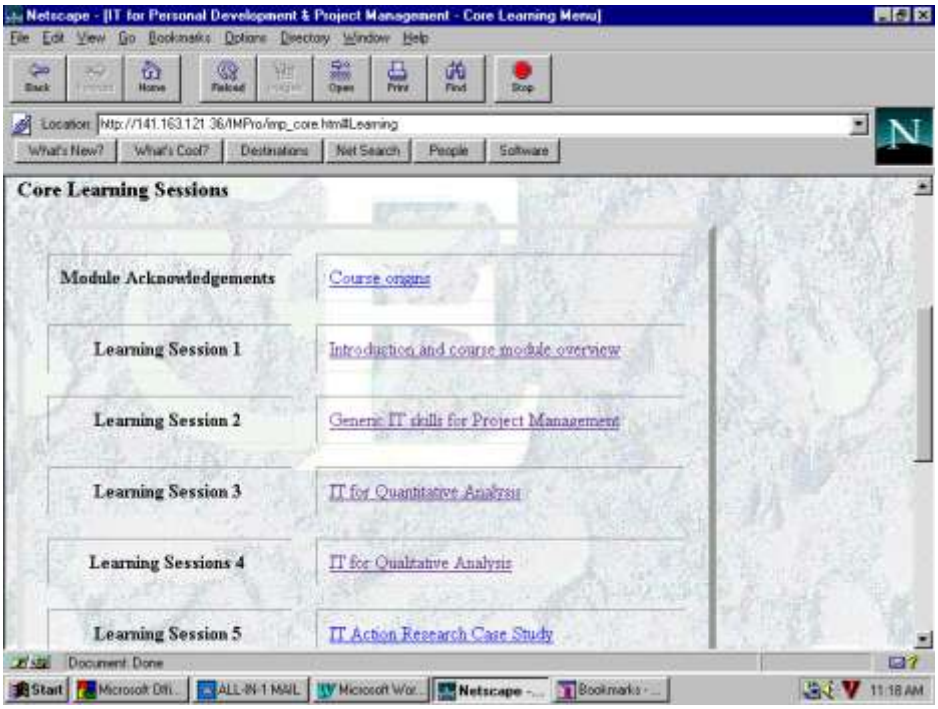

Figure 2. The core learning sessions

Table 1

Experience with different information technologies

IT application area	Yes	No
Word-processing	15	1
Email	7	9
The Internet	9	7
Videoconferencing	1	15

Table 2

Choice of venue for accessing the module

Type of venue	Number of students
Home	4
Work	8
University campus	2
RATIO center	2

Table 3

Executive summary of key pedagogic recommendations

Pedagogic area identified	Pedagogic protocols suggested
Authoring a remote learning curriculum. Need for a staff development support process for all remote tutors operating as curriculum authors. The pedagogic protocols listed opposite suggest the process a tutor may follow and the type of technical and academic support services required. Essentially, a courseware development support service is required for remote learning tutors. The tutor also needs to possess a wide range of generic IT application area skills, e.g. word-processing, DTP design and layout skills and knowledge of multimedia-type instructional systems.	• Preparatory phase of collating all course documentation into a Web-ready file format • Curriculum reappraisal. Identifying prior learning requirements, core learning elements and principle content. • Use of 'storyboard' templates as a mapping tool to establish key educational hyperlinks. • Academic linked references to external Websites related to the course module. • Use of Web-based discussion group facilities beyond email, i.e. bulletin board and chat room.
Webministration - technical and administrative support service. This project identified the need for a suitable technical and administrative system, which supports online learning. In particular, the perceived Webministration services would include the protocols listed opposite.	• Web-based course registration services. • Internet email access by remote learners to administrative & academic staff for essential troubleshooting-type queries. • A Web master technical backup and consultancy service.
Improving remote learning academic participation. The need for a virtual faculty to support remote learners was identified. This includes Webministration support services, listed above, as well as additional telematic resources that are summarized in the technical and pedagogic communications protocols opposite.	• A tutor-independent online service, with the aim of providing consistent information and better access to faculty resources. • The need for appropriately archived video courseware material. • The need for a cheaper and easily accessible multipoint desktop videoconference system over the Wideband Internet; • The need for a user-friendly Web-

	conferencing facility that will enable online social interaction.