Educational Multimedia Taskforce

SCHEMA

Review of Telematics based Open and Distance Learning

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More information about the Schema project can be found under http://www.stir.ac.uk/schema/

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Executive Summary

This Report is a review of the educational approaches used in telematics based Distance Learning (ODL). Particular reference is made projects supported by the Telematics Applications Programme (TAP) of the Fourth Framework of the EC Research and Technological Development Programme. The report concentrates on practice, reflecting our interest in how practitioners of ODL are using communications and information technology (C&IT) to deliver and support the learning process.

In the first part of the report, we present a summary of current theory relating to ODL, with particular reference to the constructivist model of learning.

We then go on to discuss the findings of a questionnaire distributed to a number of practitioners of telematics-based ODL and present a number of examples selected from current TAP funded projects which are concerned with the health and welfare area.

Finally we describe the approach that SCHEMA plans to use in its development of online professional development courses for health, education and welfare workers in remote areas of the Community.

Contents

1. Introduction

SCHEMA intends using a client-server architecture, based on Network Computers (NC™) to deliver and support a series of training modules designed to address the continuing professional development needs of health, education and welfare workers in remote communities. The Project involves the development and evaluation of a number of "virtual educational environments" and is particularly concerned with the use of the Internet to support a collaborative, problem-solving approach to learning. An underlying aim is to promote the development of a learning community which spans geographical and disciplinary boundaries.

An early phase of the Project has involved the production of a number of reviews of the use of telematics for post-qualifying education and training in the health, education and welfare fields, including SCHEMA deliverables D5.1 ("Review of CMC techniques as applicable to ODL") and D7.1 ("Review of Global Simulation techniques, originally developed for language teaching purposes"). The present review, which is concerned with the pedagogical model underlying the use of communications and information technology (C&IT) for distance learning, is based on a Web search, interviews and a survey using a mail questionnaire (Appendix A). Respondents to the survey included teachers, technical supporters, educational technologists, service providers and audiovisual producers.

Information has also been obtained to enable the construction of a database on telematics applications in education and training. The projects included in the database, selected from TAP, are at a variety of stages, address many different audiences and have utilised a number of pedagogic approaches. The database has been structured in such a way as to allow quick comparisons to be made between the differing approaches with the aim of allowing a comparative perspective to be developed.

The advent of modern communications and information technologies (C&IT) has occasioned a revaluation of pedagogic approaches and their underlying models of learning. The arrival of the Internet, especially of the World Wide Web, has been heralded as ushering in a radically revised form of higher education (see, for example, the Dearing Report (1997) in the UK). The technologies themselves are said to have become more readily available, to have decreased in cost and to have become more transparent to the end user. Although the generality of each of these claims can be disputed, it seems clear that developments in the design and power of hardware and software are providing the potential for a wide variety of new educational experiences. A major aim of SCHEMA is to investigate the way in which C&IT can be used to support differing models of the learning process.

The rapid development of communications and information technologies has coincided with a number of other changes in the economic, social and cultural aspects of society. The rapid pace of change has created an increased need for training and retraining and has focussed attention on the role of lifelong learning and continuing professional development. In these circumstances C&IT can be seen as either a harbinger of greater differentiation and social exclusion or as an aid to the social integration of marginalised individuals and communities. Through its attention to the use of C&IT for the provision and support of continuing professional development to health, education and welfare workers in remote regions of the European Community, SCHEMA aims to investigate the relationship between learning communities and social integration.

2. Theoretical Frameworks in Distance Education

All instructional systems are intended to facilitate the student learning process. There are, however, a number of distinct approaches to the task, drawing on differing models of learning. At one extreme are approaches stressing the process of knowledge transfer; at the other are approaches which emphasise the significance of exploration and problem solving.

Most computer-based training to-date has been based on the knowledge transfer model, using the computer as a tool to transfer a concise and coherent block of information from teacher to student as effectively and efficiently as possible. In this model extraneous information is left out and clear "learning paths" are set up in advance to guide the student.

The knowledge-transfer approach appears to be well-adapted to training in basic skills and to the imparting of information in areas of knowledge which are relatively static and well-defined; it is of less use in areas such as continuing professional development where higher-level skills are involved and the knowledge which is to be generated has to take account of changing situations. In these latter circumstances specific facts change so rapidly that some knowledge becomes obsolete even as it is being learnt and the nature of the real-life problems to be solved is constantly changing. What is needed in this context is the construction of a cognitive framework, which will enable the student to apply knowledge gained to new situations, using it to solve emerging problems.

Varieties of Web Based Learning

The translation of learning from the classroom to the World Wide Web complicates the attempt to produce a comprehensive classification of teaching and learning models, but educators at Pensylvania State University have suggested six basic strategies which can be employed in web-based learning (http://www.ed.psu.edu/nasa/page4.html):

1. **Expository Presentation**– this is similar to the traditional form of didactic teaching where learners are presented with information. The teacher is in control and the learners are directed to follow a path through the material. This is effectively a deductive approach to learning.
2. **Inquisitory Presentation**– this shifts the emphasis from teacher to student-led learning with student's engaging in conversations with the teacher through questioning. This strategy to engage the learners seeks to motivate them to find rules and relationships in the subject matter. The teacher is expected to create a contextualised learning environment where student's prior knowledge will be activated as a basis for a conversational teaching strategy supported through teacher help and feedback. This approach may be characterised as inductive learning)
3. **Collaborative Learning**– where students work together on learning activities, communicating with each other in order to complete tasks whereby learners are required to be able to justify their ideas, beliefs, etc. The teacher may assist in reaching decisions through clarification, facilitation and feedback.

4. **Generative Learning**– activities under this heading are aimed at allowing the learner to engage directly with the information in order to construct a personal understanding.
5. **Anchored Instruction** (see Bransford et al, 1990).– this is a learning activity presented in the form of a problem-based role play. The teacher acts as a coach and facilitates the process. The students engage with the problem under the guidance of the instructor and have ownership of the process of generating a solution or outcome.
6. **Problem-based Learning**– learners are presented with an authentic problem by the teacher and are guided and encouraged through the construction of individual understanding to arrive at a solution. The problem is open-ended in that there is more than one solution and the aim is to develop knowledge and skills through the activity, it is not a test of them. (see Dillon and Zhu 1997). The idea is to develop a deeper level of knowledge and different perspectives through solving realistic problems.

These strategies provide a framework for the design and analysis of web-based delivery and are based on contemporary learning theory and classroom-based besed practice. They all follow a constructivist agenda in the use of multiple perspectives, learner involvement and interaction and teacher guided strategy to some degree. Each of the approaches can be enhanced through the incorporation of increased contextualisation, interaction and authentication.

The Constructivist Approach to Continuing Professional Development

The development of professional skills for health, education and welfare workers, including skills in social research, requires what MacDonald and his colleagues (Macdonald *et al.* 1976) have identified as constructive understanding, combinations of generative learning, anchored instruction and problem-based learning as discussed above.

Constructivism is a collection of theories which have dominated cognitive and educational psychology for much of the past two decades. The approach claims that knowledge is constructed rather than simply passed-on and that the process of learning involves a number of cognitive processes in which the learner becomes an active participant in a social transaction. Much learning takes place as a result of learning-by-doing; an effective learning environment is one in which the learner is motivated to participate, is presented with valid material, is encouraged to construct his/her path through the material and is able to compare his/her grasp of the subject with model answers supplied through effective feedback. Many paths through the subject are allowed and collaboration with other learners as well as with tutors is encouraged.

Effective learning involves both psychological and social activity and involves the learner creating mental schemata or maps which can then be applied to his or her context and used in exploratory and problem-solving activities. Earlier stages of learning, involving comprehension and global reconstructive or “intuitive” understanding need to be negotiated before exploratory or problem solving activities can be undertaken. The initial developments in computer assisted learning tended to concentrate on these rather simpler forms of learning which can be approached via drill-and-practice software and assessed through the use of

multiple-choice question banks. The creation of educational software which can support constructive understanding is more complex. The key to success is the ability of C&IT to support interactive use.

Computer-based Interaction

In order to judge the effectiveness of technology-enabled interaction it is first necessary to examine what is meant by interaction and in particular to distinguish between the three types of interaction commonly practised in distance educators (Gunawardena 1992; Moore and Kearsley 1996).

1. **Learner-Content Interaction**

The first interaction that occurs, and is a defining characteristic of education, is the interaction of students with the subject matter in order that they can begin a process of constructing knowledge by accommodating information into previously existing cognitive structures. In telematics-based ODL the interaction may be between the individual student and material accessed through the computer.

2. **Learner-Instructor Interaction**

This second type of interaction is regarded as essential by most learners and as highly desirable by most educators. Instructors attempt to stimulate the students' interest in the subject and their motivation to learn. Charp (1994) and Porter (1994) found that teacher mediation increases the completion rate for distance education courses.

3. **Learner-Learner Interaction**

The final form of interaction is relatively new in distance education, but common in campus education, this is inter-learner interaction, between one learner and other learners, alone or in group settings, with or without the real-time presence of an instructor. Learner-learner interaction enables students to compare their developing understanding with that of others and is especially significant in professional areas. Phillips, Santero and Kuehn (1989) detail a number of pedagogical reasons for its inclusion in the design of ODL.

Distance education programmes need to be designed and organised around a framework that incorporates all three types of interaction. Harasim (1989:51) points out that learners construct "knowledge through a process of discussion and interaction with learning peers and experts". Distance education programmes should support this process, but need to be tuned to meeting the various teaching tasks for different subject areas for learners at different stages of development.

Charp (1994) notes that in ODL, with greater autonomy, the characteristics of students and their ability to work independently in the absence of a live instructor become crucial factors to success. Sherry (1996) states that the majority of distance learners possess such characteristics, being able to make use of the first form of computer based interaction. However, learner-instructor interaction and student-student networking take on a greater degree of importance for the remaining students, as well as facilitating the learning process for all students involved in the programme.

Learning Styles

Any approach adopted to the design of web-based learning should seek to realise "the need to interest the user on a continual basis" (Duchastel & Spahn, 1996). It is through the learners interaction with the computer, teacher and peers that learning occurs. Different students may have differing ways of interacting with learning materials and may adopt different strategies depending on the nature of the task in hand. The differences in approach have been systematised in the concept of learning styles.

According to Kolb et al (1979) four basic learning styles can be distinguished:

1. Converger– solves problems through "hypothetical-deductive reasoning"
2. Diverger– solves problems through brainstorming and generating ideas
3. Assimilator– solves problems through "inductive reasoning"
4. Accommodator– solves problems through "carrying out experiments"

Kolb established these four styles through an extension of established learning theories. The assimilator and accommodator originate from Piaget whilst the converger and diverger were identified from the structure of intellect model developed by Guildford (Kolb, 1985).

The identification of learning styles in the field is fraught with difficulty . Henke (1997) points out that "The literature indicates that there is acceptance of the concept of learning styles but there is much disagreement over how to measure learning styles." Even if the measurement problem can be solved it is generally impractical to conduct a learning style inventory in order to determine a person's learning styles in advance of designing and producing a course. It is still possible however to acknowledge the existence of learning style diversification and incorporate this into the design and production of materials. Divergent styles may be catered for through the provision of multiple perspectives realised through the use of multi-media tools, (eg creating video clips, sections of audio-streamed content and graphical knowledge representations) students personifying each style then have the opportunity to develop and compare their learning experience through computer mediated conferencing.

In an alternative approach to the identification of learning strategies, Bernt and Bugbee (cited in Schlosser and Anderson, 1994), examine two types of study strategies used by distance students: cognitive strategies and affective strategies. Students who passed the ODL course which is the basis of their study had differing cognitive strategies than those who failed; in contrast to the finding reported by Charp (1994) however, Bernt and Bugbee find little difference among passing and failing students in terms of affective strategies.

Each learning style reflects a particular model of the learning process and of the strategies used by learners in tackling the learning task. The match between students' learning styles and the way in which the learning task is presented and used is inexact. No one model of the interaction is universal and the adaptation or combination of learning styles and learning materials varies according to context. According to Duchastel and Spahn (1996), a model's appropriateness can be examined in terms of three forms of learning: procedural, declarative and cultural. Though this is a rather crude way of distinguishing forms of learning the distinction between the three forms of learning is useful for organising ODL materials.

Procedural and declarative learning are the skill and knowledge development of a particular subject and are easily facilitated by the adoption of any of the models presented above; cultural learning is less easily structured and necessitates a broad, wide ranging exploration in which reference to peers and acknowledged domain experts is vital

Approaches to Distance Delivery in SCHEMA

SCHEMA will seek to validate the use of learning styles in web-based course design through its adoption of formative evaluation techniques and instruments. Mumford (1992) states that it is necessary to incorporate work on learning styles into the design of web-based courses since effective course design must integrate principles of learning, learning styles and encouragement of learning to learn.

Sloan (1995) contends that computer-based learning can provide a flexible approach that can meet each student's preferred learning style. Though a learner may have a preference for one particular learning style, each learner can and will adopt more than one style in differing contexts.

The approach adopted by SCHEMA involves linking material delivered over the network with activities undertaken away from the computer and employing email, shared workspace, conferencing systems and other forms of "virtual meeting" to provide a learning environment in which learners can collaborate on problem-solving tasks.

Linking computer-based and other activities

Comprehension involves the structuring of information into cognitive or mental maps. The development of such maps requires learners to be able to build new knowledge on the basis of their previous understanding. This emphasises the importance of an individualised learner-focused approach. Although subject content is supplied by the teacher the locus of control needs to be firmly anchored in the learner. At the simplest level this may require little more than allowing the learner to exercise control over access and pathways through the information supplied; at a rather deeper level it emphasises the importance of individualised learning packages and tutor support.

The "social constructivist" concept of learning (Vygotsky 1986) implies that in order to master a new level of understanding, learners have to interact with others who provide appropriate reference standards. Given the distance and time constraints facing health, education and welfare workers in remote areas this again points to the potential significance of Computer Mediated Communication (CMC) in attempts to provide for their continuing professional development through telematics-based ODL.

In addition to using CMC to provide support and feedback from tutors, SCHEMA places particular emphasis on the use of CMC to support collaborative group projects. Group projects will involve work both on- and off-line, linking computer-based and other activities. Tools designed to encourage reflection and group discussion will be central components in the templates used in drawing-up course modules.

Simulation and situated learning

The achievement of constructive understanding involves situated learning, the recognition that the constructs being explored are relevant to the context (Brown *et al.*, 1988). SCHEMA adopts two approaches to this problem, one relating the material contained in the training modules directly to the stated professional needs of the learners and the second employing simulation techniques to create learning microworlds. In both cases tutor assistance will be on hand to provide expert assistance. The use of simulations makes it relatively easy for groups of learners to experiment in problem-solving activities. Groups can either attempt to produce a single consensual solution or allow individual members to propose separate solutions; in either case using the simulation to run through alternative "what-if" scenarios. Moderated discussion of the results can greatly assist situated learning. Mounting the simulations in a WWW-environment will allow the rapid evolution of simulations which reflect the everyday, real-life situation of the participants.

Networked Learning

Networked learning, which involves making connections among persons and resources through communication technologies for learning related-purposes, will play a vital role in the future as an increasing number of educators will adopt it for continuing education in order to overcome the restrictions of time and geographical location. In an era of life-long learning the aim must be to found long-lasting learning communities: the role of CMC as the medium for network connections will be vital in this endeavour.

Learning networks may consist of experts, fellow learners, other peers, remote resource personnel and instructors. Each participant in the network may be a resource if their experiences and comments can be of learning value. An important aspect of the attempt to foster learning networks is to identify the pedagogies and approaches to education that can be associated with it.

Schenkel (1993) points out that web-based learning can be viewed as pedagogical re-engineering. The development of web-based ODL involves new combinations of learning styles and learning materials and is considerably more than the simple translation of learning materials from one medium to another. Attempts to analyse network learning need to identify examples of how web-based learning can be used to either enrich and deepen one or more of the basic instructional strategies, or can be used to re-engineer the balance of learner time and engagement with the strategies.

Conclusion

As yet there is no definitive approach to the construction of web-based learning environments though some of the constraints placed on the more traditional learning environments allow us to seek new paradigms whilst struggling with new problems. New models of learning may be called for in order to realise the full potential of the new electronic learning environments. The main pedagogical thread connecting the development of the web-based learning environments used in

SCHEMA is the adoption of a social constructivist approach to learning. As a result, much of the emphasis will be on the use of CMC.

3. Questionnaire based Survey of Practitioners in Telematics-based Education

Methodology of questionnaire design

To inform the technical and educational design process in SCHEMA a survey was undertaken to investigate a number of factors which have informed attempts to develop ODL delivered through C&IT.

The survey was based on a questionnaire distributed to a sample of individuals engaged in delivering telematics-based ODL and covered their approaches, experiences and attitudes towards ODL in relation to three main areas:

- Pedagogy
- Organisation
- Technical

The questionnaire (Appendix A) was split into three sections. Section one covered general details about the respondents; section two covered the details of the system used to deliver the ODL course as well as details about the course itself. It is section two that gathered the information in relation to the three bullet points above and is our main source of data. The final part, section three, was for comments and a brief outline of the course to which the response related.

The survey took place among individual practitioners based in Europe, USA and Australia. A search of various distance learning Web sites generated the first batch of practitioners. People attending the EUCEN (European Universities Continuing Education Network) Conference in Örebro, Sweden in May 1998, were also sampled. The remaining practitioners in the sample were obtained via electronic distribution lists in England, Germany, Sweden, Finland, USA and Australia.

The survey took place in two stages. The first stage, described above, obtained 41 completed questionnaires. To increase the sample size in March 1999 we repeated the exercise with people attending the International Conference on Technology and Education (ICTE: www.icte.org) conference in Edinburgh, members of the European Distance Education Network (EDEN: http://www.eden.bme.hu), and the EUCEN members (eucenlist@fe.up.pt). In addition, we carried out extensive research at a number of major "ListServs" (such as www.mailbase.co.uk) to obtain further candidate lists. (The complete list of lists is given in Appendix C). This second stage generated an additional 91 completed questionnaires. Of the 91, three were repeats, giving 88 valid responses.

In total, 129 questionnaires were returned and are analysed in the remainder of this chapter.

Section 1: General Information

The large majority (76%) of participants in the survey came from higher education (HE) institutions. They came from a variety of backgrounds within the higher education community. A small number of commercial interests were also represented (24%).

Section 2: Delivery of ODL

This section of the questionnaire was sub-divided into a further four sections: Pedagogy, Organisation, and Technical.

Pedagogy

The first question simply asked for the title of the course. The second question (1b) in this section enquired about the different types of courses being delivered. The results are shown in Figure 1:

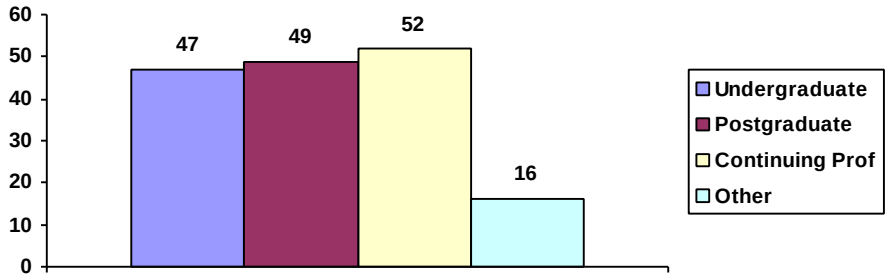

Figure 1: Type of Course

"Other" includes adult education courses, courses targeted at SME's and non-graduate / undergraduate courses. With HE represented so strongly, such a mixture of type of course is to be expected.

The next question asked whether the ODL course was new or was based on an adaptation of an existing course. The majority of courses (64%) were newly developed for the medium.

Exactly what types of learning the courses were designed to provide for the students was the subject of question 1f: "What are the students expected to learn?" The majority provided "domain content" (hardly surprising considering the number of postgraduate and undergraduate courses represented). Full details are shown in Figure 2:

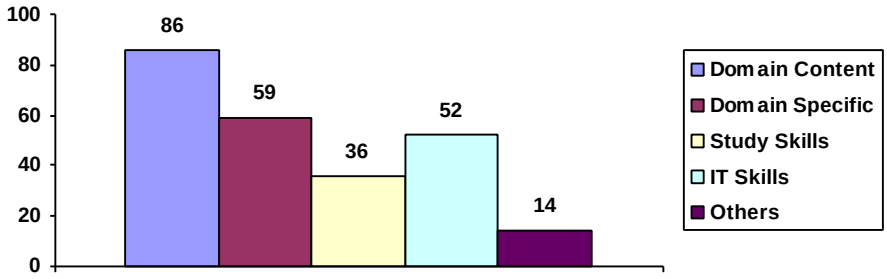

Figure 2: Course Content

Question 1g looked at how students completed course activities. 81% of courses used on-line completion with 63% employing off-line mechanisms. Not unsurprisingly many employed both.

Question 1h “What methods are used to present the main course content?” demonstrates that the on-line activity itself is generally either email or other forms of CMC. The figure, Course Materials, below summarises the different methods used for delivery. Most frequent was the Web with 100, next was email with 91, and 57 used other forms of CMC. Other methods employed were course handouts with 66, course books and face-to-face (51). Some less frequently used methods were video conferencing (13), video tapes (21), phone tutorials (20), fax (8) and audio tape (11). Amongst the others, CD-ROM is most popular with 8 courses employing this technology.

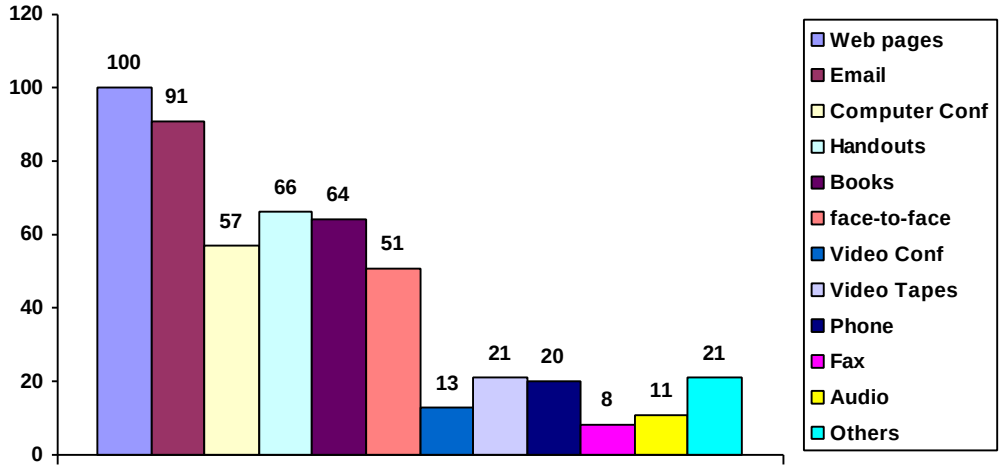

Figure 3: Course Materials

Question 1i asked about multimedia to support the learning process. The figure below summarises the results:

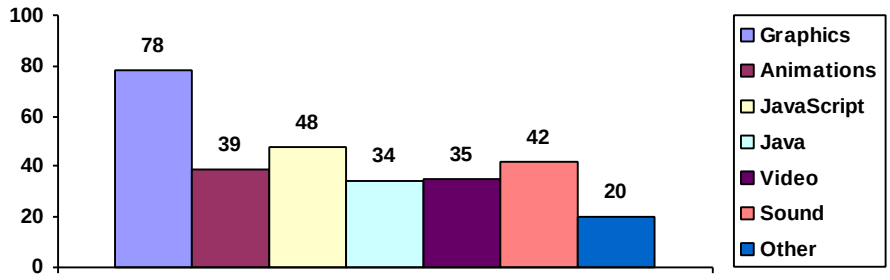

Figure 4: Multimedia to Support Learning

Lastly, in this section, we asked about how assessment was performed. The question asked for the percentage split between assignments, continuous assessment, examination and on-line contributions. (Other was also allowed for). The average for assignments was 42%, continuous assessment 14%, examinations 24% and on-line contributions 16%. These figures are based on the 92 respondents who provided data. For the remainder: some courses had yet to decide, some had no assessment and some had optional assessment.

Organisation

The second section within part two was concerned with the organisation of the online courses.

Question 2a simply asked "How is the course organised". The majority of the courses were organised as a series of modules: 70%. Only 23% were offered as whole units.

Question 2b is concerned with the pre-requisites required. Figure 5 shows the results. "Other" covers skills like computing know how and other "basic" skills:

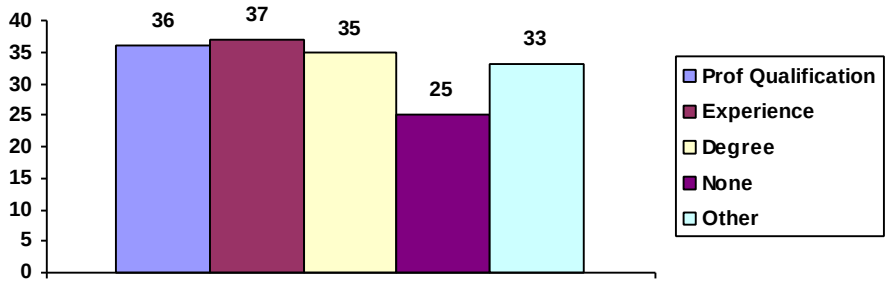

Figure 5: Pre-requisites

Question 2c asked about the place of study. The majority studied at home (88%) with significant numbers also studying at their place of work(74), or learning center(55).

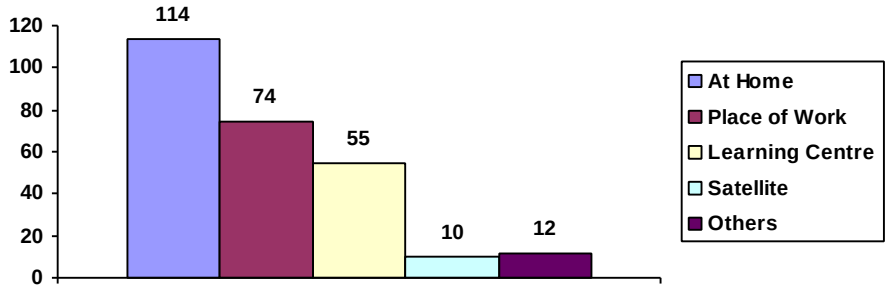

Figure 6: Place of Study

Most respondents report that study took place across a range of venues, emphasising the flexibility of C&IT-based learning: a course employing Web technology can be "studied" from potentially any networked computer.

Next we looked at the split of time spent under several headings: self-study; reading; assignments; on-line contributions; examinations; on-line tasks and other. The numbers (Figure 7) below are expressed in percentages of time spent on the courses.

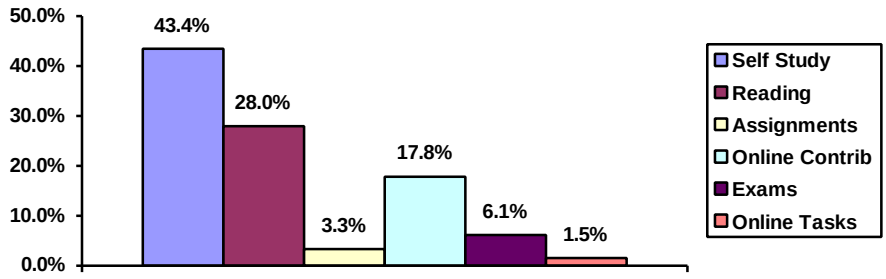

Figure 7: Student Workload

The data reflect the sort of balance that might be expected on a normal distance learning course, i.e. lots of time spent in self-study and reading, with smaller but significant amounts of activity being organised around the technology.

Figure 8, on the means of communication used, shows email as the most popular and video-conferencing as the least– considering the infrastructure generally required to support video-conferencing this is not a surprising result. The numbers are averaged from a 1-7 ranking (1 is most used and 7 is least).

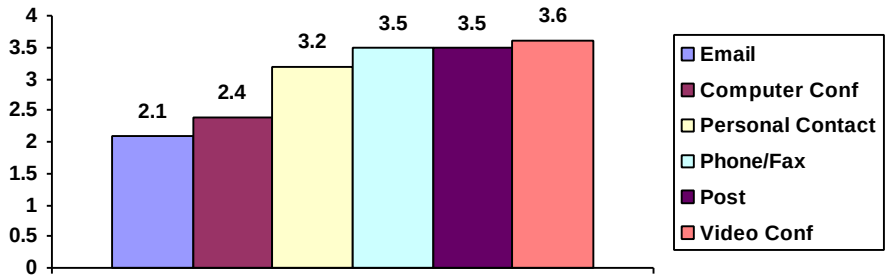

Figure 8: Forms of Communication (average ranking)

Question 2f examined whether students were expected to make regular contributions to the courses. Only nine required daily contributions. The remainder wanted contributions at pre-planned times within the course.

Technology

With the recent growth in Web based delivery systems (WebCT, TopClass, Learning Space etc) we were interested in the use being made of software packages. Figure 9 summarises the responses:

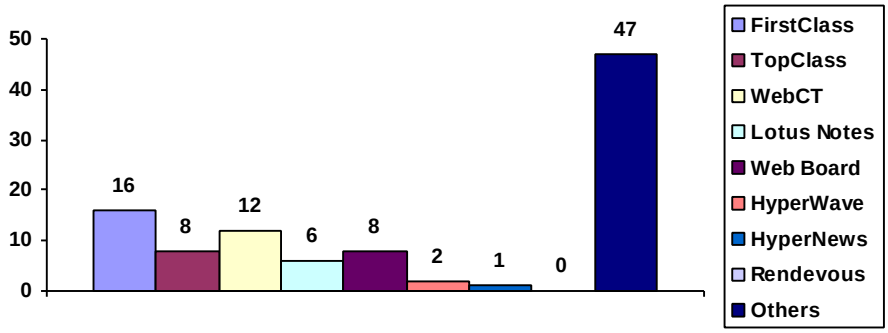

Figure 9: Software Used

Clearly systems such as WebCT have yet to have a major impact. “Others” include standard mail programs, HTML and in-house developed software.

Question 3b asked for the reasons for selecting a particular system for course delivery. We offered a number of criteria: flexibility, ease of use, inexpensiveness, ease of maintenance. Responses are given below (Figure 10):

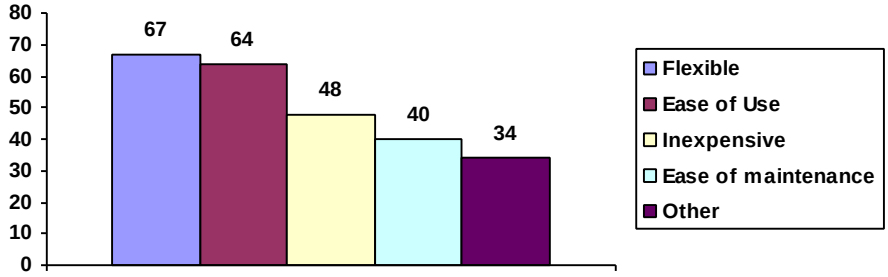

Figure 10: Reasons for Delivery System

An important issue when introducing new technology is the extent of training required for both teachers and students. For the courses sampled, teachers spent on average about 8 hours and students about 4 hours undergoing training in the use of the systems. This seems remarkably little, but is possibly related to the use of the Web and the ease-of-use that it offers, especially when sticking to standard HTML which from the results of the previous question most courses would appear to be doing.

The final question in this section asked about the developments in technology in recent years that have most influenced teaching and learning. Figure 11 summarises the responses:

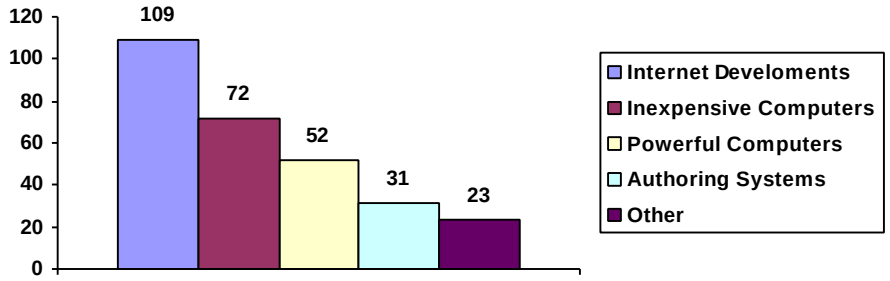

Figure 11: Developments

There are few surprises here, but, rather, confirmation that the Internet (in particular the growth of the Web) has made the most significant impact on teaching and learning. This coupled with the ever-decreasing cost of very powerful computers able to run a multitude of multi-media applications makes an attractive combination. Add to this picture, authoring systems that make building multimedia content considerably easier and we can understand why these technologies have been taken-up by many.

Technological Implementation

The delivery of the course material was examined to categorise various different types of technology and their usage. The data from question 1h ("What methods are used to present the main course content?") was divided into four categories: Computer (Computer conferencing, email and web-pages), Video (Video conferencing, video tapes), Traditional (face-to-face, handouts, books) and Other (audio, phone, fax). The table below summarises the results:

	Number of delivery Methods	Computer Technology	Video	Traditional	Other
Average	3.8	1.9	.25	1.4	.3
Std. Dev	2.2	1.0	.5	1.	.7
Minimum	0	0	0	0	0
Maximum	11	3	2	3	3
Mode	4	3	0	0	0

Table 1: Delivery Technologies

On average each course used 3.8 of the different delivery methods split between the categories as shown above. The modal number is 4. In general the developers of the courses use two computer-based technologies (Web, email, CMC) and one other. 1h indicates that the most popular combination is the Web, email and handouts.

Conclusions

There appears to be mismatch between the reasons given for adopting a particular pedagogical approach and those quoted for selecting the technology.

Given the predominance of undergraduate and postgraduate courses in the survey it is perhaps not surprising that the highest ranked activities were:

domain content/web pages/graphics/experience/at home/self study/email/scheduled contributions.

This ranking can be viewed as reflecting a traditional or "Expository Learning" approach to distance delivery and can be contrasted to the response in the Technology section that stresses the importance of flexibility. One might wonder why flexibility is not as significant in relation to the pedagogical approach as it apparently is in choosing the technology.

It is also noteworthy that 81% of the student workload was off-line, of which 43% was self study. Online working (contributions and tasks) accounted for 19%. This balance is similar to traditional courses at University's with most courses consisting of a number of weekly lectures, say 3 or 4, and a weekly tutorial lasting an hour.

This indicates that the developers of these courses are to an extent exploiting the benefits of having the students equipped with computer technology that allows them to electronically communicate with fellow students and course tutors. The figures would indicate that most of this communication is done using email. The preponderance of "Web pages" indicates that the Web seems mainly to be used as a convenient delivery mechanism. The balance between the didactic approach and constructivist approach is an important research topic for Schema. We are investigating ways in which the constructivist approach can be presented using C&IT. We would hope that the balance between these two approaches would be much more evenly spread in courses developed by Schema than appears to be the general case in the ODL courses represented by respondents to the survey.

There are a wide range of subjects offered in the courses[1], modules and units that we have sampled. This demonstrates how computer technology can usefully be employed delivering learning material across a wide range of subjects. This is not surprising as the Web, the most popular technology used in the courses sampled, is primarily a broadcast technology and well suited to the delivery of information to the student at a distance.

Tools that help with creation and management of Web sites for courses have already been mentioned. In our survey, WebCT was one of the most popular of these along with TopClass and Learning Space. In SCHEMA, we have two tools of this kind available, both developed by the University of Oulu: ProTo (Project Tools for Learning) and TELSIpro (Telematic Environment for Language SImulations– the "pro" means project not professional.) In contrast to some of the other more generic tools, ProTo and TELSIpro are specifically designed to facilitate collaboration between learners.

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[1] A complete list is provided in "Appendix B: Courses Offered" where data is available

4. Examples of Telematics Projects

In this chapter we shall describe four approaches to the use of C&IT in the provision of ODL. The examples have been selected from the list of TAP projects collected in the SCHEMA database. The aim of the discussion is to provide a brief insight into the projects, paying attention to their structure, their aims and objectives, the pedagogical perspective and organisational aspects.

The projects are:

1. **EOCS:HSC:** European Occupational Case Studies in Health and Social Care.
2. **NIGHTINGALE:** Nursing Informatics: Generic High Level Training In Informatics for Nurses; General Application for Learning and Education.
3. **CAF**É **MONDIAL:** Communication Application for Education, Multi-user Open Network, Design, Infrastructure and Logistics.
4. **MEDICO:** Multimedia Education Datasystem in Clinical Oncology.

Each project was funded under the fourth Framework TAP and is concerned with the application of C&IT to the education of professionals involved in the health and/or social care fields.

In addition to information gleaned from the Web sites established by each project, telephone interviews were conducted with project co-ordinators or contact persons. The focus of the interviews was as follows:

- Pedagogical aspects
- objectives of the project
- user benefits
- pedagogical model and background
- learning environment
- Organisational aspects
- Constitution of the project groups
- courseware and methods of delivery
- target groups and their required prerequisites
- Technological aspects
- implementation
- learning tools
- Comments

EOCS:HCS

Objectives

The European Occupational Case Studies in Health and Social Care project was a nine-months feasibility study designed "to explore effective ways in which multimedia telematics could be used in the training of health and social care workers". The project aimed "to assist those responsible for education and training of the health and social care workforce to clearly identify skills and competences required and to enable them to design and implement relevant training programmes which would be consistent across EU member states". It was hoped that the project would lead to the to creation of a European interactive multimedia "bank" of video case studies illustrating the skills, knowledge and competencies required for those working in a wide range of health and social care professions, including those working in rural areas.

Pedagogy

EOCS / HCS envisaged the development of a series of video case studies, with each study illustrating a particular range of skills, knowledge and competencies required by health and social care workers. "Using interactive multimedia technology each video case study would offer continuous analysis of functional skills including knowledge requirements, competency outcomes and considerations such as an awareness of humanity and respect for cultural sensitivities". Resource based learning was the principal pedagogical model used in the project. The main form of interaction envisaged appears to be that between the learner and the computer: it is unclear whether student-instructor interaction or student-student discussions were envisaged. The educational thrust of the project was to relate practice to training, to try to standardise this approach and to extend it to the European dimension.

The project also intended embarking on the provision of access to new methodologies of training and the rapid dissemination of new practices, with the aim of improving the competence and levels of qualification of the health and social care workforce.

The function of the concept of the European "bank" of multimedia case studies was defined as follows:

- To provide training materials for commercial training organisations, colleges and universities, including visual source materials, demonstrating skills and competencies in real work situations thereby supporting on-the-job training.
- To develop standards to assist the development of an improved European health and social care workforce by identifying best practice in the field.
- To increase comprehension of standards, leading to improvements in the "communication" of job functions, skills and knowledge in the context of actual practice. In this context, the project hoped to assist harmonisation of qualifications thus reducing the impediments to mobility of labour.

Organisation

The users involved in EOCS / HCS were teachers in colleges, training organisations, healthcare managers and qualifying organisations in health and social care.

The lead organisation in EOCS / HCS was Quay Video Production Ltd, a UK based SME. The major validation site was the Tavistock Institute in London. Other partners were:

- the Joint Council of National Vocational Awarding Bodies, London (GB)
- the Technological Educational Institute of Athens, (GR)
- Helsinki Institute of Social Welfare Helsinki, (FI)
- Hospitalari Parc Tauli, Sabadell, (ES)

Technology

The technologies investigated in EOCS / HCS were multimedia CD-ROM and electronic communications using LAN and ISDN methods for the display of video case studies. Following the feasibility study it was hoped to proceed to the development of a databank of video and other learning materials which the target groups would shape to their own needs.

Comment

EOCS / HFS had a clear educational philosophy: the use of video case studies to provide realistic contexts for training, ensuring a close fit between theory and practice. Although not overtly claiming to work from this perspective, the approach adopted is similar to the use of "global simulations" as contexts for language learning, a relatively standard application of multimedia telematics (e.g. as evidenced in TELSIpro– see SCHEMA deliverable 7.1).

Following the conclusion of the feasibility study EOCS / HFS has so far been unsuccessful in attempts to fund the development of the video database. The project coordinators are apparently experiencing some difficulty in assembling a consortium, but hope to apply under the fifth Framework for the funding of a continuation of the project.

CAFÉ MONDIAL

Objectives

Communication Applications for Education, Multi-User Open Network Design Infrastructure and Logistics is a project that is designed to provide European citizens with telematics services including information, communication, education and training over wide area networks. Healthcare is one of the target disciplines.

The aims of the project are:

- To provide access to information and courses to all citizens including those in remote areas through teleservices.

- To provide access to an information and training network throughout Europe.
- To provide telework facilities for trainers and authors.
- To develop multimedia training modules and information database in the fields of healthcare and renewable energy, so that users receive an efficient and cost effective system.
- To develop flexible, time- and distance-independent learning modules and to facilitate groupwork across countries.
- To produce training modules to be offered throughout Europe, with the possibility of ordering specialised courses and training in a timely manner.

Pedagogy

The approach is overtly based on constructivist theory and the ability of the target group to implement the new media technology in their own learning process. The pedagogy is planned on the basis that learners will carry out self-structured and autonomous learning activities. Courses available on-line include units on cancer care, healthy eating, dog nutrition and aromatherapy.

The learning settings envisaged in CAFÉ MONDIAL range from universities to the home– anywhere with a networked computer. CAFÉ MONDIAL uses both Web and First Class servers. There is also a "local server", used by authors and administrators to provide content and manage the students. The Web servers provide the content and first class provides the collaboration.

The students use log-in and passwords to access the Web pages and via First Class can meet virtually in order to exchange ideas or study collaboratively.

Organisation

Sites are established in Germany, United Kingdom, Greece, Ireland, Spain, Sweden, and Portugal at universities, adult education centres and villages. Each site is equipped with multimedia personal computers, computer- and video-conferencing facilities. They link to regional enterprises, schools, administrations, hospitals, associations and other European telecenters. The technology needed is being developed and tested by the project in relation to a number of application areas including healthcare and renewable energy. The application are tailored to the needs of the user groups. The project also examines aspects of telework and teletraining.

The target groups include nurses and doctors in initial training and further training, students and trainees in engineering, engineers in further training, and students in general adult education.

The communication and organisation among the project partners takes place through the Gateway and partners communicate at least once a day to exchange information. The various project partners offer the same course content in the different sites.

CAFÉ MONDIAL is co-ordinated from Germany by Youandi- Communications Network GmbH. Other partners are:

- Integrated Information Systems Ltd. (GR)

- IngeniA S:A. (ES)
- University of Sunderland, IT and Communications Services (UK)
- Norrhälsingsland Utvecklingcenter (SE)
- BEALTAINE Ltd. East Clare Coop (IE)
- Zukunftswerkstatt Saar e.V (DE)
- F+W, Partner für Fort- und Weiterbildung GmbH (DE)
- Medienpsychologisches Forschungsinstitut SaalandMEFIS e.V
- Studienzentrum-Universität des Saalandes (DE)
- European Institute of Women Health Ltd. (IE)

Technology

The technology implemented includes, computer conferencing systems based on First Class and the Internet/World Wide Web, videoconferencing systems, mobile computing systems for flexible access, analogue, ISDN and Very Small Aperture Terminal (VSAT) telecommunication service technologies. Students use modems at home to access the course material.

Comments

CAFÉ MONDIAL has encountered a number of problems during the implementation phase:

- Functioning and maintenance of the technology
- Problems with the choice of the most appropriate courseware
- Problems of acceptability for students. Most students are not used to learning on-line. This led to increased support and offers of special computer courses to introduce new users.
- Motivation of users. As there was no certification, students were not motivated to continue, giving rise to high drop-out rates.

It may be observed that in adopting a constructivist stance there is sometimes a danger of imputing attitudes to learners which are not based on reality. In tackling new materials students require tangible rewards. In the social constructivist model one way of providing these rewards is through social approval, but this may require the symbolic recognition provided by certification.

NIGHTINGALE

Objectives

Nursing Informatics: Generic High Level Training in Informatics for Nurses, General Application for Learning and Education is a 36-month project which started in 1996, that plans to implement training for the nursing profession in the use and application of healthcare information systems. The aim of the project is to provide

curriculum development in the multi-disciplinary field of Nursing Informatics on the basis of a consultation process designed to produce a consensus on training needs and course materials and to implement the curriculum at a number of pilot sites.

NIGHTINGALE is designed to contribute to the appropriate use of the developed telematics infrastructure across Europe by educating and training nurses in a standard way in nursing informatics. The project plans to develop a "consensus curriculum" for nursing informatics. The most important contribution to this development has been provided by a user group, comprising nursing professionals, nursing systems professionals and health policy makers from all EU member states.

NIGHTINGALE has developed courseware using multimedia computer-based-training software packages, including a CD-ROM on relevant terminology in nursing informatics. Traditional teaching materials (such as textbooks) are still seen as playing an important role and NIGHTINGALE has continued to produce work in this genre. Dissemination and exploitation of courses has been initiated through SME multimedia publishing partner(s). Verification of course materials is planned for 1998/9.

Pedagogy

NIGHTINGALE is based on traditional didactic methods with courses being delivered in an institutional setting. In the development of course materials a consultation process, based on workshops and conferences, has been used designed to produce a common curriculum.

Organisation

NIGHTINGALE plans to distribute information and courseware freely to all interested parties through the publications of the Conference Proceedings and through the establishment of the World Wide Web Server in Nursing Informatics (http://nightingale.dn.uoa.gr/index2.htm), which is planned to become a depository of nursing information knowledge across Europe. The target group (the nursing profession) is the largest in the health sector and play a very important role in all the processes of the project.

Co-ordinated by the University of Athens, the partners in NIGHTINGALE are:

- HISCOM (NL)
- DIHNR (DK)
- IGIF (PT)
- UMDS (UK)
- University of Leuven (BE)

Technology

NIGHTINGALE has an eclectic perspective, developing course materials in nursing informatics designed to be used in a variety of training situations in nursing informatics, but the core products are computer-based training packages. The technical aspects of the project cover a range of technologies, such as multimedia education tools, CBT– CD-ROM training, and distance education through the Internet and WWW networks.

Comments

NIGHTINGALE is an exercise in the use of collaboration amongst trainers and users in the design of courseware. Rather than being designed to develop new technical solutions it plans to use established pedagogical and technological means to meet the needs of the nursing profession as it moves into the “information society”.

MEDICO

Objectives

MEDICO is an ambitious 24-month project designed to develop and validate telematics applications for the dissemination of new information on the diagnosis and treatment of cancer. Partners are using a variety of telematics applications to break down the financial, geographical and language barriers to continuing medical education. The overriding objective is the early and widespread adoption of “best practice” through telematics-delivered, evidence-based education and training programmes. This requires accelerated information flows between clinical research and clinical practice. Horizontal links with other ACTION projects are being maximised, but MEDICO is the principal means of disseminating results to wider user groups across the European Union and beyond, using interactive satellite television, CD-ROM, disk-based learning packages and established on-line services. Interoperability between these methodologies is being investigated and new interoperability options tested.

Pedagogy

The project is planned to provide a faster information flow from clinical research to clinical practice facilitating earlier adoption of evidence-based best practice by health care professionals across all member states. Rapid and effective communication between health care professionals and research-based pharmaceutical and medical equipment companies is a core component. It is hoped that this will lead to an earlier rejection of ineffective and inappropriate treatments and an increased harmonisation of treatment outcomes between countries and between centres. The approach combines elements of expository presentation or knowledge transfer, collaborative learning and anchored instruction.

It is intended that the project will generate a clear understanding of end-user needs and of the acceptability or otherwise of telematics as a way of meeting them.

Organisation

Each of the partners is developing a range of materials:

1. **EuroTransMed**: a series of live interactive satellite programmes on oncology, delivered free of charge to end users at EuroTransMed receive sites. Programmes will subsequently be available on video, and the availability of Internet audio and video servers is being tested. The first programme under MEDICO explained the objectives of the ACTION cluster and was designed to increase awareness of the possibilities of telematics facilitating the task of doctors. The last programme under the MEDICO project will present results. In between, a range of programmes on oncology will be based on submissions from all ACTION partners to an editorial board representing other ACTION projects and other user groups. Programme content relevant to clinical practice is seen as an essential pre-requisite to the adoption of new telematics modalities. Content is funded by an industrial partner.

2. **University of Leeds**: disk-based teaching programmes on upper-gastrointestinal cancer and inflammatory bowel disease, which will serve as a template for other disk-based teaching programmes. A range of MEDICO partners/contractors are assisting the University of Leeds in evaluating the adopted telematics approach to Continuing Medical Education.

3. **European School of Oncology**: "State-of-the-art knowledge in clinical oncology"– an HTML hypertext on optimal management of cancer, developed from CD-ROM version implemented under the START project, for the Internet and other networks.

4. **PixelPark**: a feasibility study, analysis of user needs and technical possibilities across member States, leading to a prototype design for interactive, multi-media on-line services between hospitals and GPs.

5. **TeleSCAN**: development of new, user-friendly search facilities on the Internet. On-line accessible MEDICO dataset in TeleSCAN.

6. **European Organization for Research and Training in Cancer** (EORTC is the widest quantifiable user group within the project): provision of content and content advice throughout the group for on-line and off-line services, a user survey among institutions affiliated to the EORTC on the dissemination of information by Telematics-assisted means and an evaluation of their ability to access information.

7. **EuroTransMed, NKI, OLP**: an evaluation and demonstration of interoperability in multi- media between video, CD-ROM, and on-line services.

8. **All partners, plus the British Oncology Association**: an ongoing and final evaluation report.

Material is being validated at a number of training sites, mainly in the UK:

- Western General Hospital Edinburgh
- Royal Marsden Hospital Sutton
- City Hospital Nottingham
- Dumfries & Galloway Royal Infirmary
- Whipps Cross Hospital London

- Cookridge Hospital Leeds
- Weston Park Hospital Sheffield
- Middelheim Hospital Antwerp
- University of Padua
- Medizinische Hochshule Hanover

The principal user groups will be hospital-based health care professionals, but the materials generated throughout the project will be available to support additional materials targeting patients, media and the public.

Technology

A full range of C&IT is being used including high band-width interactive satellite broadcasts and video recordings. Existing telematics links between hospitals, teaching centres and end-users are being used for the dissemination of information on best practice. CD-ROM and disk-based teaching programs have been developed for use in medical education.

Comments

MEDICO brings together a range of providers concerned with research, education and the delivery of care in cancer. Existing high band-width connections between universities and hospitals are being used to help disseminate instances of evidence-based best practice with the aim of ensuring a faster information flow from clinical research to clinical practice across all member states. Rather than a specific pedagogical or technological perspective the project is based on a common concern with the dissemination of best practice in the diagnosis, treatment and care of cancer sufferers.

Conclusion

Although “telematics for health care” is one of the largest areas of the TAP, the number of projects concerned with the use of C&IT for education and training in health and social welfare is surprisingly small. Those that do exist employ a variety of educational and technical perspectives and it is difficult to discern any general patterns.

The adoption of a social constructivist perspective directs attention to the importance of learning as a collaborative enterprise. Relatively few TAP projects appear to support this activity, even though references to the constructivist position are common. Where interaction is encouraged it tends to be unidirectional, either between the individual learner and the computer, or between the instructor and the student. There is little encouragement for group problem solving with learners working together, using C&IT to overcome the constraints of time and distance. The use of telematics to support active learning through collaborative problem-solving is the essence of the approach to be used by SCHEMA.

5. Conclusions

There remains a considerable gap between the theory and practice of telematics-based ODL. The central pedagogical concept in the social constructivist approach is that learning involves an active social process, students constructing and validating newly-acquired skills and knowledge by engaging in dialogue with fellow learners, tutors and experts. From this perspective the most important attribute of the convergence of communication and information technologies is the ability of multimedia telematics to provide a supportive environment for the development of learning communities which are characterised by rich and multi-stranded patterns of interaction. The use of simulation techniques extends the scope of potential interaction to include virtual worlds, echoing Gibson's famous definition of cyberspace as “a consensual hallucination”.

Examination of existing uses of multimedia telematics for open and distance learning in health and welfare provides few examples of the sort of rich interactive environment envisaged in the social constructivist approach. Most of the interactions which are supported are one-way, either involving single students and a computer or, in broadcast mode, involving an instructor and a distributed set of learners. The learning networks which form are sparse and single-stranded and are far from the dense, multi-stranded forms of interaction implied by the notion of the learning community (cf. Wellman, 1997).

Different stages of learning, different forms of knowledge and different types of student require different approaches to learning. Engagement of adult learners in meta-learning and reflection enables them to become pro-active participants in the learning process, but makes considerable demands on course designers. Flexibility and space for collaborative reflection are two of the prime requirements. Multiple representations of domain content and the provision of opportunities for shared consideration of the learning process make it possible for learners to explore their approach form anchored, generative and problem-solving perspectives.

For some ideas and concepts interactive computer-based courseware, in which the interaction is simply between the learner and the software, may be thoroughly appropriate. For instance, in the teaching of statistics, a guided investigation of the steps taken to carry out a particular test may be the most pertinent form of teaching. In a more complex example, the use of an anchored model of a simulated dynamic system, where learners can modify the parameters in a spreadsheet and see the “what if” consequences, may be a powerful way of exploring the effects of interventions in systems which may be difficult if not impossible to explore in reality. Despite the popularity of this approach, however, it remains unclear how “deep” or generalizable the resulting learning is. To facilitate the learning process, further discussion between students, tutors and experts may still be required. This may occur through collaboration during the simulation process or in after-simulation debriefing but, in either case, telematics-based learning environments should provide the opportunity for both on- and off-line cooperation.

The delivery of multimedia software over the Web is still in its infancy. Most ODL course materials delivered over the Web consists of straightforward HTML pages. The student experience may be little more than (sophisticated) page turning, with hyper-links enabling a variety of learning paths to be explored. The restriction to HTML is for good reason– the delivery of rich interactive material requires high bandwidths and the use of plug-ins, neither of which may be generally available.

Users in hospitals, universities and public agencies may well have access to high bandwidth networks, but this is by no means universal and is relatively rare in the case of the individual home user (especially in remote rural areas). Even without the obstacles which may be posed by different operating systems, variation in computer hardware and changing versions of software, the installation of plug-ins is by no means unproblematic. Enabling naive computer users (especially those remote from main services) to install and maintain these additional software components can be time-consuming. Some ODL courses are beginning to exploit alternatives such as JavaScript and Java. These are powerful programming languages and can be used to construct engaging multimedia, but there is not a great deal of courseware presently available which makes use of the facilities they provide and developing such material will be an expensive task.

Multimedia extends beyond the presentation of text and graphics to incorporate other sensory modes, notably audio and visual. There is a general assumption that interaction involving visual and audio components is richer and more effective than forms based on other channels of communication. Research evidence for these assumptions remains stubbornly inconclusive (see Doherty-Sneddon, et al., 1997; Finn, et al., 1997), but in efforts to produce a rich learning environment it would seem prudent to make provision for the use of video and audio conferencing. Again this makes heavy demands on band-width and plug-ins and needs formative user-involvement.

The way ahead in SCHEMA

SCHEMA is based on the combination of specific hardware– NCs– in a client-server topology, a particular approach to learning environments– using the Web to support a collaborative, problem-solving approach to learning– and a distinctive set of end-users– health, education and welfare workers in remote areas. The choice of these elements sets the programme for the development and validation of the continuing professional development modules which are the final product to be delivered to end-users.

The choice of the Network Computer (NC™) is designed to overcome many of the problems of managing diverse platforms and operating systems which have complicated efforts to achieve common standards. The NC is simple to operate. The user only has to connect it to a television set of monitor and to a network, switch on, and insert his/her smart card. The applications which are then available depend on specification, but at base will consist of simple Web-browsing and word-processing programs.

SCHEMA is currently investigating two alternative specifications for the NC interface: one based on an enhanced version of the in-built NC OS (a variant of RISC OS) and the second on Citrix/MetaFrame.

The use of TopCat™ server software developed by Acorn and MicroLynx provides access to any applications developed for RISC OS, running on a NT server, while still allowing the use of the native OS and the local processing power of the NC for local applications such as video-conferencing. The long involvement of Acorn in the UK schools market means that there is a host of good quality educational programs which can now be run on the NC. Support for Shockwave and other plug-ins is included, but, at present, JavaScript support is minimal. This is important because one of the main learning environments being used in SCHEMA, ProTo, makes

extensive use of the language. Acorn are working on providing the facility in the near future.

The alternative way in which the NC can solve the multimedia “problem” is through the use of the Citrix Metaframe technology. This allows a fully functional version of the Microsoft Windows environment to be run on the NC (or indeed many other machines). Any multimedia software available for Windows, such as Netscape Navigator or the Microsoft Office suite, can then be made available. The mechanism used by MetaFrame is to provide a software client on the target computer and to run the application itself on a central server (UNIX or NT).

Both the TopCat and Citrix/MetaFrame solutions provide a much simpler approach to managing the network. Any applications, plugs-in or versions of Web browsers that are thought to be appropriate for a particular set of users can be added to the central server, becoming available in a consistent fashion to all users. The absence of local hard discs or floppy drives also greatly simplifies the task of the system administrator, making it impossible for users to accidentally modify the OS or introduce undesirable material, such as viruses, to the system. This is a crucial consideration when the participants in an ODL course are scattered across wide distances, far removed from central support services.

A further advantage of the NC is its initial cost. Although the cost of multimedia PCs has tumbled it is still the case that a basic machine, with CD ROM drive, good graphics and audio, costs about €1000. The NC costs one-third of this. (For further details of the NC and its use within SCHEMA see Deliverable D2.2 (Booth 1998))

We have argued strongly that effective CPD demands a collaborative approach to learning. To support this we are focussing on two applications which run within a standard Web environment but provide explicit support for collaboration and discussion. ProTo provides a number of group workspaces and discussion areas in which learners and teachers can meet and work together, can reference external resources, and share the production of new materials for publication on the Web (SCHEMA deliverable D5.1 (Pulkkinen and Ruotsalainen 1998)) TELSIpro, a development of a package originally developed in the context of language learning, uses simulation scripts to establish microworlds where students can assume roles and negotiate with each other to solve “virtual” problems which are based on “real-life” scenarios (SCHEMA deliverable D7.1 (Rousselle and Pärkkä 1998)). Evaluation of the communicative processes which occur in the environments supported by the two applications and comparison of their learning benefits is a key task in the SCHEMA programme.

The initial development of ProTo and TELSIpro was in connection with relatively simple Web material, mainly text-based. This only scratches the surface of educational multimedia and one of the intentions of SCHEMA has been to provide remote learners with audio and video-conferencing facilities so that they can engage in potentially richer forms of collaboration, seeing and hearing each other and sharing applications. Inexpensive cameras and suitable software have been developed which can be used on NCs to support these activities, but progress in this area is likely to be held up by logistic and financial problems about the availability of ISDN.

The goal of SCHEMA is to develop and demonstrate a technical infrastructure and set of learning environments which enables health, education and welfare workers in remote areas to come together across the barriers of distance and discipline. The success of the Project will be judged on the extent to which the electronic network

used to supply and support CPD materials provides the basis for a multi-stranded learning community which can help overcome marginalisation. This will be the topic of future research reports.

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Appendix A: Questionnaire

OVERVIEW

The aim of this questionnaire is to investigate the development of open and distance learning (ODL) networks delivered via communications technology.

The methodology is to survey a sample of experts about the various approaches, experiences and attitudes towards ODL networks in relation to three main areas:

- pedagogical
- organisational
- technological

The questionnaire is split into three sections. Section One covers the general details about the respondee while Section Two covers the details of the system used to deliver the ODL course as well as details about the course itself. The final part, Section Three is for final comments and a brief outline of the course.

SECTION 1

GENERAL INFORMATION

Please provide some background details about yourself. This information will only be used in aggregate form, so that individuals (participants) will remain completely anonymous. By providing contact details, you will be helping us to check the information with you at a later date.

Name:	
Address:	
E-mail:	
Institution:	
Department:	
Position:	

SECTION 2

Complete this section in regard to the course with which you have the most involvement.

1. PEDAGOGY

1a. What is the name of the course?

… .

1b. What type of course is it?

☐ undergraduate ☐ postgraduate ☐ continuing professional development

☐ other (please state) ____________________

1c. Is this a new course developed for ODL? ☐ Yes ☐ No

1d. What are the goals of the course?

… …

… …

… …

… …

1e. What types of learning activities are used in the course?

… …

… …

… …

… …

1f. What are the students expected to learn?

☐ domain content ☐ domain-specific skills

☐ study skills ☐ IT skills related to the domain

☐ other (please state) ____________________

1g. How are any course activities completed?

☐ on-line ☐ off-line

☐ other (please state) ____________________

1h. What methods are used to present the main course content? (tick all appropriate)

☐ face-to-face lectures ☐ video conference lectures ☐ web-pages
☐ course handouts ☐ computer conferencing ☐ e-mail ☐ audio-tapes
☐ phone tutorials ☐ course books ☐ faxed material ☐ video-tapes
☐ other (please state) _____

1i. What types of computer multi-media are used to support the learning process?

☐ Graphics ☐ Animation ☐ DHTML/Javascript ☐ Java Applets
☐ Video (e.g. Quicktime) ☐ Sound (e.g. RealAudio)
☐ other (please state) _____

1j. How are the learning outcomes assessed (state % split if appropriate)?

☐ assignments _____ ☐ continuous assessment _____
☐ exams _____ ☐ on-line contributions _____
☐ other (please state) _____

2. ORGANISATION

2a. How is the course organised?

☐ modular units ☐ complete unit
☐ other (please state) _____

2b. What are the pre-requisites for students taking the course?

☐ degree ☐ professional qualification ☐ experience ☐ none
☐ other (please state) _____

2c. Where do students study?

☐ at home ☐ place of work ☐ learning centre ☐ satellite campus
☐ other (please state) _____

2d. What is the average student workload for the course?

☐ self-study _____ hours ☐ course reading _____ hours
☐ assignments _____ hours ☐ on-line contributions _____ hours
☐ examinations _____ hours ☐ on-line tasks _____ hours
☐ other (please state) _____

2e. What are the main forms of communication for the course?

(prioritise the list i.e. 1-7 where 1= most used)

☐ e-mail _____ ☐ computer conferencing _____ ☐ post / mail _____

☐ phone / fax _____ ☐ video-conferencing _____ ☐ personal contact _____

☐ other (please state) _____

2f. Are students expected to make regular contributions to the course?

☐ daily ☐ weekly ☐ other (please state) _____

3. TECHNICAL

3a. What software is used to deliver the course?

☐ TopClass ☐ WebBoard ☐ HyperNews ☐ Lotus Notes

☐ FirstClass ☐ WebCT ☐ HyperWave ☐ Rendevous

☐ other (please state) _____

3b. Why did you choose this type of delivery system?

☐ inexpensive ☐ ease of use ☐ ease of maintenance ☐ flexible

☐ other (please state) _____

3c. How many hours staff training is given prior to using the system? ____ hours

3d. How many hours student training is given prior to using the system? ____ hours

3e. In your opinion what developments in technology in recent years have had the most important influence on teaching and learning? (tick all appropriate)

☐ inexpensive computer systems ☐ more powerful computers

☐ development of the Internet ☐ more powerful authoring systems

☐ other (please state) _____

SECTION 3

COMMENTS

1. Please give a brief outline of the course

2. If you are willing to allow access to the course please state the web address.

HTTP:/ /

3. If you have any comments or observations not covered elsewhere, please provide them here.

Appendix B: Courses Offered

Achieving Communications excellence

Adult Degree Program (many courses leading to the baccalaureate degree)

Advanced English Composition for International Students

Advanced Internet

Advanced Learning Technology Programme

Advanced Telecommunications

AKTIVMEDIA Web-Designer Basics

All courses that are technologically enhanced

Anthropological Perspectives on Global Issues

Applications of Information Technology in Open and Distance Education

BA degree in Social Work

Bachelor of Health Science (Aboriginal Health and Community Development)

Bachelor of Education in Adult Education

Basic Production (Audio, Film, Video)

BCM 410A, Molecular & Cell Biology

Business Statistics BU400

Certificate in Drug and Alcohol Studies

Certificate in SME Management

Community and Public Health Nutrition

Computer Applications for Health and Research

Computer Mediated Communication

Computer Technology in Art Education

Computers in Teaching and Learning

Course Platform with several courses

CSCW in Education

Didactics of technical subjects

Die Talentproblematik im Sport

Ed. Admin /Teacher Ed. 505--Internet Applications for Idaho Educators (Online)

Educational technology 15 credit course (one credit equals 40 hours of full-time work done by the student)

Educational Technology in Foreign Language Teaching and Learning

Electronic Commerce

Electronic Marketing

English Composition I

English Composition II
English for Maritime Emergencies
Environmental Education
Environmental Management
External Placement Program
Facilitating online
Facilitating Self-Actualization
Facilitating Survivors of Domestic Violence
Final Honours Spanish
Finding and evaluating Internet resources
Foundation for Higher Education
Fundamentals of Electrical Engineering
GDS Junior Part 1
Grad Certificate / Grad Dip / Masters of Sports Medicine
Graduate Certificate in Language Assessment
Health Science
HNC Logistics and HNC Police Studies
Human Biochemistry
Human Development across the Life Span
Informatik - Studienrichtung Informations und Kommunikationsmamagement
Information technology engineering
Information Technology Fundamentals
Instructional Design
Internet Applications for Idaho Educators (Online)
Internet skills
Internet-based Master of Public Health Degree
Intro to Multimedia
Introduction into Distance Education
Introduction to Human Resource Development
Introduction to Quality Management
KeyBytes: The Interactive Course in ICT
Kie.98.505 English on the Internet
Leadership for Environment and Development
MA in Education
MA in Learning and Teaching: Resource-Based Learning module
MA in Professional Development

Management & Marketing
Master of Educational Management
Masters in Social and Administrative Pharmacy
Math 120
MBA
Media visualising war
Medicinsk teknik / Biomedical Engineering
MOBILE - A GSM Course
MSc in LL
Msc International marketing (Distance learning)
MSc Social and Administrative Pharmacy
Multimedia English Course
Multimedia und Tele-Lernen
Music arranging with computers
Online Learning
Open and Distance Learning Strategies
PGCE Secondary (open University)
Physics 1 Laboratory
Postgraduate Certificate in Retail Management
PPL
Practical design of intercultural materials
Products and services
Program for Educational Science Oriented towards School Leadership
Programme of internet-mediated adult education courses
PRONET
Psychology
Psychosynthesis
Public History
Questions of environmental management
Quick Skills
Quo vadis Europe?
Research 1
Research Methods
RMN Conversion by Distance Learning
Self-access language learning (for students from all courses and faculties)
SIMULAB

Skills Analyst Certification

Special Education

Statistic for corporate account

Survey of Information Systems

Teaching and Course Design in Higher Education

Teaching children to read

Tele-Akademie

Telecommunications in Education

Telecommunications Applications

Theories of Learning

Tour d'IT

Travel Medicine MSc / Diploma

Use of interactive technology in higher education

Using the Internet in Professional life

WebMentor - Training development & Management Infrastructure

Writing examination answers

WWW Course of the Control Technology as a part of the Technology Education

Appendix C: Electronic Distribution Lists

eucenlist@fe.up.pt

well-request@mailbase.ac.uk

continuing-education@mailbase.ac.uk

flexible-learning-request@mailbase.ac.uk

computer-assisted-assessment-request@mailbase.ac.uk

earli@nic.surfnet.nl

neteach-l@raven.cc.ukans.edu

itforum-request@uga.cc.uga.edu

distance-learn-request@njcu.edu

ipct-l@lists.nau.edu

edutech-l@listserv.techrscs.panam.edu

aom-resch@sting.isu.edu

aom-dstlrn@sting.isu.edu

aom-dstlrn@sting.isu.edu

aera@asu.edu

distancelearn-lang@mailbase.ac.uk

cmc-in-he@mailbase.ac.uk

nls-forum-request@mailbase.ac.uk

distancelearn-research@mailbase.ac.uk

web-assisted-assessment-request@mailbase.ac.uk

virtual-seminar-research-group-request@mailbase.ac.uk

teaching-on-line@mailbase.ac.uk

ifets-discuss@listserv.readadp.com

edresource@makelist.com

ifets-discuss@listserv.readapp.com

Chicago. David, Matthew. "Distance Learning, Telematics and Rural Social Exclusion." In Encyclopedia of Developing Regional Communities with Information and Communication Technology. edited by Stewart Marshall , Wal Taylor , and Xinghuo Yu, 205-209. Hershey, PA: IGI Global, 2005. http://doi:10.4018/978-1-59140-575-7.ch036.Â Let us start with a definition: distance education can be called an educational learning process or system where teachers or instructors are Sample PDF. Distance Education in the Era of Internet. $37.50. Chapter 36. Distance Learning, Telematics and Rural Social Exclusion (pages 205-209). Matthew David. of Telematics as it is applied in the network-based distance education software. The TRENDS Project. The TRENDS Project aims at the development and efficient delivery of in-service training to school.Â Superhighways for Open and Distance Learning. EDEN 1997 Conference, pp. 32-36. Christos Bouras, Senior researcher in the Computer Technology Institute, Kolokotroni 3 Introduction Many confusing terms ïƒ‹ Online learning, flexible learning, open learning, telematics, Web-based education, distance."â€" Presentation transcript: 1 Online education: a review.Â 5 Converting to online learning Learnerâ€™s viewpoint: Advantages and disadvantages: ï‚¥ Flexibility (pace, place, space) ï‚¥ Multimedia (e.g., simulations) ï‚¥ Learner motivation and isolation ï‚¥ Accessibility (costs, disabilities, technophobes). 6 Design issues (1) Technology: ï‚¥ Fluency Teaching: ï‚¥ Use media appropriately ï‚¥ Support close student interaction ï‚¥ Communicate expectations up front ï‚¥ Provide timely feedback ï‚¥ Emphasize time-on-task ï‚¥ Maintain consistent standards (Chickering & Reisser, 1993). Student retention in open and distance learning (ODL) is comparatively poor to traditional education and, in some contexts, embarrassingly low. Literature on the subject of student retention in ODL indicates that even when interventions are designed and undertaken to improve student retention, they tend to fall short. Moreover, this area has not been well researched.Â Literature Review. It is clear that ICTs play a great role in the ODL systems. Emerging technologies, such as wireless networking, the Internet, and mobile communications, go a long way to enhance connectivity amongst stakeholders.Â Based on this literature review, the common problems of distance learners can be summarized as follows Since distance learning programs don't require you to be physically present in a classroom or follow a predefined timetable, you are free to set your own schedule. Distance education provides you the flexibility to complete your coursework from anywhere, at any time, and at your own pace. You have an important chore to run in the morning?Â Distance-learning programs make use of sophisticated technology to provide education. By accessing study material electronically, submitting assignments via websites, and participating on online forums to interact with professors and classmates on a day-to-day basis, you can become more technologically savvy than your classroom counterparts. Now, what would be 5 cons for taking an online degree?