

Paper 1:

Supporting Networked Learning as a whole: Pedagogy, Management and the Learning Environment

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Summary

- This paper describes a prototype online Learning Environment supporting open and distance learning. The environment was developed to meet key pedagogical and management requirements which are described here and which were ascertained through the 'Learning Environment Club' - a collaboration involving eleven Further Education Colleges. The most distinctive aim has been to provide a model and overall online support for the whole enterprise of student-centred, flexible learning.

The degree of support provided by the Learning Environment for an effective and flexible pedagogical model is discussed. In particular, constructivist and dialogue-oriented views of learning are considered. This is used to focus an analysis of how online environments in general can fully support effective pedagogies. In addition, critical success factors for the introduction of this kind of technology to an institution are discussed.

Introduction

- Education is currently undergoing huge changes. Part of this comes from new perceived learning needs - for lifelong learning, constant updating of knowledge and skills as people's worlds continually change. Learning needs now are often immediate, varied and unpredictable. This, along with new economic pressures on educational institutions, provides huge challenges, as well as huge opportunities. In meeting these, many educators are looking to information technology in support of learning - whether desperately clutching at a straw, or eagerly embracing the opportunity to fulfil cherished dreams. But how information technology should best be used, and how it should fit into existing institutions and ways of working is a complex question which we are only starting to answer.

This paper focuses on the whole online learning environment. It describes a prototype Learning Environment that has been developed. It then uses this to help address the question of how an online environment can support an effective and flexible pedagogical model, for example the three phases of learning that Mayes and Neilson (1995) identify: initial conceptualisation, construction and dialogue.

The development has taken place within an action research project entitled the 'Learning Environment Club'. This has involved eleven U.K. Further Education colleges together with a software supplier. The remit of the club has been:

- To ascertain key requirements for IT support for the whole learning process.
- To develop and evaluate prototype Learning Environment software as an aid to clarifying these requirements.
- To ascertain the best ways of using this kind of technology to benefit learners and institutions as a whole.
- To identify pedagogical and management issues which need to be addressed in moving forward, including critical success factors. (See Banks (1997) for a discussion of management issues.)

Although the club has focused on the Further Education sector, we feel that most of the lessons are general across all sectors of education.

There has been a good deal of work on the design of individual 'courseware' elements and a number of other online environments are available which cover some of the same ground. The distinguishing feature of the work described here is its holistic view of the learning process and benefits that this can bring.

Requirements and Implementation of the Learning Environment

- The requirements were derived in a series of workshops. They have been incorporated in a fully functioning Learning Environment, which is currently being piloted in a number of FE and HE institutions. The main requirements and features of the Learning Environment are:
 - 1) Full support for a resource-based, student-centred open learning model. This implies:
 - 1a) Making learning resources available to learners in two ways:
 - Structured learning through direct access to a programme through which the learner progresses.
 - Research - the learner locating resources him/herself - through searching and browsing.
 - 1b) Support for the entire learning process, which was defined for our purposes in figure 1 (see also Cowham, 1997).

Strand 1: Pedagogy and Design

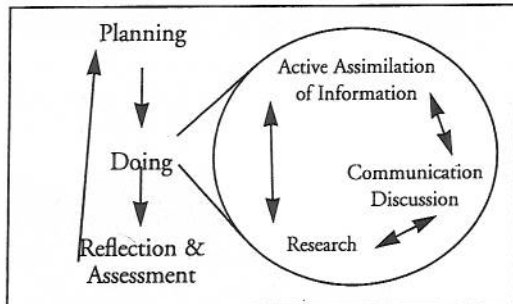


Figure 1 - Learning model for the individual learner

In this model, planning and reflection, with the student taking responsibility for his or her own learning, are seen as integral to learning (FEU, 1994). Assessment is necessary both to provide an external record of what the learner has achieved (summative) and also to guide the next round of learning by identifying strengths and weaknesses (formative). The core of learning is seen as being active, and to support this, students are primarily supplied with 'activities' with which they must interact (individually or in a team), and which are supported by learning resources. Figure 2 shows the information structure of the implemented Learning Environment which meets these requirements.

- 1c) Embedding communication / discussion within the core structure of the learning.
- 2) Flexibility is of the essence. This means meeting the needs of individual learners, rather than providing standard fixed courses, which learners can take or leave. It also implies adapting the offering as needs change - not just on a fixed annual cycle. This would encompass, for example, support for individually tailored learning programmes, with the capability to provide the learning resources that are just right for a particular individual, and to change these immediately as the needs of the individual (or group) change. This opens up the possibility of on-demand or just-in-time learning (Hamalainen, 1996, Lewis, 1995).

The Learning Environment supports this through a drag and drop interface which allows tutors to re-use any component -

resources, activities or modules - in constructing an individual learning programme for a student or group. This is achieved through a drag and drop interface.

- 3) Timely support for the learner, including detailed tracking of their progress is crucial (Donovan, 1996). The Learning Environment provides:

- Immediate one-to-one asynchronous access to the right support person for the student the moment questions arise through (for example) integrated e-mail linked to each online activity.

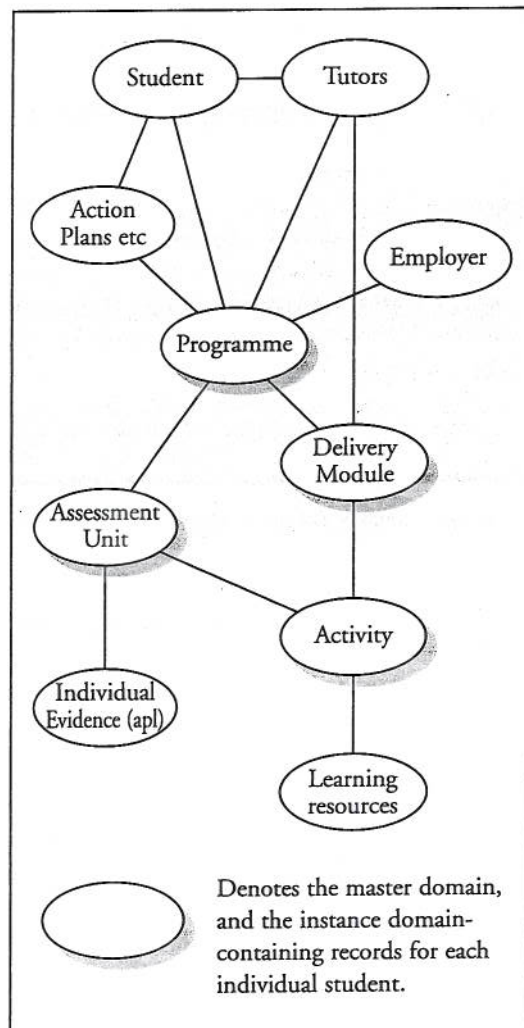


Figure 2 - Learning Environment Information Model

- Student progression is automatically recorded and made visible to the team of tutors. There is an automated facility to focus in on problem areas - e.g. overdue assignments - enabling tutors to spot problems as soon as they arise.
- 4) None of this is possible without the right learning resources being available. Generally speaking, it will be impossible for staff to develop the bulk of the resources for a course themselves. The model has to be sharing and re-use of materials, both within an institution, and between institutions. In relation to the online learning environment this requires:
- Effective and flexible search facilities for locating the right materials. (Also, ideally, automatic notification facilities when new relevant materials become available.)
 - The added value obtained by cataloguing materials for optimum accessibility. This principle extends to external resources - such as Web pages etc.
 - The capability to embed any type of online learning materials, whether textual or multimedia, Web based or not, and whether located on CD-ROM, local network, or internet.
- 5) Support for students (and staff) working from a variety of locations, such as home, the workplace, community centres, or open learning centres in the college.
- 6) Information from the learning process should feed directly into management information, so that the institution's management can be aware of and quickly respond to changing learning needs.

Figure 3 shows one typical student view of the Learning Environment. The Learning Environment is implemented in a client - server environment, supporting access over local or wide area networks (tcp-ip). A relational database (specifically Oracle) on the central server(s) holds the information. The client runs on Windows PCs. In principle, the

application could equally run over the World Wide Web, with a web browser accessing the database through a gateway. Extension to this environment is under consideration.

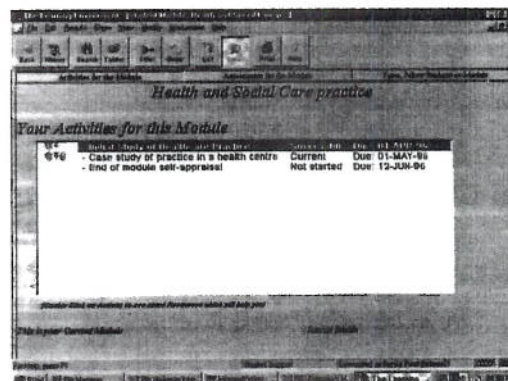


Figure 3: Typical initial view of a learner's workspace

Pedagogical Issues for Online Learning Environments

- The online environment itself will not dictate the pedagogical approach used, any more than physical environments such as lecture theatres and seminar rooms do. However, just like physical environments, they will tend to favour certain learning processes, and the sum of the environment, its content, and how it is used by teachers and learners will determine the overall learning experience.

To discuss the learning process, we use the framework suggested by Mayes and Neilson (1995). This framework suggests three phases of learning:

1. Initial conceptualisation of the subject area using declarative materials such as lecture, books, online text and images.
2. Construction, where the learner actively engages with the subject, to link it in with their own knowledge framework. This can be provided by activities such as essay-writing, problem-solving and (some) interactive online material.

Strand 1: Pedagogy and Design

3. Dialogue, where the learner expresses aspects of their emerging understanding in words, and relates this to the understandings of fellow learners and tutors. This may be provided by activities such as seminars, classroom discussion and online discussion lists.

To take these phases in turn:

Initial conceptualisation is the phase most obviously supported by the majority of online learning materials and environments. It is relatively straightforward for a learning environment to support this, making the appropriate set of declarative materials available to the learner in a structured fashion, and allowing him or her to work through them.

However, if only this style of learning is supported, then the learning experience as a whole is likely to be inadequate.

So how can we go further to support the second phase, construction? As a basis for discussion, we take one example from the literature of key features for the constructivist approach (Grabinger et al, 1997), and show how the Learning Environment can support each feature (Table 1). Certain features depend mainly on the nature of the individual learning activities and resources, whilst others primarily relate to the embedding framework provided by the learning environment.

Key Characteristics For Constructivist Learning	Rôle of Learning Experiment	Role of Content (the specific activities & resources)
Student Responsibility Self-directed learning, identify own knowledge, manage own learning.	Inclusion of Action Plans etc. Ability to individualise learning. Explicit visibility of progress overview.	A minor role
Dynamic Generative Learning Self-directed learning, identify own knowledge, manage own learning.	Interactive activities are the primary elements of learning. Support for active research. Integration of planning & reflection,	The content of learning materials is crucial
Authentic Contexts Use of realistic problems and examples.	Ability to tailor the learning programme contents to match the individual learner's interests.	The content of learning materials has a prime role.
Collaboration Exposure to multiple perspectives. Requirement to verbalise and examine own understandings. Developing cooperative skills. This also relates to Mayes' third phase: dialogue (see below)	Environment enables communication tools, to be situated in current context, but the main onus lies with the use of these tools themselves. Shared folders and annotations facilitate group work.	Possibility of resources directing learners to work collaboratively.
Reflection Articulation of what has been learned and how. Understanding of the personal learning process. Feedback to planning next phase of learning.	Integration of assessment. Ability to embed learning appraisal type activities. Ability to modify future learning in light of reflection.	Materials may ask for reflection.

Table 1 - Learning Environment and content features supporting effective learning

The Learning Environment does demonstrate that the essential features of constructivist learning can be supported through the online environment. However, the level of support is far from ideal as yet. Some outstanding issues include:

- Integration of individual learning materials with the environment. The ideal would be for the outcomes of learners' activities to be able to feed back into the environment, influencing the future course of learning. Currently, the capabilities to do this are patchy across toolsets, and largely non-standard.
- What degree of direct learner control over their programme of learning is appropriate? In the current Learning Environment, this is entirely mediated by the tutor, who is the only person with permission to modify the contents of the learning programme. This is sometimes appropriate, but it is not clear when the learner should also have this capability.
- To what extent should the learning needs assessment and planning of learning be structurally linked to the individual programme that is devised for a student?
- At exactly which points in the learning process should dialogue with the tutor be embedded?

The third phase, *dialogue* also supports the constructivist assimilation of knowledge by the learner. It is identified as a distinct phase because social interaction is seen as playing a distinct and crucial role in the learning process. Our Learning Environment supports the integration of dialogue with other phases of learning, for example through situating e-mail communication or online conferencing in the context of a specific learning activity. However, in common with most current environments, it is definitely information-centric. The transition between dialogue and use of information is far from seamless. Working with chunks of information - whether declarative or interactive - is the primary mode of use of the environment, with dialogue being presented as a localised add-on.

On the other hand, some approaches to online learning are dialogue-centric. In particular, this applies to asynchronous conferencing / discussion

approaches (e.g. McConnell, 1994) where following and contributing to a discussion thread is the primary learning activity, and information materials hang off this.

The ideal situation online environment would not enforce either information or dialogue as primary, but allow learners to seamlessly switch between each mode, maintaining context as this is done. This is what happens in a good primary or secondary classroom. The teacher delivers information as well as asking and responding to questions. Learners assimilate and construct information from worksheets, mixed with asking questions and small group discussion of the worksheet activities, etc. The transition is so smooth that one is generally not even aware of it.

One development which addresses this is the Knowledge Tree of Brailsford et al (1997), which integrates a concept-oriented information store with threaded discussion support. However, further work is certainly needed.

Organisational Issues for Online Learning Environments

- Trials suggest that the approach to migration of new approaches and technology into an institution is more important than the technology itself. Some critical success factors may be:
 - An effective high-level champion combined with nurturing for staff at the grass-roots.
 - Catalyst team or staff member, with sufficient resources to support their role.
 - Demonstration of early success in an area that is small enough to be achievable, but significant enough to excite enthusiasm.
 - Buy-in from key stakeholders.
 - Perception that it will make participants' jobs better in some way.

- Appropriate focus.
- Defined migration paths from initial small-scale success to later widespread achievements.
- Defined mechanisms for taking feedback and adapting the introduction strategy based on successes and problems.
- A good fit with the institution's (evolving) culture.
- Technology that is reliable, has a good user interface and evokes confidence.
- Good provision for staff training.

Conclusions

- This work shows that it is possible for online learning environments to address the important pedagogical issues that arise when IT is used to support the new styles of learning provision that are in demand. However, we are a long way from definitive answers, and more work is needed, particularly in the systematic evaluation of the application of these approaches. It is hoped that current evaluation of the pilot use of the Learning Environment in a number of colleges and universities will contribute to this.

Acknowledgements

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An ethnographic methodology was employed to generate an adequate description of 'just what' happened when university education was transposed from a traditional setting into the new technology. Students were observed orienting themselves to course requirements so that conference transcripts reflected the students and tutors understanding of what they ought to do. It was found that the transcript served as an official document, in many instances on-line activity was an artificial construct consciously produced as material for assessment. Almost all students moved outside the conferencing system to produce a 'contingent' technology of learning and developed an informal practice which has been given little attention in CMC literature.

Introduction

- Computer conferencing has been applied in education for many years and is presently being integrated into intranet and Internet structures. The interactive nature of conference systems, their potential for collaborative working and their text based, asynchronous operation have made them major tools in the development of on-line teaching and learning. The automatic gathering of information on computer mediated activity has held out the prospect of 'informating' the learning environment (Zuboff, 1988). Most studies of asynchronous learning by computer conference focus on the transcript of the conference and pay little attention to the informal practices which surround the use of the technology. In this study of a place-based learning network, we question both the reliability of the conference transcript and assumptions about the use of conference technology.

Mason has called transcript the 'most obvious data available to conferencing evaluators' (Mason, 1992 p113). The method most commonly advocated for analysis of transcripts has been content analysis. Such analysis relies on the idea that conference activity is faithfully recorded in the transcript. Content analysis, in a narrow sense, involves the analysis and categorisation of messages according to basic types and generates a typology which allows a quantitative analysis of activity. Mason and Henri, two main advocates of content analysis, expected to gain an understanding of broad social and psycho-

logical issues through the quantitative analysis of material collected in the transcript (Mason, 1992; Henri, 1992).

Content analysis has been extended in recent years to systems for automatic collection and processing of materials for researchers and educators (Henri and Rigault 1995, 1995a). This approach has been incorporated in the DELTA (Co-Learn) project (Viéville 1995, Viéville 1996). Transcript has in this way provided the basis for an 'informating' technology to assist in the construction and formalisation of knowledge and increase awareness of the process of learning. The transcribed record can provide a resource for assessment, though it is worth noting that almost no discussion of this feature has taken place. More recently the transcript has been identified as a potential source of information for the evaluation of teaching (Turoff, 1997). In the light of the findings of this research such a reliance on transcription evidence must be carefully appraised.

Technologies in use

- Authors from a variety of backgrounds have argued that to understand how people use technology, it is critical to understand the situation of its use (Bijker et al, 1987, Orlikowski, 1992, Orlikowski and Gash, 1994). The concept of 'technological frames' has been applied to the assumptions, expectations and knowledge users bring to a technology and their interaction with it (Orlikowski and Gash, 1994). An alternative tradition has grown up in Computer Supported Cooperative Work (CSCW) (Suchman 1987). The idea of situated action has it that intelligibility is achieved on each occasion of interaction with reference to situation particulars. It has been applied in education through the concept of situated learning (Brown et al, 1989; Lave, 1993). In particular it has been utilised with Conversation Analytic (CA) methods to investigate 'communities of practice' (Hodgson and Fox, 1995).

Conversation analytic (CA) approaches to computer conferencing have been applied by a number of authors (Hodgson and McConnell, 1995; Hodgson and Fox, 1995; Kurland and Barber,