What is Flexible Learning? Lessons for Educational Technology

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Abstract

The use of technology to support more flexible forms of education is becoming increasingly common. Despite claims that the web will revolutionise education, it must be accepted that many attempts at web-based education simply reinforce current 'poor' teaching practices or present more of the same disguised in updated packaging. This paper suggests that this occurs because of a limited understanding of how flexible learning should differ from traditional approaches. This paper presents a framework that situates flexible learning with respect to more traditional offerings and discusses the implications for educational technology design

Keywords

Educational Technology, Flexible Learning

INTRODUCTION

Much of the current focus on the role of the internet in changing aspects of teaching and learning in higher education has been developed from either a technologically deterministic position or from a psychologically derived standpoint (Harsim, 1990; Kozma & Johnston, 1991; Berman, 1992; Cowley, Scragg et al., 1993). The technologically deterministic perspective (Levinson, 1990; Mak, 1995) sees the role of IT in education as one of technological capability. This perspective is in keeping with the 'impact' school of IS research which views technology as an "exogenous force which determines or strongly constrains the behaviour of individuals" (Markus & Robey, 1988: 585). The psychologically derived perspective argues instead that the design of educational technology should be based on aspects of learning and memory theory where the central concern is with individuals cognitive capability (Feenberg & Bellman, 1990; Gallagher, 1994).

In fact, much of the criticism that is levelled at educational technology is similar to concerns raised over the introduction of information systems (IS) or information technology (IT) in organisations. It is important then that the lessons learnt from research in industry implementations be applied to the educational situation. Two issues hold particular relevance for educational researchers: the lack of sociological considerations in educational technology design and the non-alignment of technological and educational objectives. This paper argues that to maximise the benefits of educational technology, greater emphasis must given to the motives and planning behind the adoption of educational technology.

The paper presents a simple framework for comparing 'emergent' teaching and learning practices with more traditional practices. This is discussed in terms of the implications for educational technology design. The paper concludes by presenting some simple guidelines for the design of educational technology to support both teaching and learning practices.

TRADITIONAL IS EDUCATION

Willis (1995) has argued that traditional education is characterised by the following:

- Learning process is sequential and linear;
- Planning is top down and systematic;
- Course objectives guide all learning activities;
- Teachers are perceived as experts with special knowledge;
- Careful sequencing of teaching activities is important to learning predefined skill sets;
- The main goal is delivery of pre-selected knowledge;
- Summative evaluation forms the basis of assessment; and
- Objective results are critical.

IS courses following this traditional style tend to revolve around the group lecture, supplemented by tutorials or workshops designed to reinforce the material 'delivered' by the lecturer. Courses are often modularised with each week covering a new area of knowledge or skill set. Learning objectives are carefully spelt out in course outlines and clearly linked to the various pieces of assessment. Courses emphasize parity and are readily accepted by faculty steering committees and external examiners.

While well accepted and often successfully executed, this form of learning generally fails to engage students in deeper learning (Mills-Jones, 1999) or to deliver the problem solving skills favored by IS employers (Bentley, Lowry et al., 1999). Many Australian and New Zealand IS departments have adopted problem based learning and active learning strategies to address these concerns. However, to date the logistics of dealing with large student numbers have limited the opportunities in these areas. The arrival of interactive technology like the Internet has offered new ways to enhance current IS teaching practices.

To date, economics issues have commonly been the driving force behind IS Department's flexible learning and educational technology initiatives. The drive to attract more students and the associated funding has seen many IS Departments adopt 'distance' style offerings that merely use the Internet to deliver traditional mail based distance education. Under the banner if 'flexible education', lecturers have put resources including lecture notes online and in some cases streamed lectures using web based audio and video technology. Unfortunately there has been limited evidence that this newer approach to material delivery has added real value to students learning experiences (Riddle, Nott et al., 1995; Vargo & Cragg, 1999). The nature of the course and the expectation of students learning are fundamentally the same as those of the traditional education. It has been argued that to achieve real added value, the use of educational technology must be adopted in conjunction with a more fundamental change in the nature of student learning activities (Ramsden, 1992; Mak, 1995; Lamp & Goodwin, 1999; Vargo & Cragg, 1999). This is true flexible learning.

SITUATING FLEXIBLE LEARNING

Sociological theory has for some time recognised the essentially dualistic nature of human activity systems. Parsons and Bales (1955) labelled these dimensions *task* and *socio-emotional*, reflecting the difference between the technical aspects of work related structures and the social concerns of the human actors operating within those structures. Etzioni's (1965) work into organisational control further developed the concept of two dimensions of human activity. Etzioni labels the domains *Instrumental* and the *Expressive*. Instrumental refers to those activities that deal with the input and distribution of resources in the organisation, while expressive refers to activities that affect interpersonal relations within the organisation, particularly the adherence to norms. These dimensions, identified in industry, can be used to explore the various activities in teaching and learning.

Social theory suggest that these activity dimensions are central to individual and group development of values and beliefs (Pfeffer 1981), a perspective in keeping with the notion of education as developing new value and belief structures or schemata. Consequently, an argument can be made for the view that because education is an important context for personal interaction – second only to 'work' - it is central to the social creation of meaning. This view is substantiated by the fact that the 'identity' of a person within a western culture is strongly based on their level of educational participation.

Student development of shared knowledge and meaning can be described within the context of the task and social-emotional dimensions. Students interact at many levels to create, confirm, and recreate shared meanings. This shared meaning construction covers a much larger knowledge domain than has traditionally been considered in the context of academic learning. This broader definition is consistent with Brown's (1994) examination of outside school learning, Fensham's (1992) work on commonsense knowledge, and Resnick's (1987) exploration of learning and reasoning outside school. However, educational research has often identified these knowledge construction activities as separate function taking place inside and outside of school. This view denies the role of social interaction within school in constructing shared meaning.

Most approaches to teaching and learning theory can be located within this framework, highlighting the differing perspectives and assumptions of teachers. The different approaches reflect disjoint views of the need for standardised education and for student interaction. Assumptions regarding the appropriate structure for education (task) can be thought of in terms of a uniformity-diversity dimension, while assumptions regarding appropriate student relations (socio-emotional) may be represented in a competition-collaboration dimension (Figure 1).

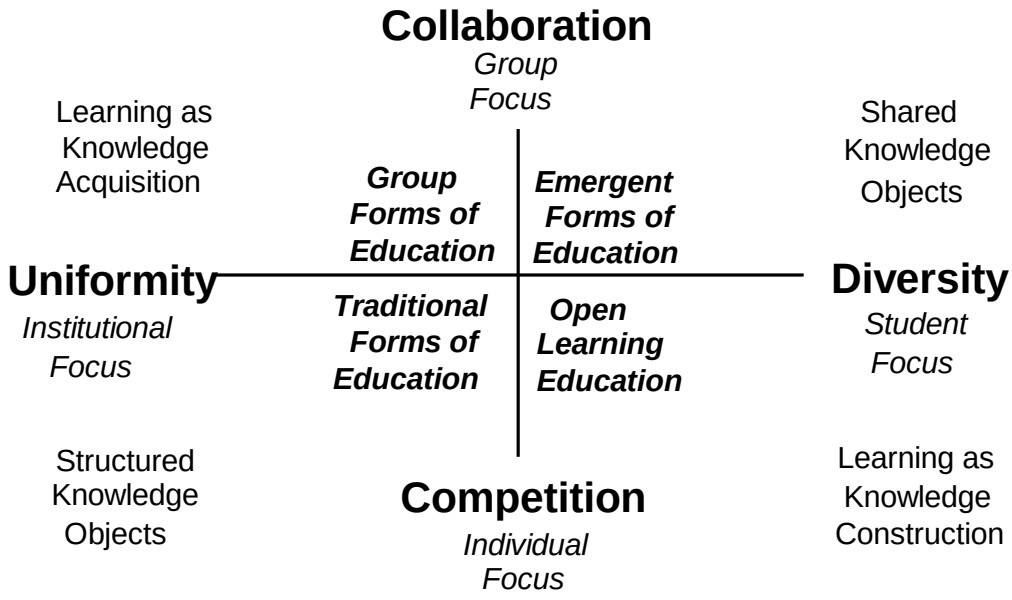

Figure 1. Socio-Technical domains of the educational context

Uniformity-Diversity Dimension

The Uniformity-Diversity dimension distinguishes between those approaches to curriculum design that concentrate on singular notions of subject design, course delivery, and assessment, and those which emphasize flexible approaches. Uniformity of task is institutionally focussed,

that is, it concentrates on meeting university-wide standards, norms and seeks to do this by offering the 'same' experience and assessment to all. Such programmes are readily accepted by boards of studies and external moderators. Diversity of task is student focussed, offering different learning experiences for individual students. Diversity is often accepted in principle but less frequently practiced and less readily accepted. The uniformity-diversity distinction has received a great deal of attention in recent research into effective teaching and learning practices (Ramsden, 1992; Ramsden, Margetson et al., 1995).

Behind the current calls for more flexible teaching and learning practices lies the belief that teaching, particularly in higher education, needs to adopt a stronger student focus (Boyer, 1990; Brown, 1994). While academics who adopt a uniform approach talk about the 'right' teaching strategy, those interested in diversity deny the existence of any single 'right' way to teach (Mak, 1995; Bentley, Lowry et al., 1999; Mills-Jones, 1999). They argue instead that 'best' practices can only be based on an understanding of particular student learning needs. The growing pressure for diversity stems from a number of factors including: the diverse nature of the student population, the diverse needs of employers, the diversity of educational intentions, and the need to provide greater levels of teacher satisfaction with the educational process.

Competition-Collaboration Dimension

The Competition-Collaboration dimension reflects differing perceptions concerning the complex social interaction between students which are so important in developing shared knowledge objects. The extremes of this dimension are somewhat multi-faceted in that they deal with the distinction between an individual focus (competition) and a group focus (collaboration), as well as dealing with the underlying assumptions regarding student attitudes to both their peers and the teaching staff (Johnson & Johnson, 1989).

At the simplest level, the competitive aspect of the socio-economic dimension views students as a large collection of individual units (Bereiter, 1990), a perspective strongly evident in traditional educational activities. This view assumes students are motivated primarily by assessments, and that it is through assessments that students can be manipulated to receive planned educational objectives. By contrast, the collaborative end of the dimension views students as active constructors, rather than passive recipients of knowledge (Brown, 1994). The view assumes that learning is best facilitated through shared learning experiences between students as well as between students and teachers. (Kushan, 1994). These of views are often represented in notions like communities of learners (Brown, 1994); cooperative learning (Johnson & Johnson, 1989); and professional communities (Lieberman, 1992). Such views of the learning context and student interaction have strong implications for the appropriateness of current assessment tactics and the role students should play in them.

The intersection of these two dimensions results in four domains representing traditional education (uniformity/competition), group education (uniformity/collaboration), open learning (diversity/competition), and emergent forms of education (diversity/collaboration). The focus of this paper is on the emergent forms of education resulting from an increased focus on diversity and collaboration.

CHARACTERISTICS OF EMERGENT FORMS OF TEACHING AND LEARNING

Having situated the various approaches to teaching and learning within a task/socio-emotional framework, it is possible to see that opportunities exist to expand educational technology beyond the current flexible delivery metaphor. Indeed it is possible to envisage a three-stage

model that highlights the maturity of flexible learning initiatives, from flexible delivery through flexible interaction to flexible exploration (Figure 2). The majority of current applications fit into the first stage with very few in the third stage. Consequently, we represent the three levels as a pyramid, highlighting the current focus on lower level activities and the need to progress to higher level activities.

The first stage, flexible delivery, embraces the majority of current web based delivery efforts. The second stage, flexible interaction, supports a more cooperative form of flexible delivery by using web and Internet technologies to enable students to interact outside the traditional boundaries. Many course websites already utilise bulletin board and chat facilities. However, this is often an adjunct to the learning process and simply continues the information delivery notion. Movement from the first level to the second implies a more conscious utilisation of synchronous and asynchronous communications devices to engage students in both lecturer to student and peer to peer investigations of the problem being explored.

The third stage, flexible exploration, is characterised by the concept of student exploration of IS concepts using web and Internet technologies. At this stage, students can explore concepts in a non-linear, student-directed fashion. For the most part, little effort has been expended at this level.

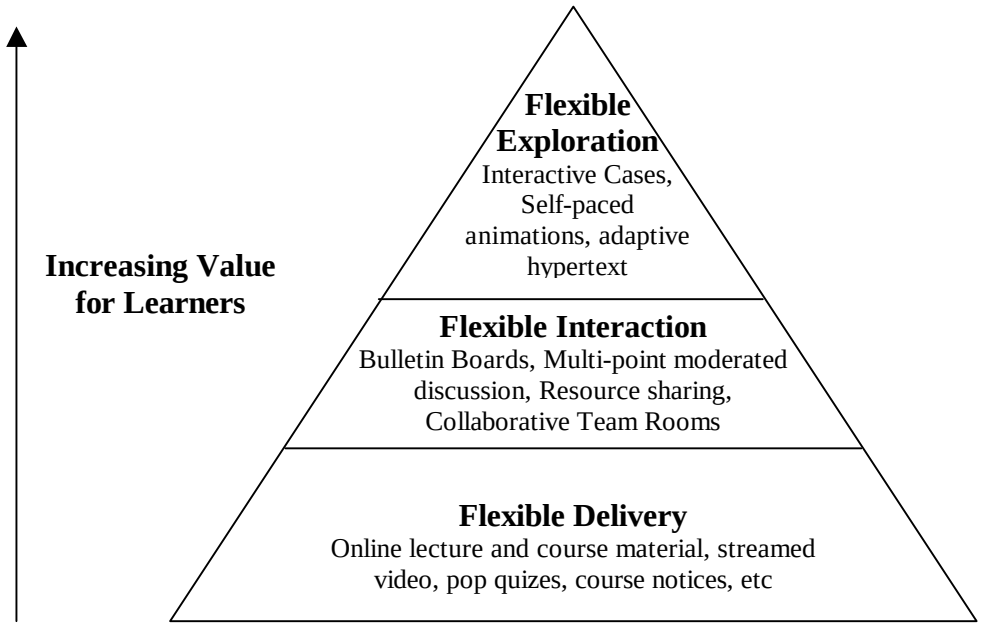

Figure 2: A Maturity Model of Flexible Learning Facilities

The emergent forms of education encompass the flexible interaction and flexible exploration stages. These are summarised next.

Flexible Interaction

If we accept the view that learning encompasses the development of new and often complex schemata (Bereiter, 1990) or that it involves doing something different as a result of experience (Biggs & Moore, 1993), then we need to consider the social context in which such learning occurs. Moreover, if we concede that teaching and learning involves a process of

developing and changing individuals' values and beliefs and enabling them to see the world from a different perspective, then it is appropriate to view the entire process as complicated layers of social interaction.

No matter which definition of teaching and learning we, as teachers, subscribe to, a high level of student-student or student-teacher interaction is inevitable. This paper adopts a perspective, which sees learning as a contextually dependent process that creates in the learner historically-dependant meaning constructions which in turn act to constrain future interpretation or learning. This strong focus on the social context of learning has implications for the development of teaching strategies. It implies that the effectiveness of any students' learning is heavily dependent on the environment in which it is conducted. Such a perspective is consistent with Brown's (1994) focus on learning settings and the development of learning communities.

Context is particularly important in IS education because IS education must be strongly grounded in the frame of modern business organisations – it is this grounding which differentiates IS from computer science. Central to this premise is the notion that IS knowledge is obtained through communication developed within a social context. In this respect, the web and the Internet offer a wide array of opportunities to support student interaction. The facilities range from the simple bulletin board, ICQ, IRC and other generic chat type facilities to the more sophisticated online tutorial facilities like Net Meeting, White Pine's Meeting Point and Class Point, and Lotus's Learning Space. Web based courseware products like Web CT, TopClass, eCollege, and Blackboard's Course Site, which are increasingly being used in Australian and New Zealand IS Departments all offer interactive facilities. However, recent surveys have shown that communication facilities alone will not deliver increased value to students or academics (Parry, Cockroft et al., 1999; Vargo & Cragg 1999). It is not the technology itself, but the way it is integrated into the learning process that creates value to students.

An example of an integrated learning process using web and Internet technologies is the virtual collaborative team room. Traditional project groups often base themselves around a team room - a physical location where material related to the project can be grouped together in a work environment. As a collaboration tool, the physical team room is often highly effective. Group members are able to enter the room and begin working by themselves on a particular piece of the project, and then easily adapt themselves to working in groups should another member arrive. Further, due to its ability to develop project memory, the physical team room facilitates group members to pick up where another member left off on a particular task, thereby allowing for time-diverse collaboration. But the physical team room requires the co-location of all members of the project group. An alternative is to create a virtual team room utilising groupware applications. By locating the team room within an Internet connected computer system, group members are able to participate in the project, and obtain many of the advantages of the physical team room even if they are in geographically diverse locations (Davis, Motteram et al., 1999).

Flexible Exploration

The flexible exploration perspective views students as active constructors, rather than passive recipients of knowledge (Brown, 1994). Practically this is reflected in the wide spread adoption of case based and problem based learning approaches to student learning (Prawat, 1993; Bentley, Lowry et al., 1999). One of the perceived advantages of the case and problem based methods is that they allow student to deal with complex but realistic situations, to gain experience in practical decision making, and develop their own models and approaches for dealing with unstructured problems (Bentley, Lowry et al., 1999). It is claimed that student

recall and understanding of key concepts is improved when they are actively engaged in such realistic learning activities (Mills-Jones 1999; Mitchell and Hope 2000).

However, too often case and problem situations become overly sanitized and artificially abbreviated. The loss of richness in the material is a commonly a product of tight teaching schedules or attempts to highlight the lecturer's perception of the important aspects of the case. As a result, students tend to approach the case as an exercise in re-organising the material to find the answer. This reduces both the experiential and realism aspects of the learning exercise (Friedman & Kahn, 1994; Gallagher, 1994; Bentley, Lowry et al., 1999). The internet and the web offer a range of opportunities to address these concerns, particularly in terms of increased realism, improved student motivation, and an increased emphasis on self directed student exploration of the material. At the simplest level multimedia facilities can enhance the visual aspect of case material. Audio and video tools can be used to upgrade case exhibits and break up the written components of the material. This is often enough to improve student motivation to explore the case material on their own or with peer groups.

In teaching cases specifically developed to take advantage of new technologies, communications tools and simple artificial intelligence agents can be used to encourage student interaction with the virtual actors in the case. Controlled interaction with artificial organisational units like steering committees or management groups can be supported allowing students to explore the material in ways not originally conceived by the lecturer. The student experience can also be enhanced by the ability to contextualise the case material within the wider context of resources available on the web. These features all add to the complexity and realism of the problem being explored.

Another initiative that supports student-centered, self-paced learning is the use of adaptive hypertext. Technologies like XML and knowledge mapping concepts like Walden's Paths can allow students to direct their own exploration of the course material (Shipman, Furuta et al., 1998). By mapping all the concepts covered in online course material using XML it is possible to allow students to retrieve information based on search criteria they establish rather than the week-by-week delivery that currently defines information retrieval.

Use of online feedback can address an often-cited criticism of flexible exploration, namely, a lack of feedback and direction provided to students. For example, results of online quizzes can provide a nominal value that represents how well a student understands particular concepts. Based on this feedback, course material relevant to identified 'problem' areas can be collected by meta-crawler programs and delivered to the student. Given that the many university undergraduate courses are reaching class sizes of over 300 students, and that tutorial classes often do not benefit shy or less self-assure students, adaptive hypertext as a supplement to traditional methods, can offer a more effective feedback mechanism that traditional learning environments can offer alone.

IMPLICATIONS FOR EDUCATIONAL TECHNOLOGY DESIGN

Ramsden (1992) suggests six key principles for effective teaching in higher education, many of which are in keeping with the emergent forms of education.

- Raising student interest and providing clear explanation of concepts;
- Having genuine concern and respect for students and student learning;
- Providing appropriate assessment mechanisms and useful feedback;
- Setting a clear goal and providing an intellectual challenge;
- Encouraging student independence and control over learning engagement; and
- Learning from students. (Adapted from Ramsden, 1992)

These principles all have a strong student focus and imply the need for a flexible approach to subject design and execution. In addition, the principles depend on a strong collaborative interaction not only between students but also between students and teachers.

Brophy and Alleman (1991) pose a series of relevant comments for curriculum developers that are also important in the development of educational technology. They state that curriculum developers should pay attention to some very fundamental questions:

> *"What are the intended functions of activities within various types of curricula, and what is known about the mechanisms through which they perform these functions (if they do)?*
> *What is it about ideal activities that make them so good?*
> *What are some common faults that limit the value of less ideal activities?*
> *What principles should be followed by curriculum developers in designing activities and by teachers in implementing them with students?"*
>
> (Brophy & Alleman, 1991: 10)

By adapting similar principles, and by taking into consideration the issues outlined in the previous discussion on emergent teaching practices, it is possible to outline a number of simple educational technology design principles. The following may be considered good principles for the design and development of effective educational technology to support emergent teaching practices.

1. Contextualise learning

The use of new technologies offers the opportunity to contextualise learning in ways not previously possible. The use of on-line systems and simulators allow for student exploration of knowledge domains within a framework resembling actual practice. It is particularly important that technology does not de-contextualise learning by conveying mixed messages.

2. Be developed to support curriculum goals and objectives

Educational technology needs to be developed to support educationally derived objectives and goals. This necessitates detailed exploration of how each technological mechanism supports learning in specific higher education contexts. Well-designed educational technology should allow multiple teaching goals to be realised. For a system to be widely useful and broadly accepted it needs to fulfil a variety of educational objectives and student needs. The most important design question for educational technology is probably whether the system should be developed at all.

3. Motivate students to use it

It is quite likely that there will be some resistance to technological use. System design and implementation should cater for such concern. It is possible to overcome the fear of technology by supporting a variety of learning experiences and provision of choice in learning approaches. Well-designed systems should enhance a student's perception of self-efficacy and not detract from it.

4. Create Communities of Self Directed Learners

Interactive communication facilities are of value only when they create communities of learners and not when they simply provide additional avenues of information delivery. Well-designed technology based systems also ensure that students progress in their learning activities, whilst allowing them to broaden their understanding and explore tangents if they wish to do so. One

of the real strengths of emergent educational technology is its ability to broaden students' conceptions of the world.

5. Provide adaptability and flexibility

Emergent systems must be adaptable so that teachers can ensure currency of the material provided. It is equally important that they be flexible to allow teachers to adapt the teaching practices to suit different student groupings. The need for structure in a technology must not remove a student's ability to self-regulate their learning experience.

6. Encourage and facilitate open discourse

Many existing technology based educational systems are designed simply to provide a more flexible method for the delivery of existing teaching material. New educational technology needs to step beyond these constraints and provide facilities, which encourage and allow interaction between students and between students and teachers. This discourse should, where possible, be removed from the limitations of time and locational constraints.

7. Provide appropriate feedback channels

Much of the existing educational technology allows only for one way communication of material. It is important, in conjunction with the previous principle, that emergent systems allow for teachers to support and monitor student learning through the provision of appropriate feedback. This feedback is an important aspect of any students' performance and perceived self-efficacy (which in turn effects future performance). The feedback should go beyond traditional communication of results and assessment feedback and incorporate more general feedback of students' overall performance.

8. Support Students and Teachers Needs

When educational technology is developed from a purely pedagogical perspective, it is likely to support student needs. However, it is important that emergent systems also support teachers' needs. A system's 'success' is highly questionable if it creates extra burdens for teachers or removes those aspects of teaching that are considered enjoyable. A good system should enhance a teacher's participation with students and support other teaching related issues like satisfaction, motivation and career concerns.

CONCLUSIONS

Clearly there is a need for educational technology to be better designed so that it supports teaching practices rather than acts as billboard advertising technological wonder. This paper has outlined a number of principles which need to be considered in the development of systems designed to support more emergent forms of education. The final point to be made is that educational technology should not be considered a focal point for any reform of education but rather a resource to be integrated into a much wider repertoire of educational resources.

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