

**Emergence of Fourth Generation Technologies**  
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## Introduction

Access to higher education has expanded significantly in most countries over the last half century. Worldwide, the normally conservative higher education environment came under considerable pressure from society to change: to become more accountable, more efficient and effective, and more relevant and responsive, while providing greater and more equitable access. This broadening of access to higher education has occurred within the context of a growing global concern for social justice. Governments of all political persuasions found themselves under pressure not only to expand higher education, but also to make access more open and equitable. This global trend away from the perception of universities as elite institutions which perpetuate advantage, towards a more equitable higher education sector, was justified by economic development and human resource utilisation arguments, as well as those reflecting a desire for social justice.

The move to mass higher education was so dramatic it placed enormous strains on the resources available to support higher education. In many countries one significant response to such demand was to turn to open and distance learning as a way to cope with such an increase in numbers. Initially these developments were restricted to the 'new' universities as they struggled to compete for numbers with the more established universities. In many respects these 'new' universities 'led the charge' in adopting open and distance learning approaches. For these new universities it was natural for them to see open and distance learning as a way to enter the international market. Open and distance learning provided 'educational products' which could be sold overseas. Initially, these 'products' were seen as something that could earn substantial revenue and involved very little in the way of extra development costs. They were generally the same materials offered to Australian distance education students.

Open and Distance learning has quite a long history in Australia driven by the geographic isolation and vast or sparse populations which demand an alternative education system. Many of the early school systems adopted the 'correspondence model' detailed in Table 1 as the only way to provide access to education.

**Table 1: Models of Distance Education: A conceptual framework**

Models of Distance Education and Associated Delivery Technologies	Characteristics of Delivery Technologies					
	Flexibility			Highly Refined Materials	Advanced Interactive Delivery	Institutional Variable Costs Approaching Zero
	Time	Place	Pace			
<b>FIRST GENERATION - The Correspondence Model</b> · Print	Yes	Yes	Yes	Yes	No	No

<b>SECOND GENERATION -</b>	Yes	Yes	Yes	Yes	No	No
<b>The Multi-media Model</b>	Yes	Yes	Yes	Yes	No	No
· Print	Yes	Yes	Yes	Yes	No	No
· Audiotape	Yes	Yes	Yes	Yes	Yes	No
· Videotape	Yes	Yes	Yes	Yes	Yes	No
· Computer-based learning (eg CML/CAL/IMM)						
· Interactive video (disk and tape)						
<b>THIRD GENERATION -</b>	No	No	No	No	Yes	No
<b>The Telelearning Model</b>	No	No	No	No	Yes	No
· Audioteleconferencing	No	No	No	Yes	Yes	No
· Videoconferencing	No	No	No	Yes	Yes	No
· Audiographic Communication						
· Broadcast TV/Radio and Audioteleconferencing						
<b>FOURTH GENERATION -</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>The Flexible Learning Model</b>	Yes	Yes	Yes	Yes	Yes	Yes
· Interactive multimedia (IMM) online	Yes	Yes	Yes	Yes	Yes	<b>No</b>
· Internet-based access to WWW resources						
· Computer mediated communication						
<b>FIFTH GENERATION -</b>	Yes	Yes	Yes	Yes	Yes	Yes
<b>The Intelligent Flexible Learning Model</b>	Yes	Yes	Yes	Yes	Yes	Yes
· Interactive multimedia (IMM) online	Yes	Yes	Yes	Yes	Yes	<b>Yes</b>
· Internet-based access to WWW resources	Yes	Yes	Yes	Yes	Yes	<b>Yes</b>
· Computer mediated communication, using automated response systems						
· Campus portal access to institutional processes and resources						

While some early attempts at open and distance education in higher education can be linked to the 'correspondence model', most institutions entered the arena by utilising 'second' and 'third' generation

technologies. The dominant world view of distance education at this time can be defined as an industrial model of teaching and learning heavily influenced by mass production and individual study. The driving force was to provide access to education for large numbers of students. For some of the newer universities such access involved substantial numbers of international students.

In a recent paper, Garrison argued that:

*.... an emerging world view of distance education incorporates highly interactive communication technology, along with the ideal of personal and collaborative learning. (Garrison 1997: 3)*

This was a reference to the emergence and influence of fourth generation technologies or what Taylor refers to as the 'flexible learning model'. In describing the adoption of fourth generation technologies at the University of Southern Queensland, Taylor indicates that:

*... the essential features of a fourth generation e-Learning environment support a learning process that is interactive, non-linear and collaborative. These features include the use of an interactive study chart as a basic navigational tool, which sets the broad parameters of the subject matter content to be investigated, and lists a number of exemplary references. References are electronic and hot linked via specific URLs. Additionally, the students are free to surf the Net for supplementary teaching-learning resources that meet their specific needs. They are also able to upload and download assignments, with those of sufficient quality being added to the teaching-learning resources database for reference by future students. The interaction with courseware materials is, however, only one element of the interactivity built into the USQ pedagogical approach. Interaction with other students, teaching staff and other experts, who act as mentors, is achieved through the use of Computer Mediated Communication (CMC), primarily through the deployment of asynchronous discussion groups. Students are encouraged, and in many cases required, to communicate through various electronic discussion groups, established for specific content areas as well as for informal social interaction. (Taylor 2001: 6)*

This sort of e-learning environment described by Taylor is beginning to emerge in higher education contexts but right now online teaching and learning which is wholly online is not widespread. Online education has seen three modes adopted, 'supplemental or adjunct', 'mixed mode' and 'wholly online'. As suggested the latter is not yet widespread. Nevertheless, this model will be used as a basis for discussing the emergence of fourth generation technologies, for it captures the potential of what fourth generation technologies might bring to higher education contexts. As will be illustrated, these changes are based in the nature, quality and levels of interaction promulgated mainly through asynchronous communication, a key feature of wholly online approaches. For example, access to asynchronous communication (discussion boards, bulletin boards) allows learners

*... to communicate with each other independent of time and distance (and) moves distance education away from a transmissive teacher dominated model of education to a more interactive form of learning ...In a knowledge-based society ... it is essential for students to be able to question, discuss and analyse their learning in a social context.*

Such a change in the nature of interaction quite logically extends to a quite different interpretation of what is meant by a 'cohort of learners'. It is a departure from the classroom dominated model. Members of the cohort still belong to 'a group' and can communicate effectively as a group but are located worldwide and in culturally different and diverse settings. In terms of communication:

*... there is a qualitative difference between the traditional on-campus (real-time verbal communication) and computer mediated communication (asynchronous written communication)*

*... with the reflective and precise nature of the latter being very different from the spontaneous and less structured nature of oral discourse ... . (Taylor 2001: 6)*

The emergence of fourth generation technologies has the potential to change the teaching-learning landscape, at least in those places which have adopted the 'totally online' approach. The changes inferred above herald significant changes in the models of teaching and learning which have been used in traditional face to face and open and distance learning settings. It is to this which we now turn our attention.

### **Exploring the potential of teaching/learning totally online: the role of learning communities**

As previously indicated, developments in online education for higher education contexts have revealed anomalies in the teaching/learning context as we know it. The 'classroom' is not defined by some physical location. Interaction between teacher and student, and student and student is not predominantly 'real time' communication. Students can interact with the subject matter in a manner that suits their needs and can revisit discussions and topics for review and reflection. The 'new' concept of classroom portrayed in online settings brings a diverse group together in a different way to the more traditional classroom but in a way where a social presence is not only preserved but enhanced. Nowhere is this more important than in those instances where the diversity of student groups is built around cultural and geographical differences. To be able to address the problems associated with isolation and difference is a big step forward in open and distance learning, particularly where numbers of international students are involved. As the numbers of potential online students increases (due to advances in technology) the ability to create a sense of belonging through enhanced social presence constitutes a major development. Contact between participants is technically but a 'click' away.

The availability of asynchronous communication with its emphasis on the written word through computer mediated communication is also ideally suited to facilitating higher order thinking. For example, Garrison mentions that

*... the asynchronous and precise nature of this means of communication is consistent with higher order thinking and cognitive development ... (and) in higher education, writing is crucial to thinking about complex issues in a meaningful manner. (Garrison 1997: 5)*

Some have ignored these changing parameters offered in totally online environments and have tried, mostly unsuccessfully, to re-create the classroom model, particularly in respect to those attributes dominated by the idea that a cohort of students should cover the same content in the same order and more or less at the same pace. This unfortunately misses the point in what totally online contexts have to offer. In these new contexts, the teacher is able to structure the content around issues and concepts using forums set up on discussion boards/bulletin boards. The composition of comments for these forums is more reasoned, more precise and, once posted, represents a permanent record of discussions and debate. The asynchronous nature of this communication allows this to occur and represents the catalyst for changing teaching/learning environments.

These fundamental differences in the way learners can now communicate with teachers, with one another, and with other 'experts' online has an affinity with constructivist approaches as they apply to higher education. Constructivism is based on the idea that the learner 'acts upon' the subject matter, individually or with others, in order to construct meaning and 'take control' over his/her learning. Online environments provide opportunities for the learner to do just that through an expanded concept of interaction-between learner and content, between teacher and learner, between learner and learner. Online environments not only provide opportunities for 'individual constructivism' (interaction with content through a range of cognitive tools such as concept maps and graphic organizers) but also opportunities for 'social constructivism' (collaborative learning and co-construction of knowledge). The 'totally online' environment is able to deliver on both of these fronts, although it may appear to some that an environment which lacks such social and interpersonal

features as physical presence and non-verbal cues can actually promote productive social interaction. Recent research on online pedagogical frameworks provide some insights into the potential of online to do just that. The work in progress by Mayes at Glasgow Caledonian University is an example of this. The framework developed by Mayes and his colleagues portrays a basic unit of learning which he calls a 'conceptualisation cycle'. This pedagogical framework is a three step process - conceptualisation, construction and dialogue.

Mayes coins the terms primary, secondary and tertiary courseware to describe the nature of differences in technology use for each step in the learning cycle. This is a significant departure from the 'one shape fits all' design which has been associated with online environments. Of greater interest for this paper, however, is the insights it is able to provide into how learning relationships might be used for determining the requirements for learning networks. His work in this area is drawn from Lave & Wenger's work on 'communities of practice' and how particular factors derived from this can influence the motivation to learn. So far, Mayes research in the area has demonstrated a 'complex interplay between cultural and contextual factors' influencing the interpretation and characteristics of a learning relationship. This is leading to the development of ideas aimed at demonstrating what effective support systems might look like and how they might be included in the design of online environments. This is of particular relevance for courses where students are drawn from different cultural and geographical settings.

What is appealing about this framework is that:

It takes a holistic view of the role of technology in teaching and learning in higher education and rejects the notion that the use of technology is either restricted to computer mediated communication (CMC) contexts (email, discussion boards etc.) or the presentation/delivery of subject matter using multimedia.

It acknowledges the special features of online environments (eg. asynchronous communication) as an important element in supporting teaching and learning in higher education where the development of higher order intellectual skills and abilities is a critical learning outcome.

It captures the essence of what constructivism offers higher education contexts, particularly in respect to 'individual constructivist approaches' in the 'construction' stage of the cycle, and 'social constructivist approaches' in the 'conceptualisation' stage.

It draws heavily on the work of Lave & Wenger (1991) and their concept of 'communities of practice' to acknowledge the role of learning relationships in formulating support systems which might facilitate more robust and productive learning networks.

### **Issues Facing Online Teaching and Learning**

The pedagogical framework proposed by Mayes provides a structure around which we might begin to compose a richer and more detailed description of the 'totally online' teaching and learning environment. The theoretical bases put forward by Mayes and his colleagues captures the potential of constructivist approaches for higher education and integrates this with a framework that acknowledges the potential of key features of e-learning which is wholly online.

In the third part of the paper, several issues are presented for consideration. The Mayes framework has been used as a basis for discussing these, since at this point in time there is a dearth of data based on empirical studies. Three broad areas are used as a basis for framing key issues. These areas are 'Resourcing online teaching and learning', 'Inclusivity in online teaching and learning' and 'Coping with flexibility in online teaching and learning'.

The Mayes framework provides a useful context for framing some of the more important questions concerning the future of online teaching and learning in higher education. The framework even allows us to offer some

tentative solutions.

## **Resourcing Online Teaching and Learning**

While predominantly anecdotal right now, the experiences of those who teach online (particularly those of teachers of adults in higher education, where 'text transfer' is the dominant form of communication) would seem to imply that teaching online is a very 'labour intensive' activity. Some teachers involved in teaching online have even suggested that teacher-student ratios of 1 : 25-30 appear to represent the limits if we are to capture the potential offered by online approaches in 'personalising teaching and learning'.

The advent of on-line delivery has provided an incentive to some higher education institutions that is focussed squarely on the dollar and this has seen governments and senior management in higher education institutions salivating at the prospect of -

- a cheap way of delivering education that can save millions of dollars direct funding to the higher education sectors;
- the potential income that globalisation of education can produce.

The reality would appear to be that senior management in higher education institutions have engaged in 'premature salivation' and governments in 'misplaced salivation'. As Postle & Sturman indicate -

*The danger in both views ... is that it focuses attention on the returns from a delivery mode and not the nature of the mode and how it can be designed to provide the most appropriate pedagogy for the disparate clientele that it now attracts. (Postle & Sturman 2001: 44)*

Like any 'product', online education is not a cheap alternative if it is done well. The personalisation of education as framed in the Mayes framework is very resource intensive and it is that personalisation that is seen by the clients of online education as the hallmark of the quality of teaching and learning that they can now access. As Garrison so aptly puts it

*In an attempt to reach mass audiences in an open and cost effective manner, distance education may risk the diminution of essential educational processes. (Garrison 1993: 209)*

An analysis of some of the work that is currently being done to address this issue reveals a 'mixed bag' of responses.

## **The Resurrection of the Transmission Model**

The enthusiastic uptake of multimedia technology by some senior managers and government officials is linked to ways they see as raising the efficiency of the educational process and providing greater access to larger numbers of consumers. They see value in the way the multimedia industry is developing bigger and better 'products' which can be placed on the Web and 'delivered' to clients. They argue that this can represent savings in development of materials and in teaching. The following represents an example of this focus on 'products'.

*The Portal for Online Objects in Learning (POOL) Project creates a landmark resource for organisations that are producing learning content for online delivery. By facilitating the management, storage and retrieval of learning objects such as audio or video clips, simulation applets and multimedia case studies, POOL provides organisations in higher education, workplace training and continuing education with a gateway to learning resources and a distribution channel for their learning object. (Porter 1999: 52).*

While not dismissing this as a totally useless exercise (the ideas and material would be motivational to say the least), as a solution it is flawed. In terms of the Mayes framework the focus of this activity can be restricted to the 'conceptualisation' stage and fails to include activities that relate to the 'construction' and 'dialogue' phases. There is an absence of any reference to the specific interactive elements that situate the content in learner contexts. In fact how can something that is developed 'acontextually' be used authentically. Mayes & Fowler explain this development thus -

*Increasingly, the power of access and display for multimedia content, coupled with the dramatic growth of the Web, has encouraged a crude 'delivery' model of education. (Mayes & Fowler 1999: 487)*

They see these developments as a not so subtle return to the 'transmission model' of teaching and learning, where the 'construction' of meaning and the 'testing' of this against other judgements are missing. This is no solution to the problem of resourcing online teaching and learning.

## Intelligent Tutoring Systems

Possibly a more productive way to address the problem of resourcing online teaching has been the work that is being done around the topic of 'intelligent tutoring systems'. There are at least a couple of developments that qualify. The first is linked to what Taylor (2000) refers to as 'fifth generation technologies'. Although developments around fourth generation technologies are still gaining momentum, there is already emerging a fifth generation distance education model (see Table 1). As Taylor maintains

*The fifth generation has the potential to decrease significantly the cost of online tuition and thereby increase significantly access to education and training opportunities on a global scale. (Taylor 1999: 1)*

Preliminary work undertaken by Taylor suggests that it is possible to utilise automated response systems based on existing software that can scan the text of data of incoming messages and 'respond intelligently'. Taylor explains the system as an initiative -

*... where we have developed prototypes of what we refer to as intelligent object databases, which can be searched by prespecified key words. Upon receipt of an electronic query from a student, the search engine seeks an appropriate match with a previously asked question, which if successful, triggers a personalised response to the current question without concurrent human interaction. (Taylor 2000: 7)*

A major use of this approach would seem to lie in the relief it can give to teachers in responding individually to student concerns/questions and so provide the teacher with the 'space' to manage the learning environment and maintain a focus on 'big picture' issues without losing the personalised approach to teaching and learning. It will be interesting to see whether the essence of 'construction' and 'dialogue' as detailed in the Mayes framework can be preserved through such approaches. Mayes et al (2000) have adopted a similar approach to Taylor in addressing this 'resourcing' issue but have chosen to -

*... capture, store and retrieve the records and outputs of real learning episodes and to make these available for new learners ... (this) offers the prospect of a real alternative to the building of intelligent tutors .... Rather than programming computers to minimise effective tutorial dialogues (they) start by collecting real examples. (Mayes 2000: 1)*

While these developments are potentially useful in solving the problem of resourcing online teaching, there are those who argue that such developments represent the 'thin edge of the wedge' in eliminating teachers. Some argue for intelligent tutoring systems which emulate (even eliminate) human tutors. While Taylor or

Mayes don't argue directly for any reduction in the role of the teacher (they argue for more space for the teacher to focus on the more critical tasks), this work is being undertaken in a context where cost cutting is the main agenda and discussions derived from this will affect the resources available for teaching and learning. There is a push to find ways to increase class sizes without significant increases in costs. The major successes of online teaching and learning to this point in time are linked to the improvements made in 'personalising' distance education. Developments that might negate these gains would seem to be a retrograde step. In fact, Mayes gets at the crux of this issue when he argues for the work in this area to proceed on the basis that we set out -

*... to understand both at what it is that makes the human contribution so enduring and appealing, and also how it is that educational technology can support these elements in the face of growing student numbers and shrinking resources. (McEndree & Mayes 1995: 2)*

## **Differentiated Staffing Models**

Another useful development in addressing the 'resourcing' issue concerns the use of a differentiated staffing model. The best examples of this includes the designation of different roles for a teaching team involved in teaching online. Some of the roles identified in these examples include 'presenters' and 'proctors'. The task for presenters is to manage and lead the team in implementing the course. Key roles for this person might include:

- managing the course strategies (deciding on the balance between asynchronous/synchronous; establishing forums, summarising key points and issues, developing and implementing key cognitive strategies);
- building and maintaining a sense of social presence.

Proctors on the other hand may offer assistance in the form of -

- facilitation of discussions in some forums;
- marking assignments;
- facilitating 'chat' sessions.

The electronic environment provides opportunities for presenters and proctors to be located virtually anywhere in the world and thus 'meet' regularly and in a cost effective way via email and virtual chat. This model offers considerable promise in addressing the resourcing issue. Further work on the nature and separation of tasks for team members together with an assessment of costs involved may provide a useful alternative for addressing the problem of resourcing online teaching and learning.

## **Coping with Flexibility in Online Teaching and Learning**

While the Mayes' framework is based on a different interpretation of 'interaction' to that popular in 'traditional classrooms', it still supports the notion of some sort of 'learning community' to be together during the implementation of a course and particularly where 'dialogue' is an important element. By linking his pedagogical framework to Wenger's work on communities of learning, Mayes places considerable emphasis on the importance of participants shaping each other's experience of meaning within a learning community. For the Mayes' framework, participation is not the same as collaboration where particular elements of a course can be structured to allow members to collaborate on a task or project. It involves shared ways of engaging and working together. This presents an interesting dilemma for those working in the field of online teaching and learning. How flexible is flexible? How is it possible to capitalise on the potential offered by learning communities in practice in a context where flexibility (time, place, pacing) takes on a whole new meaning.



This question is now one that is critical for the future direction of online education.

Initial work on addressing the concept of flexibility in online environments has tended to focus on responding to an apparent mismatch between the flexibility offered by open and distance learning (and now extended by online approaches) and the administrative and organisational features of institutions that belong to supporting on campus models of teaching and learning. This is obviously a response by the sector to capitalise on the increased demand for courses which allow greater flexibility. As such, the motivation to change administrative and organisational structures is based on commercial realities. Students will go where they can get the flexibility they want. This has shaped the direction taken in the way institutions have responded to flexibility.

For example, if we examine the nature of flexibility in online contexts and how it sits within current administrative frameworks we begin to get an idea of some of the existing tensions. Taylor (1996) suggests that as distance education moves towards later generations of delivery the primary benefits for learners are flexibility of access and increased student control over their learning.

*In effect, these 'flexible access' technologies have the potential to allow the student to access learning at will, as lifestyle permits... Such flexibility has a major pedagogical benefit - it allows students to progress at their own pace. Thus varying rates of individual progression can be accommodated, unlike typical conventional education practices. (Taylor, 1996: 3)*

However, Gellman-Dearley & Fetzmer (1998) and Berge (1998) identify and assess a range of contextual issues arising from teaching online programs. These authors conclude there is a need to examine current academic, governance, technical, cultural, legal, labour-management and fiscal practices as universities increasingly move to on-line education. The barriers that currently exist in these areas may well impede the realisation of Taylor's belief in the potential of on-line education. More will be said on this later.

Paralleling these changes to established teaching/learning practices are pressures to significantly rethink policies and procedures governing the academic management and administration of distance education programs. Moore (1994) suggests that, in higher education, many of the administrative systems were originally designed to service traditional students taught by traditional teachers. He goes on to say:

*The barriers impeding the development of distance education are not technological, nor even pedagogical. We have plenty of technology, and we have a fair knowledge about how to use it. The major problems are associated with the organizational change, change of faculty roles, and change in administrative structures. Here we desperately need all the ideas and all the leadership than can be assembled. The starting point is to expose the problems. (Moore, 1994:4)*

Providers of tertiary distance education programs influenced by this view argue that there must be a major shift in 'what is generally known to be true' (Imershein, 1976) in every area of our work. Academic managers must look 'outside the square' to develop more student-centred, rather than institution-centred, policies for the administration of academic programs. However, such 'student-centredness' tends to revolve around the provision of flexibility in terms of entry, progression and assessment, as the following examples illustrate.

## **Student Enrolment Periods**

Student motivation to begin study in programs can be enhanced by the immediacy of the online process and knowledge that study materials are readily available online. However, in many cases students are required to wait until the start of a new semester to fully access study materials. If students are required to wait until the start of a new semester to fully access study materials, there is the potential to generate frustration and the possible loss of the student. What are some of the solutions being offered to address this issue?

- continuous enrolments with students permitted to commence study as soon as they are accepted;
- more frequent set enrolment periods.

## Student Progression

With materials available on-line at all times and individual students able to manage their own study schedules, students can complete courses of study at times other than the normal end of semester. Such students want to have their grade registered and commence study of their next courses as soon as possible. Requiring students to wait weeks or even a full semester (because of problems of course offerings on pre-requisite requirements) before accessing their next course of choice detracts from the satisfaction with provider service. What are some of the solutions being offered?

- more frequent course enrolment times;
- register grades at the time the student completes a course of study;
- offer all courses at all times and reduce prerequisites wherever possible.

Most of these solutions are aimed at providing students with the freedom to self-structure the sequence and timing of their progress of study. They are aimed at addressing 'client needs' and increase 'customer satisfaction' corporate solutions in a commercial world.

The preceding discussion draws attention to the fundamental changes to current administrative arrangements that may be needed to respond to the levels of flexibility now possible and which students are now demanding. Some idea of how far universities might go in changing administrative procedures and processes may be found in a quote made by Bertrand Russell where he states

*...without control there is anarchy and without initiative there is stagnation.*  
(Russell 1949: 67)

Some of the solutions in achieving such a balance may reside in integrating administrative, organisational and academic functions through a smarter use of available technology. However, a more fundamental issue relates to the dilemma raised at the beginning of this section. Even if it is possible for universities to change/modify their administrative structures and procedures to cope with the flexibility inherent in the online environments, is it educationally desirable to go down the path which fails to acknowledge the educational significance and value inherent in utilising learning relationships to facilitate the development of learning networks (Mayes). It is obvious that by following the commercial line there will be little need to 'learn in groups'. However, the educational benefits, particularly in higher education, may be lost by pursuing this path.

## Inclusivity and Online Environments

The final issue dealt with in this paper concerns the appropriateness of online approaches for different target groups or how inclusive online approaches actually are in terms of meeting the needs of diverse groups. Specifically we will look at how different groups might be catered for in online contexts defined by the level of expertise (eg. undergraduate, postgraduate) groups defined by different learning preferences and groups defined by cultural difference.

As a way into this topic, we will examine the concept of 'meaningful engagement' in online contexts. The Mayes' framework, as we have seen, draws heavily upon the idea of participation in learning communities. Both 'construction' and 'dialogue' place considerable emphasis on quality interactions between teachers and students as well as among students as participants in a 'learning community'. As we have seen, it is the

contextualisation (dialogue) stage of the Mayes cycle which demands participation in learning communities. However this stage does not necessarily capture the total range of activities which might define interaction in an online environment. Paulsen (1998) uses the following to describe the various types of activities which might be included in online settings.

- one alone
- one to one
- one to many
- many to many

'One alone' activities are those where learners interact with course materials and resources. This may include sources such as online databases, online journals or webliographies. 'One to one' activities are those interactions which can occur between teacher and student using such online tools as email and can be defined by tasks such as counselling, mentoring or responding to specific questions. 'One to many' activities are those where the teacher is involved in facilitating, summarising, clarifying, illustrating or elaborating. 'Many to many' activities are more likely to be those which relate to computer mediated communication contexts (discussion groups - asynchronous or synchronous) and may involve students in collaborating, group problem solving or project management.

Teaching-learning online described in terms of the range of activities classified by Paulsen's framework provides different insights into the concept of engagement for it goes beyond the notion of interaction as occurring only in computer mediated communication settings (eg. synchronous or asynchronous discussion groups). By embracing the broader concept of engagement defined by the Paulsen framework then it is possible to accept the argument that most learners can be provided with experiences which constitute 'meaningful engagement' without necessarily participating in computer mediated communication settings. Both 'conceptualisation' and 'construction' demand 'meaningful engagement', but engagement portrayed by the Paulsen framework need not require of the learner high levels of interaction with other people. Of course it is clear from what has been argued previously that, to gain the most from 'dialogue', it is necessary for learners to go beyond those interactions between subject matter, learning tasks and the pedagogical environment. The nature of interactions that take place in learning communities (discussion groups, virtual chats) can be problematic for some groups. It is here that inclusivity is sorely tested in online contexts.

## **Cultural Difference**

It can be argued that computer mediated communication does provide the basis for a degree of equality of social interaction among participants to be achieved. For example, the online context can provide a rather 'neutral' ground. The absence of physical presence and non-verbal aspects of communication can provide a 'comfortable' environment - the concealment of obvious physical differences can play a role in this. For international education this constitutes a positive. However some writers (Gunawardena 1996) indicate it can be argued that the social equality factor may not extend to participants who are not good writers and who must communicate primarily in text-based formats. There are others who maintain that the very nature of the activities typical of the 'dialogue' stage detailed by Mayes (eg. reflections, critiques, debates) are unfamiliar to many who have educational backgrounds and experiences in culturally different settings. These have been a constant source of concern for international education even in traditional open and distance learning settings.

Notwithstanding that these represent very real concerns for those whose prior educational experiences were in culturally different settings, the online environment seems to offer greater opportunities for these learners to enjoy successful and meaningful learning experiences. First, these students need not leave familiar

surroundings and their local context to participate. With online education they are able to study from home or at work. Second, the online environment provides ample opportunities for sensitive and competent teachers to identify difficulties which arise out of cultural difference and take steps to overcome these difficulties early and unobtrusively without focussing attention on the issue or the person.

The use of email provides a mechanism to approach learners personally and sensitively in order to address concerns. The permanent records of discussions and dialogue on discussion boards or archived chat sessions provide opportunities for describing and modelling learning relationships.

Although empirically indefensible at this point in time, it is not out of the question to claim that this issue does not necessarily represent the barrier that some would suggest online approaches present to learners from culturally different settings. This is not to say that they do not present some learners with difficulties - rather it is being suggested that the online environment in some way can cope with these problems provided that teachers are aware and understand the potential of the online context to address these concerns.

### **Learning Preferences/Learning Styles**

Jones, Jacobs & Brown (1998) refer to a body of research on student learning which identified 'nine distinct styles'. They argue that these styles differ 'more in name than in nature'. Others, such as Brickell (1993), have endeavoured to develop "statistically prevalent types of learning styles" and come up with four (convergers, divergers, assimilators and accommodators). St Hill draws heavily on some New Zealand research to suggest that teachers in higher education contexts need to structure learning experiences which provide opportunities for all learners irrespective of their 'learning preference'. Briefly, St Hill describes such preferences in terms of a predisposition to reading (visiles), listening (audiles) or doing (tactiles). It is interesting to note that in a study conducted by Postle & Sturman (2000) into learning preferences in online contexts, their findings paralleled those made by St Hill. In their study they suggest that online contexts should endeavour to structure learning experiences in a way that provides opportunities for all learners irrespective of their learning preference. In this study, however, learning preference was defined in terms of a 'predilection to learning alone' (independent), a 'predilection to learn through communication with teachers and peers' (interactive) and a 'predilection to learning in a group focussed on specific tasks' (collaborative).

The point to make with these latter studies is that it is the teacher's responsibility as far as possible to ensure there are adequate and appropriate opportunities for all, irrespective of their learning preference. The view that suggests we should try to 'cater for different learning styles/preferences' by way of 'individualising instruction' is unsustainable.

That is not to suggest that online approaches, as they are currently represented, do not pose significant problems for some learners who find the environment 'unfriendly'. For example, the use of the term 'lurker' to describe those who do not participate online as frequently as the teacher would like, does not acknowledge the fact that there are those who prefer to work more independently. The fact that text transfer is the dominant form of communication in current online contexts is certainly a problem for those who find reading and writing a more difficult process. However these predilections to a particular preference should be acknowledged in the design of online teaching/learning environments and not in the response that argues for the design of individualised programs. The point can be made again that the online environment, particularly for higher education students, provides a range of opportunities to respond sensitively and personally. If the teacher is made aware of potential problems and knows the online tools at his/her disposal, then this is not the issue that some claim it to be. In fact, with the advent of greater bandwidth and advances constantly being made with software and hardware, the design of materials will be able to address this issue even more adequately.

## Level of Expertise (novice and expert learners)

An assessment of the first two groups (culturally different; learning preferences) would suggest that online contexts already can make quite adequate and appropriate responses to partly address these concerns. If not now, then certainly in the not too distant future. Further advances in technology will allow more inclusive practices to be available to ensure that these groups can participate meaningfully and successfully in online programs. The third group mentioned, however, poses a different problem altogether. A survey of programs that are currently offered online reveals that most are offered at the postgraduate level. At the undergraduate level, there are many more online programs which can be described as 'supplemental/adjunct' or 'mixed mode' programs where online approaches are combined with face to face or traditional distance education programs. Moodie (1998) suggests that the 'online phenomenon' is not for everyone. He maintains that online teaching-learning contexts are appropriate when students possess 'the necessary independent learning skills'. He is clearly of the opinion that mature age students with some successful study behind them and work experience are more able to benefit from 'e-learning'. On the other hand Mayes and his colleagues are working with secondary school students in wholly online situations. In their project involving the use of their framework in what is known as the "Vicarious Learner Project" they observed 16 year olds attending schools in three different countries (UK, Finland and Portugal) and conclude -

*... a moving from a learning-content view to a learning-how-to-learn account is probably taking the work in the right direction. (McKendree & Mayes 2000: 14)*

It would seem that the jury is still out on this. However, it may be that online contexts which employ pedagogical frameworks similar to the one proposed by Mayes offer teaching/learning frameworks which can challenge the notion that online contexts are more appropriate for mature learners.

## Conclusion

In this paper it was argued that fourth generation technologies provided a watershed that effectively has divided models of open and distance education. Before the advent of fourth generation technologies, one could describe models of open and distance learning in 'an industrial sense' - providing access to large numbers of students who had little opportunity to participate in higher education and the provision of packaged material so complete that the learner had little need for a great deal of contact with the teacher or with other students. Fourth generation technologies made it possible for learners at a distance to communicate effectively and efficiently with their teachers and other students and thus was born the online phenomenon.

However, increased opportunities to experience more open and sustained interaction has not always seen educators exploit the potential offered by the online environment. The re-creation of the traditional classroom does not fit comfortably with online approaches. The pedagogical framework developed by Mayes and his colleagues seems eminently suitable for exploring the potential of online education for higher education. Several reasons were supplied to support this claim. It will be interesting to follow the research involving this framework. In fact, it is frameworks such as this, which provide us with ways to structure our own investigations. Hopefully, this paper has given some guidance on how this might be done.

Right now, however, it is possible to claim that online education has already made its presence felt in higher education and offers obvious advantages to those who, through situation or circumstance, choose to study at a distance. For international education these advantages include:

- the opportunity for students to access quality courses without leaving their home country;
- the opportunity for students to study and interact with others from different cultures and backgrounds;

- the ability to participate in teaching/learning experiences which promote the highest ideals of higher education (open & distance learning is now not necessarily an inferior experience to face to face);
- the opportunity to experience the benefits that quality interaction brings to teaching and learning (enhanced social presence, more personalised teaching methods, access to rapid and personalised feedback);
- opportunities for contact with "experts" in other countries (by way of collaboration ventures between institutions or guest appearances in courses).

However, in order to capitalise on what has been started and to further establish online education as a key element in higher education, particularly in the areas of international education, we will need to be wary of how we approach the following propositions:

- that online approaches are an inexpensive way to offer courses to large numbers of students;
- that online approaches are appropriate for "novice" learners.
- that collaborative online ventures between institutions are merely a matter of linking existing programs;
- that capitalising on the flexibility offered by online education can be achieved by changing administrative and organisational structures, policies and procedures.

The above list is provided in order to highlight the existence of a number of dilemmas which confront those who would work in the area of online education. These dilemmas need to be dealt with. However, the agenda in which they are considered will determine the future of online education. An agenda dominated by commercial interests will provide one set of answers; an agenda dominated by educational interests will provide a different set of answers. Can there be some blending of the two?

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