ePedagogy in Online Learning:

New Developments in Web Mediated Human Computer Interaction

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Chapter 12
Web-Mediated Education and Training Environments:
A Review of Personalised Interactive eLearning

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ABSTRACT

This chapter reviews the concept of personalised eLearning resources in relation to integrating interactivity into asynchronous learning. Personalised eLearning resources are learning resources which are selected to suit a specific student or trainee's individual learning requirements. The affordance of personalised eLearning would provide educators with the opportunity to shift away from eLearning content that is retrieved and move towards the provision of personalised interactive content to provide a form of asynchronous learning to suit students at different degree levels. A basic introduction to the concept of ePedagogy in online learning environments is explored and the impacts these systems have on students learning experiences are considered. Issues, controversies, and problems associated with the creation of personalised interactive eLearning resources are examined, and suggested solutions and recommendations to the identified issues, controversies, and problems are reviewed. Personalised interactive asynchronous learning resources could potentially improve students' learning experiences but more research on the human computer interface of these authoring tools is required before personalised eLearning resources are available for use by non-technical authors.

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INTRODUCTION

This chapter provides a review of personalised interactive eLearning resources. Personalised eLearning resources are suitable for integrating interactivity into asynchronous learning. Asynchronous learning is the learning which takes place when a student has the opportunity to interact with learning resources and return at a later time to discuss or question the content with peers or lecturers. Alternatively, asynchronous eLearning refers to the learning which takes place through communication with other students or lecturers who are not necessarily online at the same time; this type of learning is facilitated by the use of: e-mails; discussion boards; blogs; and wikis.

Personalised eLearning resources refer to the creation of eLearning resources which have been specifically selected or tailored to suit the learning preferences of individual learners. Personalised interactive eLearning resources provide students and trainees with the opportunity to engage with interactive eLearning resources which have been specifically selected relevant to their individual requirements. The benefits to be achieved by enabling students to interact with personalised eLearning resources will be discussed. The objectives of this chapter are to provide the reader with a clear understanding of the concept of personalised eLearning resources and how these resources can integrate interactivity to form asynchronous learning. Also, to provide an overview of the issues, controversies and problems associated with the creation of personalised eLearning resources and some of the solutions to be considered to make personalised eLearning resources achievable.

BACKGROUND

Electronic learning (eLearning) has not impacted on education and training quite as much as expected. Educational environments refers to formal teaching environments which provide a broad range of instruction for students and also issue recognised standardised certification of awards at various levels of academic achievement. The potential use of technology in higher educational environments has not yet been fully realised (Donnelly & O'Rourke, 2007). Higher level educational Institutions provide tuition and examinations which lead to high level qualifications for successful students in: Bachelor; Master; or Doctoral degrees.

The reasons for the low adoption rate of eLearning or the use of learning management systems (LMS) are numerous; some reasons are mentioned in this chapter. LMSs are computer applications or systems which have been specifically developed to facilitate the use of technology by lecturers or trainers when instructing students or trainees. Over the years several lecturers have expressed concerns that engagement with eLearning would lead to redundancies and their active participation in the use of a LMS would lead to the demise of the lecturing profession (O'Donnell, 2010). Others were of the opinion that eLearning would weaken the branding of their educational environment (Sonwalkar, 2008). Some lecturers are afraid of putting all their work from over the years onto the world wide Web (www) for fear that it will be stolen by others (O'Donnell, 2008), copyright theft, that is: others who never took the time to create class handouts and learning resources of their own would use the online learning resources created by others as their own. Several observed that the pedagogical benefits to be achieved through the use of technology enhanced learning (TEL) had yet to be proven. TEL refers to the use of technological devices and communication mediums to augment the learning experience. Quite a few simply admitted that they would not have the time required to create eLearning resources and that no designated time table allocation of hours was allowed for the creation of TEL resources. Several lecturers admitted to lacking sufficient computer skills and knowledge of eLearning platforms to enable them to create eLearning ac-

tivities (O'Donnell, 2010). Others admitted that they were not convinced that their pedagogical philosophies could be achieved through the use of eLearning, educators are ill prepared to make pedagogical connections between technology and knowledge content (Angeli & Valanides, 2009).

Traditional Learning Management Systems (LMS)

A LMS facilitates eLearning by providing a suitable online environment for educators to: store their learning resources; keep their students informed about course requirements; monitor students usage and progress through the learning resources provided; and so forth. eLearning to date has not yet impacted on the learning experience as expected and feared by some academics. Littlejohn (2009) suggested that LMS were predominantly used for e-administration and e-dissemination. E-administration would provide information to students regarding: course timetables; examination dates; continuous assessment due dates; calendar of activities for the academic year; and so forth. E-dissemination would enable lecturers to: offload the cost of printing notes to hand out to students in lectures by making the notes available online in electronic format for students to read on the screen or alternatively, print out if they so desired; or to provide links to other eLearning resources. Sonwalkar (2008) claims that online learning is ineffective; has not delivered on the expected benefits to be achieved through its use; and also adds to the existing work load of educators.

McGinnis, Bustard, Black and Charles (2008) surmised that there was insufficient attention paid by designers of eLearning resources to providing interactive content which was compelling and would meet the expectations of the net generation. The net generation refers to people who have grown up over the last 30 years or so who are more comfortable with the use of technology than the previous generation because of the prolific use of technology in their play, communication with their peers and life in general. Students who grew up in the net generation are so familiar with interactive games run on gaming consoles, computers and mobile phones, that it is very difficult for an individual lecturer or trainer to create eLearning resources which could compete with students expectations of the personalised interactive eLearning experiences created. Hence, the requirement for institutions such as the National Digital Learning Repository (NDLR), based in Ireland, which provide lecturers with good quality, peer reviewed eLearning resources to engage their students. Lecturers engaging with personalised interactive eLearning could utilise resources deposited with the NDLR to enhance the eLearning experience of their students.

The information and communications technology (ICT) infrastructures of large corporations are generally extensive and complex; therefore there is a need for personalised training for staff in specialised areas. The content of these specialised learning resources should be compiled by experts in the field. Personalised interactive eLearning could be used to establish which eLearning resources are most suited to each staff members learning requirements. Problem based learning could be used if testing of trainees is required to guarantee that the trainee has interacted with the topics provided by the personalised system in sufficient depth.

While lecturing to postgraduate students who were working in the corporate sector and engaging in continuous professional development (CPD) training realisation dawned that they would possibly benefit from having access to personalised learning resources as they were all working in different areas of IT. No personalised interactive eLearning resources were available for use with that group of students but it would have been interesting from a research perspective to see if they would have benefitted from engaging with personalised eLearning resources. That is, each student could have been guided through the personalised interactive eLearning resources based

on their prior experience, knowledge level and topics relevant to their area of work. Personalised interactive eLearning would enable students to engage with eLearning resources specifically selected to suit their individual learning requirements to facilitate asynchronous learning. Synchronous learning refers to the learning which takes place through communication with other students or lecturers who are online at the same time; this type of learning is facilitated by use of: videoconferencing and chat facilities.

Web 2.0 technologies would then provide users with a set of tools which enable synchronous eLearning: video conferencing and social networking sites, such as: Facebook; Flickr; You Tube; Bebo; Delicious; and Twitter, to broaden their understanding of the topics learned during engagement with the personalised interactive eLearning resources through discussion and feedback from peers who have studied topics relevant to the same subject area but particularly selected to suit their own personal work environment. Web-mediation refers to the use of the www to facilitate various activities, for example: e-commerce; online banking; engagement with and payment to service providers; dissemination of information; e-mail and Skype communication; webinars; video conferencing; and many more activities. Web-mediated education refers to the use of Web technologies to enrich and enhance the educational experience of students and trainees.

Training environments refers to courses which have been specifically set up to provide trainees with knowledge and understanding in specific areas, for example, mandatory compliance training i.e. manual handling or emergency response training. Web technologies can offer alternative training environments to traditional training environments. Sometimes due to cost and work commitments it is impossible to release workers for training all at the one time, personalised interactive eLearning would facilitate asynchronous eLearning to reduce the impact which training would have on the work environment by reducing disruption. Web technologies would facilitate engagement with eLearning resources which are created by lecturers and topic experts who are intent on improving the learning experience of students by providing good quality learning resources available online. Okamoto (2003) recommends that the quality and effectiveness of eLearning resources should be evaluated to ensure that pedagogical considerations are met. Conducting regular evaluations of learning outcomes are very important to ensure that pedagogical standards are upheld in all teaching methodologies applied to provide education and training.

With the increased use of technological eLearning resources comes the need to ensure that pedagogical considerations are heeded when designing these resources. Okamoto (2004) suggests that new pedagogies are needed which suit the use of new technologies in the educational environment.

Lecturers or trainers may have to move from 'host on the post' standing on the lecturing platform or at the top of a training room to 'guide on the side' facilitated by e-mail, webinars, discussion boards, skype or chat facilities, all facilitated through the use of technology.

Personalised Interactive eLearning Resources

Personalised interactive eLearning resources are specifically created or selected to suit the learning requirements of individual students or trainees. Alternatively, they could be created or selected to suit the learning requirements of specific cohorts of students. For example, educators who have experience of teaching both undergraduate and postgraduate students may have perceived a differentiation between both cohorts of students in the students' level of awareness of their own learning capacity and requirements. Such educators may find it useful to tailor the learning resources at their disposal to suit the learning needs of students at different levels of achievement as well as focusing on the individual learning requirements of each individual student.

Sonwalkar (2008) suggests tailoring/adapting eLearning resources to suit individual students interests and needs would increase the effectiveness of the LMS used in educational environments. Settouti, Prié, Marty and Mille (2009) also recommend that there is a need for personalisation in eLearning applications. Although some agree that personalised eLearning would enhance the learning experience, personalised eLearning is not easily achievable and the benefits through adoption have not yet been proven.

Personalisation of learning resources would be achieved by using an adaptive application which would match suitable learning resources with individual students learning requirements. Adaptive eLearning resources are designed to adapt to suit individual learners learning requirements based on the criteria set for determining their learning needs. Sonwalkar (2008) suggests that an eLearning adaptive application should have the ability to generate suitable learning resources based on student information which has been inputted to the LMS or collected by the LMS. The problem here is how to physically collect this student information and when it has been collected how to use this information to provide the most relevant eLearning resources to each individual learner.

The proposed adaptive application is envisaged to run as an add-in to an existing LMS. The students' engagement with the LMS will be recorded and saved in a user profile which will be stored on the server which supports the LMS. The adaptive application will access the user profile to obtain information on individual students, the adaptation rules in the adaptive application will select appropriate learning resources based on this information. The creation of adaptive applications which enable lecturers or trainers to create educational experiences personalised to individual student needs may help to facilitate the widespread use of adaptive eLearning resources. But, such adaptive systems are expensive and complex to develop.

Student/Trainee User Profiling

Settouti et al. (2009) state that there is a requirement for personalised eLearning based on individual users' interaction with the TEL system. In order to realise personalised eLearning individual user profiles would be required (Brusilovsky, 2001) to identify the eLearning resources which would be most beneficial to each learner. User profiles for adaptive educational systems contain keywords and concepts which represent the user's interests (Brusilovsky & Millan, 2007). Lecturers or trainers would doubtfully have the time to gauge the learning requirement of every student or trainee, hence, the requirement to develop personalised eLearning authoring tools to harvest information on users to populate user profiles to facilitate the allocation of the necessary eLearning resources to students based on their user profiles.

Knauf, Sakurai, Takada and Tsuruta (2010) recommend that the creation of student profiles are necessary to match personalised learning plans with individual learners preferences and talents. Should a lecturer have in excess of a few hundred students during the course of a year the creation of student profiles for all would be a mammoth task, and possibly unachievable due to time pressures and lack of knowledge on how to set up user profiles which incorporate sufficient information to enable the personalised eLearning system generate suitable learning plans for each individual student.

Some insight can be established on user preferences by performing a trace of a learner's use of a computer system (Knauf et al., 2010). Settouti et al. (2009) also recommend users interactions with the computer application should be traced to enable the creation of individual student profiles for the purpose of enabling adaptation. Such traces would need to be particularly designed to ensure that the resulting data collected on user preferences are relevant to the learning outcomes they are expected to achieve and that these user preferences give a good indication of the eLearning resources which are most appropriate for each learner.

Electronic pre tests and post tests provide lecturers with a very effective and efficient way of gauging learners' knowledge levels of any specific topic. The provision of pre tests enables students to engage with a bank of online questions, the outcome of which will determine their level of competence in a specific topic.

Gauging this level of competence prior to the students' engagement with the eLearning resources will enable the lecturer to set the personalised software to deliver suitable training material to each student based on their individual learning requirements. The use of technology in higher education facilitates the creation of a variety of different teaching resources. In adaptive TEL, the learning process experienced by each individual student is tailored to suit their needs as a direct response to their previous actions in the system (Burgos et al., 2007). The educator or trainer using the adaptive/personalised eLearning tools must ensure that the pre-recorded actions in the system provide sufficient user information to enable the adaptive system to select the relevant learning resources to suit the learning needs of each student and that they are satisfied that the pedagogical requirements of the course are realised by students engaging with the personalised system.

The concept of adaptation in technology enhanced education has been explored for nearly three decades (Burgos et al., 2006). Despite all the time and money spent on the exploration of adaptation in TEL over the past 30 years creating personalised eLearning resources is as yet not easily realisable for general use. Brusilovsky (2004) surmises that a significant amount of research and co-operation will be required in order to realise the objective of bringing adaptive hypermedia into the common practice of eLearning. Seven years on and still adaptive hypermedia has not been incorporated into the common practice of eLearning. Hauger and Köck (2007) came to the conclusion that the vast amount of effort involved in creating and implementing adaptive courses cannot be justified. This would depend on the level of success of personalisation achieved.

Foss and Cristea (2009) suggest that improved functionality and usability of these tools is necessary to promote user acceptance. From the literature review undertaken on adaptive eLearning, it would appear at times that innovators in personalised eLearning authoring tools have possibly tried to incorporate too complex a toolset into one authoring tool without sufficient heed to the pedagogical benefits and how they could be achieved by educators using these tools.

Benefits of Creating Personalised Interactive eLearning Resources

Personalising eLearning resources empowers the learner (McGinnis et al., 2008) and encourages collaboration through the sharing of knowledge (Bellows & Jankowski, 2009). The whole concept of personalising eLearning resources would empower the learner to overcome obstacles to their success by providing personalised hints and tips along the way as the learner fails any online assessments or tests. Such personalised tuition could help by retaining students focus on their weak areas of the course and assist with student attrition. By tailoring eLearning resources to suit individual students needs information overload will be reduced (Arapi, Moumoutzis, Mylonakis & Christodoulakis, 2007). Information overload could be avoided for the students as the students would only gain access to the eLearning resources which have been selectively tailored to their individual needs. Lecturers could provide personalised interactive eLearning resources to suit each student's ability and learning requirements, hence, making the students learning experience much more personal. Personalisation of eLearning resources could facilitate the re-use of good quality eLearning resources as the same eLearning resources could be presented to many students in different formats and at various levels. Different formats and levels of concepts could be presented to undergraduate and postgraduate students based on their knowledge and learning requirements.

ELearning provides students with a flexible opportunity to learn when and where they choose (McGinnis et al., 2008). The ubiquitous nature of eLearning resources facilitates student interaction with good quality learning resources despite time and location. Muñoz-Merino, Kloos, Muñoz-Organero, Wolpers and Friedrich. (2010) suggest that personalised tests can be used by educators to assist students learning by targeting individual learners weaknesses in any specific topic, once learners individual weak points are identified, built in hints can guide them to achieving the correct learning outcomes.

Existing ePedagogical Strategies

Pedagogy is the art and skill of teaching or knowledge transfer. Kumar (2007) claims that pedagogy is concerned with the creation of effective context specific learning resources. Each lecturer would be responsible for ensuring that the pedagogical requirements of students are met in relation to every learner on every course. The pedagogical approach deemed to suit a particular course of study may not be relevant to another course of study; context would have to be considered when designing the personalised learning experiences of students. Postgraduate students may require a different pedagogical approach to undergraduate students. Okamoto (2004) recommends that new pedagogical strategies are required which have been created specifically to ensure that the quality of teaching online is as good as if not better than traditional teaching methods.

Computer Supported Collaborative Learning (CSCL)

The creation of personalised interactive eLearning resources would provide lecturers with an alternative asynchronous teaching methodology to enhance the learning experience of students. Initially, students would be given the opportunity to engage with their personalised interactive eLearning resources. Subsequently, the students would be invited to join a discussion board, chat facility or video conference to discuss or question the concepts involved and to generally share opinions with peers and lecturers. Alternatively, students could be encouraged to engage with role playing through synchronous learning as this works well in TEL environments (Bender, 2005). Similar to games players liking for sharing gaming experiences with peers, learners also like to share and discuss learning experiences with their peers (McGinnis et al., 2008) and computer mediated interaction can improve learning (Alvino et al., 2009). The reason for encouraging students to engage with synchronous computer supported collaborative learning (CSCL) is to improve their understanding and hence their retention of knowledge learning as a result of engaging with the asynchronous personalised interactive eLearning resources.

ISSUES, CONTROVERSIES, AND PROBLEMS ASSOCIATED WITH THE CREATION OF PERSONALISED INTERACTIVE ELEARNING RESOURCES

Before one commences designing personalised interactive eLearning resources, one must consider what criteria the personalisation is to be based on: A student's level of achievement in this subject area to date; the prior experience of students; or the student's learning preferences. To seek to achieve all three criteria when aiming to design initial eLearning resources may be ambitious. To ensure that ePedagogy requirements are met, the creator should firstly have a very firm view of the learning outcomes expected and how best to use the medium of asynchronous personalised eLearning to achieve these objectives.

In order to measure students' level of achievement in a specific concept, the students could be subjected to an online assessment. From the results achieved in this assessment students could be directed to specific eLearning resources which could enhance their understanding of the specific concepts. Subsequent to engaging with the eLearning resources the students could be subjected to another online assessment to gauge if there is any improvement in the marks achieved in the previous assessment as a result of the students' interactivity with the selected personalised eLearning resources. To measure students' prior experience in a specific concept, factors like: level of qualifications achieved to date; former work experience; and projects completed could be weighed up and students presented with relevant personalised eLearning resources based on this information.

To gauge the most suitable personalised interactive eLearning resources to be selected for an individual based on their learning preferences may be the most difficult to quantify and therefore the most difficult to achieve in personalised/adaptive eLearning. Franzoni and Asar (2009) claimed that recent research had shown that students learn in different ways and prefer to learn through the use of different teaching resources. In the instance of matching suitable eLearning resources to students learning preferences, the lecturer would have to be sure that the learning preferences identified through click streaming (or whatever method is selected to capture information on the students learning preferences) are relevant to the students learning preferences for asynchronous or synchronous learning of examinable topics.

Knauf et al. (2010) suggest that learning plans which proved successful with previous students should be considered along with individual learner profiles, preferences and talents when designing learning content. Lecturers should build their personalised eLearning approach based on past successes, incorporating new approaches gradually to evaluate which approaches prove the most effective in improving the students learning experiences. Lecturers would be aware of the need to captivate their audience and hold their attention. Should any particular pedagogic approach fail, some lecturers will take this on board and move on to try other approaches to achieving personalised eLearning to evaluate with their students.

Chalfoun and Frasson (2011) suggest a smart 'learning system interface' for eLearning or intelligent tutoring systems should be able to match eLearning resources with students emotional and cognitive states. To match eLearning resources to individual student's emotional and cognitive states would be an ambitious project to undertake and could be a very interesting area for future research. Kumar (2007) emphasise the need to ensure that the quality of learning is maintained in eLearning environments. The quality of learning should also be maintained in personalised interactive eLearning environments.

Link, Schuster, Hoyer and Abeck (2008) observed that users have increased expectations for improvement in graphical user interfaces, human-computer interaction (HCI) and the reduction of the time required for software development in general. Potential users of asynchronous eLearning resources would expect the 'learning system interface' of these resources to be as user friendly as possible. Padda, Mudur, Seffah and Joshi (2008) express the important contribution that visual comprehension has on human cognition of information. When developing personalised eLearning resources authors should consider the visualisation of the presented information and how this may impact on learners understanding and grasp of concepts. McGinnis et al. (2008) recommend employing some of the design strategies used in computer games to encourage students to interact with eLearning resources. Some of the design strategies used in games and computer applications have been so effective that some people are now addicted to using computers for various reasons which can have an adverse impact on their daily lives and relationships. To identify the design

strategies which have proved most successful in maintaining users interest while interacting with eLearning applications would be an interesting topic for future research.

Should students have the opportunity to select the eLearning resources which they believe suit their learning needs? It is up to the individual lecturer to enable students to select their own eLearning resources or to only allow students access to the eLearning resources which the lecturers have directed the system to select to suit each individual students learning requirements based on the user information contained in the student user profile. Different approaches may be taken for undergraduate and postgraduate students.

Issues

Students are increasingly expecting LMS to cater for their personal learning requirements by providing tailored learning resources (Shank, 2008, p. 247). Providing tailored learning resources for each individual student is not an easy task to accomplish. Time, resources, training and commitment on behalf of the lecturers are required to create tailored learning resources. In addition, pedagogical requirements must be met to ensure that tailored/personalised learning resources provide the students with adequate material to fulfil the course requirements and adequately cover the syllabi.

The ability to create relevant user profiles is paramount to the realisation of personalisation (Paireekreng & Wong, 2010). The creation of effective user profiles is no easy task even to designers who are proficient in the area of personalisation; this task may be unachievable to other lecturers and trainers. Capuano (2009) suggests that personalised eLearning resources should be dynamically created to suit individual learners needs based on their previously recorded behaviour. How many lecturers would be sufficiently qualified to record students' behaviour? This issue would need to be addressed before personalised eLearning resources could be dynamically created. Liang, Zhao and Zeng (2007) propose a solution for determining user's interest in topics in eLearning systems by analysing their behaviour when reading, the results of which could be included in the user profile for personalised eLearning systems. To analyse user's interest in topics by their online reading habits would not be easily achieved. Some benchmarking process would need to be developed to establish a way of recording and analysing user behaviour to provide data to populate user profiles before personalised interactive eLearning resources are realisable.

One significant issue to be addressed in user profiling is to identify the most appropriate solution to harvesting data on abilities and preferences. In the creation of student user profiles for the purpose of providing personalised interactive eLearning resources for students use, the students should be made aware of the monitoring methods which will be applied to harvest data to populate the user profiles. In addition, agreement with the individual students should be obtained prior to the harvesting of data and the students interaction with the personalised eLearning resources (McGinnis et al., 2008). In recent years significant cases have been reported regarding breaches of data protection and the privacy of users. Some prior knowledge of users is necessary to populate user profiles (Paireekreng & Wong, 2010). Another issue to be addressed is how to effectively gather information on users prior knowledge, what metrics should be used to quantify and analyse this data and how to feed this data into the user profiles. Another important consideration is how to collect data on student ability and preferences to store in a personalised learning environment. One more significant issue to consider is the safe storage of the personal user information gathered in the user profiles, who will have access to this information, and who exactly will be responsible for ensuring the access controls to this information are enforced.

Concerns

Some lecturers claim that there is no designated time table allocation for the creation of TEL resources (O'Donnell, 2008) not to mention personalised eLearning resources which would take more time, computer skills, and commitment to create as previously mentioned. There is also the concern regarding copyright; some lecturers are afraid of putting all their work from over the years onto the www for fear it will be stolen by others. Harvesting data on students and data protection considerations would have to be taken into consideration; what types of data are educators allowed to harvest regarding their students and subsequently concerns with respect to the correct and secure storage of this collected data. In addition, lecturers may have concerns regarding whether or not the students will receive the most appropriate combination of learning resources to enhance their personal learning experience. Also, how can anyone be sure that the system developed to deliver a personalised interactive eLearning experience for students will work effectively? There is always the possibility that personalised eLearning resources may impact negatively on the students learning experience and some students may feel that they were not given the opportunity to engage with all the interactive learning resources available to the class group and failure could ensue if the course material was not adequately presented to all participants.

Controversies

Some academics at top research universities expressed concerns that the use of TEL may negatively impact on the quality of the students' university experience (McKay & Merrill, 2003). From experience some students have complained that all lecturers are not using LMS to provide eLearning resources equally. Some lecturers use LMS profusely while others do not use them at all. These concerns should be addressed by university management respectively.

Obstacles

There are several obstacles to the creation of personalised interactive eLearning resources which must be overcome before the use of personalised interactive eLearning resources will be achievable by non-technical authors. The cost of production is a major obstacle. Even if the LMS and the add-in application for achieving personalised learning resources are freely available open source software; there would still be a requirement to engage the services of a service provider to manage the integration of the LMS and the add-in application if sufficient technical expertise was not available in-house. The overall cost of running high-level LMS tools would be dependent on: the number of authors; number of students engaging with these personalised learning resources; server requirements; type and level of services to be provided; training costs; and whatever other services are required.

The time commitment required to develop personalised interactive eLearning resources would be another impeding factor (Chiu & Yu, 2002). The complexity involved in the creation of personalised interactive eLearning resources would be sufficient to turn off even the most enthusiastic lecturer. The technical support which would be required in setting up personalised interactive eLearning resources would need to be one to one for technically challenged lecturers. Sonwalkar (2008) argues that the struggle to create a pedagogically sound adaptive eLearning application has gone on for some time now, and suggests that even if such an application is realised the resulting impact on learning may be minimal.

Problems

Hauger and Köck (2007) suggest that providing the same user profile for all learners is a problem of most LMS implentations? This may well be a problem relating to most LMS sites, but the provision of personalised eLearning systems and the harvesting of the user data which is necessary to

populate the user profiles required to enable these systems to function correctly, could pose an even bigger problem.

Sonwalkar (2008) expressed concern that there are no pedagogical strategies available for educators to follow to ensure that their efforts to provide worthwhile eLearning resources will be realised and also that such learning resources will be effective in enhancing the learning experience of students. There is no incentive for lecturers to engage with the creation of personalised eLearning systems at present. When, and if personalised eLearning systems have shown that significant benefits can be achieved by developing these systems, then and only then will some of the general populace of lectures consider using personalised eLearning systems?

Law et al. (2010) mention the fact that some developers of software applications do not abide by user-centred design guidelines and end up developing products that users are unable to understand or use. This point should be heeded by anyone considering designing an authoring tool to facilitate the creation of personalised interactive eLearning resources. The application should be frequently evaluated during the development stages to ensure that potential users understand; the functionality of the authoring tool; how to effectively use the authoring tool; and the eLearning resources which can be created by using the authoring tool. The question of ePedagogy should also be a major consideration in the development of these systems.

Settouti et al. (2009) claim that hard work is required to make sense of the data collected by traces on individual students before any attempt can be made to select particular eLearning resources which would meet any students personal learning requirements. All the hard work required on the behalf of lectures in collecting user data and creating personalised eLearning resources would also be viewed as a problem to lecturers who even now feel over stretched in their duties.

SOLUTIONS AND RECOMMENDATIONS

Personalised eLearning for all will only be achieved when sufficient numbers of educators get involved in the process of evaluating appropriate authoring tools to facilitate the creation of personalised learning experiences. In addition, the sharing and reuse of personalised learning resources would be paramount to the success of this aim due to the high costs and extensive time commitment involved in the creation of these learning resources. As with eLearning, through trial and error, educators will realise what approaches to achieving personalised eLearning experiences work, the approaches which need more refinement to work, or which approaches do not work at all, and for what reasons. A substantial amount of the findings from research into the realisation of personalised learning resources are presented at specialised computer science conferences and specialised publications. The purpose of this chapter is to bring the concept of the personalisation of learning resources to the attention of a broader audience of educators.

Følstad and Knutsen (2010) recommend that the early involvement of users in the design of HCI is one of the key factors leading to the successful development of software solutions. Therefore, lecturers' and trainers' views on the use of personalised eLearning resources in their education/training approach should be collected and analysed. In addition, the views of potential users should also be analysed to identify the front end learning system's interface requirements of authoring tools which are developed to facilitate the creation of personalised eLearning resources by non-technical authors. Such systems could then be designed to suit the HCI requirements recommended by potential users.

Potential users could also suggest ways in which personalised eLearning resources could be utilised to ensure that they are used to achieve the best educational benefits from this teaching method.

Evaluations

The outcome of evaluations of personalised solutions should be considered with a view to implementing changes to existing systems to enhance and encourage engagement with the creation of personalised interactive eLearning resources. Educators who are interested in the provision of personalised eLearning will have to consider this teaching method worthwhile in order to achieve realisation of this teaching method in the classroom. Parrish (2009) claims that the learning experience will only reach its full potential when learners consider it worthwhile and thought provoking. A sufficient number of educators would have to be convinced of the benefits to be realised from using personalised eLearning resources before personalised eLearning will be generally accepted and utilised. Additionally, lecturers/trainers should also be involved in the design of personalised eLearning systems to ensure the ambitious aspirations of computer programmers are kept in check and that the solutions created perform as expected by potential users: lecturers; trainers; students; and trainees. Through engagement in an iterative process of evaluations of personalised eLearning resources, the recommendations made by potential users will be fed back into the loop to instantiate improvements in future development and designs and bring the possibility of providing personalised eLearning for all closer to realisation.

User Profiles

Settouti et al. (2009) recommend that mechanisms are required to assist users in determining which traces to apply and how; when trying to understand individual user learning preferences and requirements.

A tracking cookie could be used to trace and capture a user's interaction with the Web or an application; the generated data would then be stored in a user profile. One tracking method which can be applied to indicate user preferences is click streaming. Click streaming refers to the recording of users' navigational clicks when using an application or the Web. Each click the user makes is recorded and subsequently analysed to ascertain the user preferences. Clarification is needed on what traces can be applied to student behaviour to avoid infringing on their privacy rights. Guidance would be required on how to interpret information collected on students learning preferences and how best to apply this to assigning personalised interactive eLearning resources to each individual student. Lectures would require institutional policies regarding secure storage of personal data collected on students.

FUTURE RESEARCH DIRECTIONS

The objective of this research is to encourage more educators outside of the discipline of Computer Science to consider the possibilities which personalised eLearning could bring to their students learning experience. In addition, to encourage educators to consider the functionality which they would require in an authoring tool which would enable the creation of personalised learning resources. This research is ongoing; the ideal toolset which will enable non-technical authors to create personalised learning resources has not yet been identified. Chalfoun and Frasson (2011) suggest a smart learning system's interface or intelligent tutoring system should be able to match eLearning resources with students emotional and cognitive states. To match eLearning resources to individual students emotional and cognitive states would be a very interesting area for future research as matching eLearning resources to emotional and cognitive states lies outside the scope of this chapter.

McGinnis et al. (2008) recommend employing some of the design strategies used in computer games to encourage students to engage with eLearning resources. To identify the design strategies which have proved most successful in maintaining

users interest when interacting with systems would be an interesting topic for future research. In addition to test how these designs could be applied to encourage lecturers and trainers to interact with authoring tools for creating personalised interactive eLearning resources. An evaluation of the design strategies employed in the development of authoring tools for the creation of personalised eLearning resources would be beneficial to the identification of the ideal toolset functionality expected in such a tool.

Personalised eLearning resources for all learners will never be achievable if the concept is not considered in great detail by many educators. Suitable solutions will only be identified as a result of the analysis of data collected on what functionality non-technical users expect to see in such authoring tools.

CONCLUSION

This chapter reviews the use of personalised eLearning. The objective in creating personalised interactive eLearning resources is an attempt at moving away from learning content which is retrieved to learning content which can be experienced. The provision of learning activities which could be experienced by the learner through interaction with Web-mediated personalised interactive learning resources may improve understanding and possibly retention and therefore empower the learner, but the pedagogical merits of personalised eLearning have yet to be proven. It is envisioned that personalised interactive eLearning resources would be integrated into existing LMS for ease of use by lecturers and trainers. The issues, concerns and obstacles to the creation of personalised interactive eLearning resources were discussed and in conclusion personalised eLearning resources are not easily achieved. The privacy rights of students and trainees would have to be considered and resolved before traces can be put on their online activities to build up appropriate personal information to populate their user profiles. Web-mediated education has not impacted on the learning experience as much as expected, the realisation of personalised interactive eLearning may impact positively on the learning experience of students and trainees, but this has yet to be proven. The concepts of adaptive eLearning and personalisation of eLearning resources has been explored for more than 30 years, yet these Web-mediated educational resources are still not available for use by mainstream educators and trainers. Personalised eLearning resources are promising but there are as yet a vast number of issues, controversies and problems to be resolved before widespread application can be realised.

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KEY TERMS AND DEFINITIONS

Adaptive eLearning Resources: eLearning resources which adapt to suit individual learners learning requirements based on the criteria set for determining their learning needs.

Asynchronous eLearning: Student learning through communication with other students or lecturers who are not necessarily online at the same time, this type of learning is facilitated by the use of: e-mails, discussion boards, blogs, and wikis.

Educational Environments: Formal teaching environments which provide a broad range of instruction for students and also issue recognised standardised certification of awards at various levels of academic achievement.

eLearning: The provision of online learning resources.

Higher Education: Institutions which provide tuition and examinations which lead to high level qualifications for successful students in: Bachelor; Master; or Doctoral degrees.

Learning Management Systems: Applications specifically developed to facilitate the use of technology by lecturers or trainers when instructing students or trainees.

Net Generation: People who have grown up over the last 30 years or so who are more comfortable with the use of technology than the previous generation because of the prolific use of technology in their play, communication with their peers, and life in general.

Pedagogy: The art and skill of teaching or knowledge transfer.

Personalised eLearning Resources: Refers to the creation of eLearning resources which have been specifically selected or tailored to suit the learning preferences of individual learners.

Synchronous Learning: Student learning through communication with other students or lecturers who are online at the same time, this type of learning is facilitated by use of: video-conferencing and chat facilities.

Technology Enhanced Learning: The use of technological devices and communication mediums to augment the learning experience.

Training Environments: Courses specifically set up to provide trainees with knowledge and understanding in specific areas, for example, mandatory compliance training i.e. manual handling or emergency response training.