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INNOVATIONS IN INFORMATION AND COMMUNICATION TECHNOLOGY AT OPEN UNIVERSITY MALAYSIA

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Abstract

Well into the new millennium, open and distance learning (ODL) today continues to push forward in the domain of higher education. More often than not, it owes this advancement to information and communication technology (ICT). ICTs have provided the necessary technical capacity for ODL institutions and open universities to continuously improve their services to socially diverse and geographically distributed students. Open University Malaysia (OUM), the country's premier ODL institution, has operated for seven years under a blended pedagogy consisting of online learning, face-to-face tutorials and self-managed learning. The fulcrum for the implementation of this pedagogy is the University's ICT infrastructure; one that is constantly undergoing enhancement and improvement to correspond to current trends and ideas. This paper will explore several areas of ICT-related innovations at OUM, i.e. development of e-content; establishment of an institutional question bank; online forum data mining and analysis; iRadio OUM; development of the University's management information and document management systems; and provision of an e-library. Such endeavours are geared towards the overall betterment of OUM's educational services and hope to provide learners with the most enriching and rewarding learning experience.

I. INTRODUCTION

The World Wide Web. Increased connectivity. Digital convergence. Smarter devices. These features, borne through various information and communication technologies (ICTs), have the potential to make learning a highly personalised and data-driven experience. Today's students and customers have great expectations. They expect courses to be engaging, for their instructors to be available online, and their questions answered quickly. Influenced by their own professional backgrounds, they also want their educational experiences to have relevance to their career aspirations (Bamberger, 2004). And it is ICTs that offer support to students while they learn, acquire knowledge and communicate (Debevc, *et al.*, 2007).

This is of particular importance to open and distance learning (ODL) providers like Open University Malaysia (OUM). As new advancements in ICT continue to flood the education scene, ODL providers must strive to keep up in order to meet student demands. The rapidly expanding array of Web-enabled technologies should make for more seamless opportunities for exchange. Bransford, *et al.* (2008) also cited that digitally-based courses and their online delivery are powerful examples of new technologies enhancing access to learning opportunities. Therefore, educators, including ODL providers, must know how to respond effectively to this rapidly and continuously changing technological environment.

As open universities greatly rely on ICTs and the internet for the deployment of their ODL, it is thus significant that applications, materials and support services are designed to be accessible, adaptive, enriching, contextualised and open to enhancement. Such is the demand for a holistic teaching and learning experience – for distance learners want to feel empowered through an educational experience that allows them to explore, discover, engage, discuss, reflect, connect, integrate and develop. As distance learning through a web-based virtual learning environment is considered easier, effective and more useful (Debevc, *et al.*, 2007), it is integral that ODL providers ponder their ICT needs and capacities. Bamberger (2004) suggested a model for education evolution mirrored after Abraham Maslow's Hierarchy of Needs. All higher education institutions have "basic survival" needs, and as they begin to leverage technology to support teaching and learning processes, they will move from addressing institutional to faculty-centric needs, and finally learner-centric needs (Bamberger, 2004).

ODL providers tend to gain the most from this model, as it is apparent that technological capacity plays an integral role in helping universities move up the pyramid. An ODL experience will continue to advance towards greater empowerment, mobility and independence for its students through and because of ICTs. In this respect, OUM, like many other ODL institutions, is no different. Within the past few years, the University has embarked on several ICT-led initiatives with the collective aim of enhancing and enriching the teaching and learning experience at OUM.

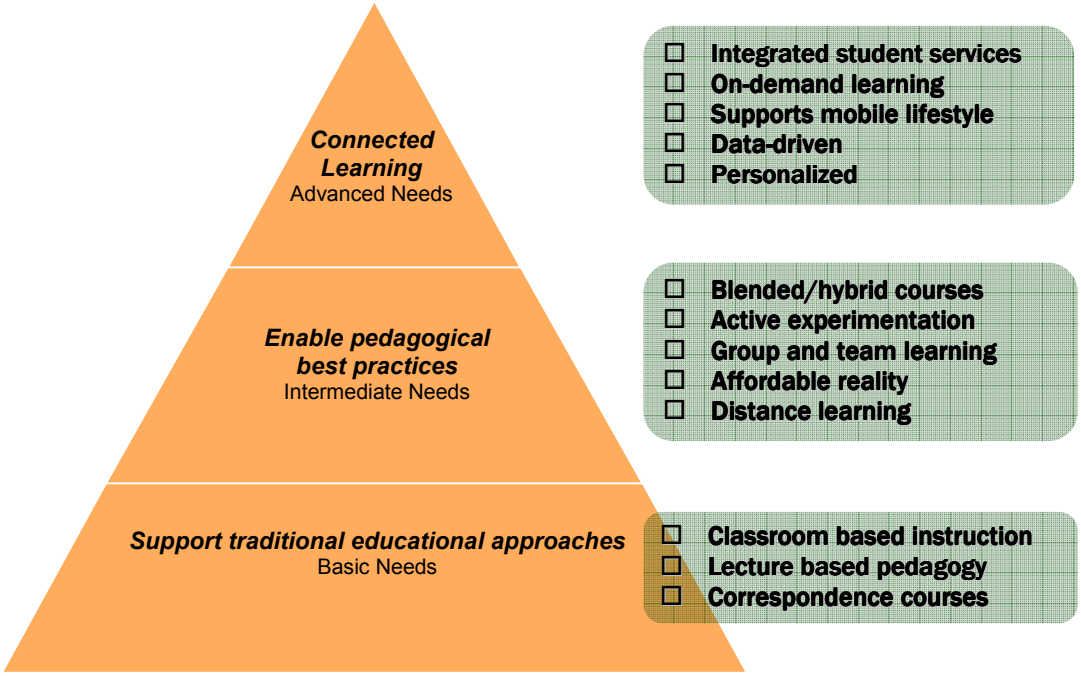

Figure 1: A Model for Education Evolution.
(Source: Bamberger, 2004)

As e-learning is a catalyst for potential ODL learners who are by and large IT-savvy working adults, ICT infrastructure can be considered an influential factor in increasing learner intake. Thus, an open university such as OUM needs to be equipped with the appropriate capacity to sustain e-learning and ICT-based activities. Internet access is vital for ODL providers, and with 14.9 million internet users as of June 2007 and the highest penetration rate in Southeast Asia, Malaysia is at the forefront of infrastructure and technology diffusion. The nation is also ranked 17th in the top 25 countries of internet users in 2003 (Belawati, in Farrell and Wachholz, 2003). With a low national dial-up cost, distinct ICT policy framework already outlined in the ICT Master Plan as well as the government's call for e-learning as a strategic thrust towards lifelong learning efforts, Belawati (2003) also reported that all Malaysian universities are already connected to the internet. In comparison to similar institutions in the region, OUM and Malaysia can be perceived to be well-equipped to leverage on ICTs and increase their usage in teaching, learning as well as education management in general.

II. ICT INITIATIVES AT OUM

Having an up-to-date and well-equipped ICT infrastructure is indeed the fulcrum for ODL operations. It is also an imperative that such ODL providers continue to enhance and improve this infrastructure in order to correspond to ever-evolving technologies. As asserted earlier, the World Wide Web, increased internet access and a multitude of devices capable of supporting diverse platforms and media will continue to influence how ODL can be delivered; as well as how best the distance learning experience can be improved.

In this paper, six of OUM's ICT-related innovations will be described, i.e.:

- Development of e-content;
- Establishment of an institutional question bank;
- Online forum data mining and analysis;
- iRadio OUM;
- Development of the University's management information and document management systems; and
- Provision of an e-library.

2.1 Development of e-Content.

The ODL journey does not begin with the enrolment of learners. Rather, it begins with the design of pedagogically-sound, well-organised and fully-structured learning materials before a course can actually be taught (Dias and Bidarra, 2007). Thus, e-learning materials are pivotal in order to ensure the successful deployment of ODL. With new technological and scientific opportunities, innovation-based institutions would look to design, organise and manage learning content with the support of specific software tools, adaptable to the learning requirements of different courses, with a stable and user-friendly interface (Dias and Bidarra, 2007).

Online learning is one of OUM's primary modes of learning (Abas and Mohd Khalid, 2006) and is delivered via the University's learning management system (LMS), i.e. myLMS. Originally limited to multimedia courseware, learning objects and online forum discussions, it has expanded to include video conferencing as well as audio and video streaming of "lectures" called i-Tutorials (Abas and Mohd Khalid, 2006).

Beginning in 2007, OUM embarked on an e-content development initiative to convert its print modules into electronic format with the aim of achieving pedagogical richness and to enhance the ODL teaching and learning experience with interactive, engaging and effective e-learning materials. Raptivity™, the world's first "rapid interactivity builder", is a software for developing e-content by providing a pre-built library of customisable interaction models based on common practices of instructional design. As such, subject matter experts (SMEs) and content developers are able to incorporate various add-ons to the e-content of a particular course, including brainteasers, presentation aids, interactive diagrams and simulations.

By the end of 2010, it is anticipated that modules for all of the University's courses will be converted into their respective electronic materials. OUM is also well aware that e-content should take into account the capabilities of its users and that it is presented in a clear and simple way (Debevc *et al.*, 2007). It is foreseeable that e-content could also be adapted according to every learner's personal capabilities and current learning curve.

With regards to manpower, capacity building of technical and academic staff is also an important component in this initiative. As such, an e-content development unit has been set up, comprising of staff who have undergone various training activities designed to upgrade and improve their own respective knowledge areas. This capacity building effort is considered part and parcel of the adoption of this technology; with a collective aim of producing the best and most fitting e-content to meet the needs of OUM's learners.

2.2 Establishment of an Institutional Question Bank.

Constructing tests and developing examination questions is known to be a time-consuming and expensive exercise (Aldabe *et al.*, 2006). OUM acknowledges that examination and assignment questions can be considered a yardstick for the University's assessment methods and overall quality. However, the University has also found that the process of developing such questions may be hampered by recurring issues concerning time and punctuality; the actual quality of the questions; as well as the preparation of questions for special examinations. In 2008, the University thus embarked on a question bank development project aimed at alleviating the aforesaid problems.

A question bank, also interchangeably known as an item bank, can be defined as "a collection of items for a particular assessment, subject or educational sector, classified by metadata which facilitates searching and automated test creation" (Sclater, 2004). A more detailed definition is also given by McCallon and Schumacker in 2002 (cited in Sclater, 2004), i.e. "a collection of test items that can be readily accessed for use in preparing examinations… normally computerised for ease of item storage and to facilitate the generation of new tests. Each item… is coded according to competency area and instructional objective, as well as empirically derived data such as measures of item difficulty and discrimination".

Over the past seven years of operations, OUM's examination questions have been developed by SMEs who prepare the questions every semester. The University's question bank endeavour aims to exploit the knowledge and experience of its 7,000-strong tutors, 70 percent of whom possess postgraduate qualification. This project, therefore, had the initial target of preparing set questions and answer schemes for 11 of the University's core and requisite courses with adherence to the hierarchical domains of Bloom's Taxonomy of Educational Objectives. OUM tutors were invited to submit sets of questions and answers and the selected few were appointed as question bank developers (QBDs). The sets submitted by the QBDs were then collated, organised, moderated and reviewed by various university personnel. These questions will then be uploaded unto the

question bank software and it is expected that examination questions could be generated in an automated and quality-controlled manner.

As item banks usually tend to grow over time (Sclater *et al.*, 2005), OUM aspires to eventually automatically generate questions for all 337 of the University's courses through the establishment of this question bank. The University also hopes to build a rich pool of quality assessment questions that should theoretically generate randomised but non-repeating questions for many examinations to come.

2.3 Online Forum Data Mining and Analysis.

At OUM, online participation and collaborative learning is an integral part of the learner's life. Face-to-face sessions are generally held only three to five times each month, and this lack of real-time interaction may lead to a sense of isolation in learners. Thus, the online discussion forum that is anchored to myLMS provides the avenue for discussions as well as promotes a connected and more seamless learning community. Through postings in the forum, learners and tutors are able to virtually interact with one another on a 24/7 basis and this, in return, encourages better communication and the sharing of knowledge. Another significant role of the online forum is for tutors to provide feedback to the learners under their care. In today's fast-paced education, perhaps even more pronounced in ODL, learners expect better feedback, more frequently, and more quickly. Feedback is, in fact, additional tutoring that is tailored to a learner's current needs (Whitelock and Watt, 2007). Back-and-forth interaction between tutors and learners in the online forum allows for the latter to test the boundaries of their knowledge in a safe environment (Whitelock and Watt, 2007) and receive the support and guidance required for ODL.

The online discussion forum at OUM was first deployed in 2003 and was designed to consolidate the learning experience by promoting a proactive environment among learners, tutors and faculty members. With the compulsory introductory course entitled "Learning Skills for Open and Distance Learners", new learners are familiarised with the teaching and learning processes at OUM; including the use of the online forum and how it complements and enriches the University's blended pedagogical approach.

An initial study concerning the effectiveness of OUM's online forum was carried out by Kaur (2004). In general, this study found that OUM learners were satisfied with the relevance of context, interaction, feedback and tutors' motivational strategies in the online forum. Now in its sixth year of service, it has clearly reached a certain level of 'richness' in terms of content. OUM believes that there is vast information and knowledge within the online forum and that this data could be mined and analysed to identify frequently asked questions (FAQs), topics, issues, patterns and quality of responses provided.

Data mining involves searching through large volumes of data for patterns that can be generalised in order to improve future decisions (Landry, Debreceny and Gray, 2004).

The forum's data, accumulated in digital form, could provide new insights into interactions in teaching and learning. In essence, the analysed data could reveal behaviour patterns, habits and perceptions related to different subject areas. Post-analysis, FAQs and the abovementioned topics and issues could be identified and prepared for each separate course. Subsequently, such information could be uploaded unto the myLMS according to each course as well.

2.4 iRadio OUM.

The use of broadcasting media for education is not a new phenomenon. In the United States, for example, live educational radio was first used in 1921 (Casey, 2008). Radio, together with television, has been used effectively in distance education for over forty years (Potashnik and Capper, 1998); even before the world was introduced to the information superhighway. Today, print, audio and video cassettes, radio and television continue to be the common technologies employed (cited in Eastmond, 2000), particularly for countries with less sophisticated capacities. Traditional radio broadcasts are a common means for distance education, especially at the primary and secondary levels. However, in higher education and ODL, internet radio can be considered a more rewarding channel due to the fact that the student body generally entails computer-savvy working professionals (Casey, 2008).

iRadio OUM is an initiative that was launched in 2007 with the purpose of broadcasting module-based and general infotainment segments over the internet. Beginning with only 21 hours of broadcast a week, iRadio now broadcasts 36 hours of 38 different programmes weekly. Accessible through the University's myLMS, this internet-based radio also allows its listeners to download the broadcasted programmes to various mobile devices so as to listen to at their own convenience.

The idea of iRadio was conceived on the realisation that such a channel would provide an opportunity to:

- add value to a learner's ODL experience by introducing module-based and motivational programmes;
- increase the involvement of academic personnel, particularly in module-based segments; and
- enhance and improve social cues and interaction between learners.

OUM also believes that iRadio will continue to grow as an important element for its learners. Based on recent statistics, the numbers of listeners and downloads have also increased over time. By early 2008, an average of 30 to 40GB of audio was downloaded each month. It has also been recorded that listeners from over 80 different countries have tuned in to iRadio. With the new addition of podcasts and videos on demand, it is perceived that iRadio will have even more appeal, as learners will be able to download specific files and listen to them on their iPods, MP3 players and even mobile phones while they are on the go.

2.5 Development of the University's Management Information and Document Management Systems.

OUM's management information system (MIS) and document management system (DMS) were developed to support decision-making processes by consolidating all related data and statistics concerning learners and tutors. Under the MIS, learner and tutor data are collated, processed, stored and disseminated in forms that are required to carry out management functions. For example, learner information in the MIS is updated on a daily basis and encompasses figures such as cumulative intake, total enrolment and demographical breakdowns according to semester, programme, gender, age, race and learning centre. The system also provides statistical trends based on applications and offers. Similarly, tutor information includes data concerning tutor numbers, demography, courses taught and academic qualifications. These data are made available to the OUM's management committee and the system has proven to be an important tool in analysing and evaluating the University's current operations.

With respect to OUM learners, the document management system (DMS) was developed to track, index and store personal electronic documents and images of paper documents such as their application forms, offer letters and certificates. The DMS serves as a filing and archiving system for each learner, and is a key component for admission and record purposes. As the information in the DMS is generally stored as scans of actual papers, they are also important for disaster recovery and could be used in the event of unforeseen events that may cause the original documents to be damaged or destroyed.

2.6 Provision of an e-Library.

As learners are geographically distributed throughout the country, OUM provides access to the resources of its digital library through an integrated Windows-based library system that is made constantly available online. The provision of this e-library is an essential support service to the learners; allowing them to easily and rapidly access the library's collections at a distance. The e-library is a concept integral to ODL teaching and learning, and has many advantages, such as round-the-clock accessibility, effortless information retrieval through user-friendly interfaces and conservation of physical collections through the process of digitisation.

OUM's digital library makes available and accessible all the reference materials in its learning modules and currently holds over 27,000 volumes of books, 70,000 e-books, 23,000 e-journals, 2.4 million e-thesis titles as well as a repository of digitised material published by the University's faculty members; all of which are cross-searchable by learners. OUM's librarians also hold an Information Skills workshop at different learning centres with the purpose of introducing new learners to the library's resources and provide training for information searching. Due to the e-library's digital nature and as new technologies in archiving and digitisation come into the picture, it is also open to enhancement and will continue to be a major component in the ODL experience at OUM.

III. THE WAY FORWARD: WHAT DOES THE FUTURE HOLD?

Technology has been identified as the most compelling developmental factor for the development of ODL (Casey, 2008). As ICTs continue to expand, the acceptance and quality of ODL are perceived to improve as well. ODL institutions must realise that the world is changing and there is a need to adapt, while still preserving the essential elements of the higher education experience (Bamberger, 2004).

That said, however, there is no doubt that there are technological trends and forces that need to be highlighted, some of which are connectivity, digital convergence, smarter devices and a learner's online/offline experiences (Bamberger, 2004). Thus, the higher education experience, through ODL, will be "just in time, just enough and just for me" (Bamberger, 2004). In this paper, I would like to draw attention to one particular technological brainchild that has greatly impacted ODL, i.e. the open source software (OSS) movement.

The OSS movement is a fashionable topic in education (Bulchand, Osorio and Rodríguez, 2007) and ODL in particular. As connectivity becomes more ubiquitous; as man-machine interaction continues to improve; and as the World Wide Web's span and universality continue to grow, so too has the cost and fiscal demands for technological targets. Thus, one of the greatest contributions of the OSS movement is the alleviation of this financial pressure on educational institutions (Bulchand, Osorio and Rodríguez, 2007) by providing a range of free-of-cost softwares and platforms.

Moodle is a noteworthy open source e-learning platform that has been adopted by many ODL institutions that require an adaptable course management system without having to bear the burden of cost. Apart from cost, an OSS such as Moodle also offers independence from seller; control and quality; opportunity for innovation and development; promotion of the local technological industry; as well as widely available technical support (Bulchand, Osorio and Rodríguez, 2007).

In light of the developments in ODL, it is significant to note the contribution of several initiatives in the OSS movement, one of which is the Massachusetts Institute of Technology (MIT) OpenCourseWare (OCW) programme. Initiated in 1999 and scheduled to be completed this year, the MIT OCW programme provides open access to 1,800 of its courses over the internet without stipulating any cost. The MIT OCW programme is, indeed, the true success story of the OSS movement and literally fulfils MIT's mission statement to serve the nation and the world in the 21st century. Through this programme, entire class syllabi, lecture notes, course calendars, problem sets and solutions, examinations, reading lists and even video lectures can be freely obtained by anyone with an Internet connection.

The OpenCourseWare Consortium, a by-product of the MIT initiative, now includes over 200 members from 16 countries, with major involvement by China and also includes the United Kingdom's Open University (OU). The Consortium offers free and open digital publication of high quality educational materials that are organised as courses and made

available online under an open license. Similar to MIT's OCW programme, OU's OpenLearn (http://openlearn.open.ac.uk/) provides access to almost 500 units of its course materials grouped under different topics and levels of difficulty. The Commonwealth of Learning (COL) also supports Open Educational Resources (OER) by providing various materials online (http://www.col.org/colweb/site/pid/4516). Most of the course materials, guidebooks, handbooks and toolkits are jointly produced by COL's partnering institutions. COL's involvement not only exemplifies providing open access to education, it also promotes collaborative efforts of open universities in the Commonwealth region.

This provides a snapshot of what the future might hold for ODL. In the case of OUM, the OSS movement provides many opportunities to share and collaborate among like outfits. Based on the fact that OSS allows for freedom to modify, customise, adapt and enhance softwares, higher education institutions, particularly open universities, now have the choice to 'build' rather than 'buy'. Apart from the obvious financial advantage over the purchase of commercial licences, the movement also encourages networking among ODL institutions. Through the sharing and redistribution of various softwares, OUM believes that open universities across the spectrum could learn from each other's experiences; all for the betterment of ODL in general.

OUM as well as other ODL institutions could do well to keep in mind the efforts of MIT and the OpenCourseWare Consortium. There is much to learn and adopt from their successes, and ODL can clearly profit from the open provision of extensive, high quality course materials. Similarly, the idea of exploiting the universal influence of the internet for the benefit of higher education is one that is presently offering limitless possibilities to ODL practitioners.

IV. CONCLUSION

The advancement of ODL remains concurrent with the progress of ICT. Even historically, distance education has drawn parallel lines with continued developments in technology – from correspondence courses to broadcasted programmes over the radio and television, and now, through the seemingly boundless capacities of the internet.

OUM will continue to place emphasis on its ICT infrastructure. Through the betterment of access, services and adopting new tools, there is ample opportunity for sustained growth and surpassing learners' expectations. Through e-content, OUM hopes to produce learning materials that are accessible, adaptive and contextualised for an enriched pedagogical experience. Through the institutional question bank, OUM also hopes to fully utilise the brainpower already available at the University's disposal and automatically generate quality, moderated examination questions for many semesters to come. Through the online discussion forum, OUM believes there is a prospect for identifying, segmenting and managing relevant knowledge into a properly accessible format for the use of both learners and tutors. Finally, through iRadio OUM, the University can spread its wings even wider and reach even its remotest learners.

An ODL institution such as OUM must continue to strive to employ the best technologies in order to provide the "just in time, just enough and just for me" higher education that ODL learners demand. Keeping in mind Bamberger's model for education evolution (2004), ICT is anticipated to remain a compelling factor for ODL institutions to move towards a mobile, data-driven, personalised and learner-centric learning experience.

REFERENCES:

Abas, Z. W., & Mohd Khalid, H. (2006). *Achieving Pedagogical Richness to Meet the Needs of ODL Learners*. Presented at the International Conference on ICT in Teaching and Learning: Enhancing Learning Through Technology.

Aldabe, I., de Lacalle, M. L., Maritxalar, M., Martinez, E., & Uria, L. (2006). ArikIturri: An Automatic Question Generator Based on Corpora and NLP Techniques. In Ikeda, M., Ashley, K., & Chan, T. W. (Eds.), *Lecture Notes in Computer Science* (pp. 584-594). Berlin: Springer.

Bamberger, R. H. (2004). Learning in a Connected World: Leveraging Technology in Higher Education Institutions [White Paper]. Retrieved July 2, 2008, from http://www.microsoft.com/education/Learning_Connected_World.mspx

Belawati, T. (2003). Malaysia: ICT Use in Education. In Farrell, G., & Wachholz, C. (Eds.), *The UNESCO Meta-Survey on the Use of Technologies in Education in Asia and the Pacific (2003-2004)* (pp. 107-110). Bangkok: UNESCO.

Bransford, J., Slowinski, M., Vye, N., & Mosborg, S. (2008). The Learning Sciences, Technology and Designs for Educational Systems: Some Thoughts about Change. In *Learners in a Changing Learning Landscape: Reflections from a Dialogue on New Roles and Expectations* (pp. 37-67). Berlin: Springer.

Bulchand, J., Osorio, J., & Rodríguez, J. (2007). Information Technology for Education Management and Open Source Software. In Tatnall, A., Okamoto, T., & Visscher, A. (Eds.), *IFIP Volume 230: Knowledge Management for Educational Innovation* (pp. 115-122). Boston: Springer.

Casey, D. M. (2008). A Journey to Legitimacy: The Historical Development of Distance Education through Technology. *TechTrends*, *52*(2), 45-51.

Debevc, M., Stjepanoviĉ, Z., Povalej, P., Verliĉ, M., & Kokol, P. (2007). Accessible and Adaptive e-Learning Materials: Considerations for Design and Development. In Stephanidis, C. (Ed.), *Universal Access in Human-Computer Interaction: Applications and Services* (pp. 549-558). Berlin: Springer.

Dias, A., & Bidarra, J. (2007). *Designing e-Content: A Challenge for Open Educational Resources*. Presented at the European Association of Distance Teaching Universities 20th Anniversary Conference. Retrieved 26 June, 2008, from http://www.eadtu.nl/conference-2007/files/OER9.pdf

Eastmond, D. (2000). Realizing the Promise of Distance Education in Low Technology Countries. *Educational Technology Research & Development*, *48*(2), 100-111.

Kaur, A. (2004). Effectiveness of Online Discussion Forum at OUM. Proceedings of the 4th Southeast Asian Association for Institutional Research Annual Conference.

Landry, R., Debreceny, R., & Gray, G. L. (2004, January). Grab Your Picks and Shovels! There's Gold in Your Data. *Strategic Finance*, pp. 25-28.

Potashnik, M., & Capper, J. (1998, March). Distance Education: Growth and Diversity. *Finance & Development*, pp. 42-45.

Sclater, N. (Ed.). (2004). *Item Banks Infrastructure Study*. The United Kingdom: JISC.

Sclater, N., Cross, R., McDonald, D., & Kelly, J. X. (2005). Defining the Infrastructure for a National Item Bank Service. Proceedings of the 9th Computer-Assisted Assessment (CAA) Conference.

Whitelock, D., & Watt, S. (2007). Open Mentor: Supporting Tutors with their Feedback to Students. Proceedings of the 11th CAA Conference.