Editorial policies

Open Praxis is a peer-reviewed open access scholarly journal focusing on research and innovation in open, distance and flexible education. It is published by the International Council for Open and Distance Education—ICDE.

The aim of Open Praxis is to provide a forum for global collaboration and discussion of issues in the practice of distance and e-learning.

Open Praxis welcomes contributions which demonstrate creative and innovative research, and which highlight challenges, lessons and achievements in the practice of distance and e-learning from all over the world.

Open Praxis provides immediate open access to content on the principle that making research freely available to the public supports a greater global exchange of knowledge.

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This last 2013 issue of *Open Praxis* brings together nine articles which were awarded an ICDE prize for Innovation and Best Practice in the field of open and distance education. They describe innovative practices or research in a wide variety of areas.

These ICDE prizes, which aimed to stimulate innovation and best practice in open, distance, flexible, online and e-learning, were awarded in the 25th ICDE International Conference, 16–18th October 2013, held in Tianjin (China).

The scientific committee of the conference pre-selected 27 papers among those submitted to the conference and proposed for the prize (169 candidates). Out of these, nine papers were selected as the winners by the Editorial Board of *Open Praxis*, on the themes of Open Educational Resources and intercultural aspects, Learning analytics, Mobile learning, Impact, Teaching quality, and Leadership. Awarded papers were selected considering both the conference and the journal’s general criteria. Special consideration was given to the following selection criteria: overall clarity, innovation, good practice, transferability, impact and overall quality.

Du Ruo and Yang Xiaotang were awarded the ICDE KNOU prize on the theme of mobile learning for their paper *Build optional digital textbooks for distance learners*. The authors of this paper explore a new type of e-books, the “digital textbooks,” mainly in four areas: definition, tools, technology and functions, based on research on mobile learning and ubiquitous learning. As they contend, supporting different learners successfully in a digital age, will depend on how well those new media and new technology are used when building smarter learning materials and learning environments. It is essential to carry out research to evidence how these media are actually supporting learners, and this paper provides an example of such research.

The prize on the theme of leadership was awarded to Khar Thoe Ng, Suma Parahakaran, Rhea Febro, Egbert Weisheit and Tan Luck Lee for their paper *Promoting sustainable living in the borderless world through blended learning platforms*. The authors remind us that the definition of learning space has become broader over the past decade through blended learning platforms incorporating emerging digital and non-digital learning tools. The paper reports recent studies on the development of blended learning platforms to promote sustainable living. It focuses on in-service teachers’ understanding of, as well as the attitudes towards, Education for Sustainable Development and the three essential skills that are required for sustainable living, i.e. thinking, technology and living skills. These include cooperative learning and communication skills developed by their students through sharing of resources in e-platforms with easy access information and cross-cultural learning opportunities. The concept of “borderless school” illustrates very well the current trend in lifelong learning.

On the theme of learning analytics, the prize was awarded to Dewi Juliah Ratnaningsih for her paper *Open and Distance Education Systems: Do They Enhance Graduates’ Soft Skills?* (The
results from 2009 Universitas Terbuka Tracer Study). The research carried out by the author of this paper showed that open and distance education learning systems improve students’ soft skills. Among others, soft skill attributes such as independence, responsibility, self-confidence, creativity, problem resolution, communication, project management and time management, were developed during their learning process. Another issue addressed referred to which soft skills acquired by graduates are required by stakeholders at work. Even though the results presented were obtained in 2009, their analysis has been framed by an extensive and updated review of literature, and interpreted in relation to more recent research studies, being meaningful for the current context.

There were three prizes awarded on the theme of OER and intercultural aspects.

William Jobe, in *A Kenyan Cloud School. Massive Open Online & Ongoing Courses for Blended and Lifelong Learning*, describes a research carried out to tackle secondary school dropout rates in Kenya, through the Kenyan Cloud School (which contains all the courses taught at the secondary level in Kenya), addressing as well the lack of research regarding MOOCs and OERs in secondary schools in developing countries. It is a powerful example of how these open access courses can help to prevent secondary school dropout. Potential successes from this project, and the lessons learned, can inspire and guide similar efforts in other developing regions to further explore the potential of educational efforts that utilize MOOCs, digital badges and Mobile Learning.

Khor Ean Teng and Chung Sheng-Hung (*A Framework for the Development of OER-based Learning Materials in the ODL Environment*) analyse the development cycle of an OER-based course, at Wawasan Open University (Malaysia), an issue that is not usually addressed in publications on OERs. The paper explores aspects such as the creation and assurance of learning content; exploring OER repositories; assessments review and establishment of collective feedback sessions, with feedback from the tutors and students, and other stakeholders, via virtual Workshops. The initiative can lead to increasing the participation of OER learning environments in ODL.

The primary goal of the project presented by Hongxin Yan and Sandra Law (*An Interactive OER Course Development at Athabasca University Based on ODL Principles*) was to improve completion rates in first-year calculus in the distance education context. For this purpose, an OER course was initiated, with five stand-alone pre-calculus learning modules designed to increase retention and completion rates for first year calculus learners. In order to include dynamic activities that could support the display of a variety of mathematical formulas, an open source Flash-based authoring tool was developed: the Athabasca University Tutor Authoring Tool (AUTAT). It is based on the needs assessment carried out and the design principles discussed in the paper, and benefits from the open education/software movements.

Wei Xu was awarded the prize under the theme of teaching quality for her paper *A New Interactive Method to Distance English Learning in Conceptual Age*. Based on left-brain and right-brain characteristics in relation to learning, and the potential uses and application of Cloud service to education, this paper presents a method aimed at distance English learning, recommending the establishment of a cloud resource platform to share teaching resources and improve teaching quality, and encouraging learners to make full use of them. Ensuring that these resources are well balanced and selected in such a way that they activate different brain areas would help achieve coordination and cooperation between left-brain and right-brain.

Finally, two prizes were awarded for papers under the theme of impact.

The paper *In their own words: Student stories of seeking learning support* by Mark Brown, Helen Hughes, Mike Keppell, Natasha Hard and Liz Smith, shows a research study using phenomenological data, which investigated the experiences of university students during their first semester as distance learners, in order to find out about the use and effectiveness of learning support services. By exploring and understanding the participants’ experiences, told in their own words, a grounded
theory approach was applied to the process of data analysis. There has been an impact on the design of learning support services at a distance learning institution, and the research has also shown that nothing creates greater impact than the students’ own words (or other participants in a study).

Adrienne Isakovic and Allan McNaught (Supporting Learning Through the Use of Self-Reflection Blogs: A study of the experience of blended learning students in the United Arab Emirates) present a study which examines how the use of student-written blogs support student learning, through the eyes of the students themselves. The authors wanted to collect evidence, from a learners’ perspective, on the potential of Web 2.0 tools, and blogs in particular, to be transformational in teaching and learning. By evaluating the use of blogs in four distinct areas: as a medium for facilitating learning; as a medium for interactivity; as a medium for metacognitive thought and reflection; and as a learning tool, the study provided evidence that Web 2.0 technology can assist in developing greater learner ownership and self-management of learning. The findings of the study, and the recommendations in this paper, can be very helpful to teachers and course managers who want to implement the use of blogs as a meaningful tool in learning reflexively.

It is our desire that the diverse ideas, findings and recommendations found throughout these papers are useful to our readers, and inspire future research studies and the implementation of innovative practices, as well as submitting their own papers to future calls for prizes and/or papers.

Thanks are extended to the members of the journal’s Editorial Board, which selected the winning papers from a shortlist determined by a committee of reviewers appointed by the 25th ICDE World Conference core programme committee.

ICDE warmly thanks all sponsors, who contributed so generously to the prize scheme. And, of course, congratulations to all awarded authors.
Build optional digital textbooks for distance learners

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Abstract

E-books seem to be a trend and an excellent solution for mobile learning lately, but what kinds of e-books are good fit for distance learners' needs? For the purpose of offering open, more appropriate, better in quality, more convenient and flexible learning materials for distance learners. From 2011, through an experimental study on the basis of research on mobile learning ubiquitous learning and any-media, a research group at the Open University of China started to explore a new type of e-books, named “digital textbooks,” sampling three experimental courses for trial; mainly getting results in four areas: definition, tools, technology and functions. The experiment is still in progress, the learning pattern centering on digital textbooks is still being explored. In conclusion, how we support different learners successfully in a digital age depends on significant ways on how well we use those new media and new technology when building smarter learning materials and learning environment.

Keywords: digital textbook; learning material; media; mobile learning; ubiquitous learning

Introduction

The rapid development of new media, wireless network technology and mobile computing technology promotes booming and gradual maturity of mobile learning (hereafter called m-learning), providing relatively complete material basis and technical environment for the research and development of newly developing learning model of ubiquitous learning (hereafter called u-learning); and the development of technology pushed the reform of educational theory forward while the development and reform of the theory widely provided a firm theoretical foundation for the implementation of u-learning.

To realize the u-learning in the environment of Open and Distance Education, we explore a new kind of learning media, or a new kind of learning material combination, which is with complete content of one course able to upgrade dynamically and which can take on different patterns with on demanded styles and constantly improving aided learning function (Bennett, Maton & Kerfin, 2008). The students can read through various terminals. It can be used under various environments such as off-line and on-line, and is able to provide necessary resource support for m-learning and u-learning in the future. Is it an e-textbook? Has it replaced the printed textbook? Through what kind of technology can it be implemented? What is the function and how can it apply to teaching?

In November, 2011, the research group on development and application of digital learning materials in the context of u-learning of the Open University of China (hereafter called OUC), on the base of preliminary study and practice, allied with technology team of R&D Center for Knowledge Engineering of Beijing Normal University, aiming at the current situation of the development and application of learning materials of OUC and in view of the idea of the any media, put forward the compose of building “optional” and “new type of learning material” for distance learners. Furthermore, we selected three experimental courses including PHOTOSHOP Image Processing for trial (Small & Vorgan, 2008). Exploring how to realize the integration of information technology and education in building course learning materials at such a comparatively microscopic field, in order
to provide more appropriate, better in quality, more convenient and flexible learning materials which are accessible at every time and place for learners; exploring the any media in the context of the regular pattern of digital learning materials building, so as to offer some adopted ideas and cases for the enhancement of the quality and efficiency of building, and the enhancement of the whole ability of the building team.

The evolution and analysis of distance learning resources

The development of media technology have made human's reading habits change, promoted the update of teaching idea and also hastened the emergence and development of new teaching media. In the practice of distance learning, from the printed textbooks, audio-visual learning materials, e-textbooks to Computer Assisted Instruction (CAI), learning package and so on (see Figure 1), on the foundation of mutual complementation and interaction, many kinds of media learning resources made up the organic entirety, in order to provide an important support to distance learning.

Printed textbook is mainly making by paper, then printing to textbook, on which the course teaching content mainly includes basic content, experimental content, instructional content, and learning reference content, etc. (The Open University of China, 2008). Printed textbooks have occupied the leading role for a long time. It is a teaching media that most comprehensively and systematically

![Figure 1: Media Evolution and Development of Learning Resource in ODE (Xiaotang, 2011)](image)

Figure 1 Notion:
- Stage 1. Printed Textbooks+ Correspondence
- Stage 2. Printed Textbooks+ Radio & TV
- Stage 3. Printed Textbooks+ Radio & TV+ Audio& Video
- Stage 4. Printed Textbooks+ Audio& Video+ CAI+ PC online+ TV
  OR Learning Package+ PC online
- Stage 5. Printed Textbooks+ PC on line OR e-Textbooks+ PC online
- Stage 6. Printed Textbooks+ IPTV+ PC online
  OR Printed Textbooks+ PC online+ Smart Mobile Phone
  OR Digital Textbooks+ PC online+ Smart Mobile Phone
contains the contents of teaching, learning guidance etc.; it is the basis and foundation of manufacturing multiple-media learning materials, which can provide a guideline for distance learning, and lead the learners to finish tasks and assessment according to the pre-defined learning path; Results of a survey on the application status of students’ printed textbooks conducted by OUC in the respective years of 2007, 2008 and 2012 showed that printed textbooks were still the teaching media which were most widely used, most important and most favorable among students; But with the development and application of advanced technology, its defects has also become more and more apparent, such as contents being not vivid enough, unable to update timely, relatively unitary forms, the two sides of teaching and learning being unable to communicate in time and so on (Chao & Chen, 2005).

After the printed textbook, audio-visual material and courseware appearing in different periods also have its merits and disadvantages, then what the teaching effect will be if to physically combine these learning materials? “Learning package” can be regarded as the representative of this kind of combined learning material. The most typical and the most successful case of application learning package of the Open University of United Kingdom, which is used for distance learning, often contains printed textbook, audiovisual learning material, exercise-book, courseware and etc., which, after overall teaching design, is the new type of combined learning material made up by multiple kinds of media learning material. Based on the course resources of “One College Graduate in Each Village,” OUC has developed convenient and practical “course learning package” with high cost efficiency, which includes the course tutorial and textbook for each course, learning guidance for 2 class hours (VCD) or all lecture videos of the lecturer (DVD), formative assessment handbook and assessment instruction, etc. The content and form of combination are relatively flexible and provide remote learners with abundant learning resources and more choices, which to some extent makes up for distance learning loneliness. But the learning package, which physically integrates all kinds of textbooks, still fails to realize the dynamic updates of the teaching content and the live interaction of people-to-people.

Such problems can be solved through online courses and MOOCs, which integrating learning resources and learning activities together and quite popular in distance learning field at home and abroad, now. But it is still too early to conclude the tendency that online courses and MOOCs are able to replace printed textbooks, because the advantages of online courses and MOOCs are more embodied in the interaction of learning processes. However, the structural presentation, media operability and other aspects of learning content are still poor. Moreover, under the conditions of visiting and scanning online course whenever and wherever being limited by network conditions and devices, there is no possibility to access to the network courses when off-line. From the perspective of convenience and availability of access, printing learning materials is stronger than online courses on the contrary. Therefore, we have paid more attention to e-books and electronic textbooks (e-textbooks), with the hope of forming a new learning material through new technologies, which can not only exert the merits of printed textbooks but also help improve their shortcomings and problems (Educause, 2006).

The development of e-book and e-textbooks

- **At the international level**

The integrated application of information technology, especially the popularity of Smartphone’s and Pads (tablet computers) provides more possibilities and spaces for thinking to solve the above-mentioned problems (Eason, 2011). Pad has just provided with an appropriate platform (Meurant, 2010). Compared with that of Smartphone, the screen of Pad is larger and this, on the one hand,
makes it easier to operate and on the other hand, enhances visual experience. Compared with keyboard and mouse based computer, touch screen makes human-machine interaction more natural, and is more acceptable for both adults and children. Besides, Pad, as a mobile device, makes it more convenient for learners to use in varieties of environment (Lau, 2008).

Batches of companies such as Inkling, which specially develop various enhanced e-books for Pad, enjoy a huge amount of downloading in App Store and are popular with learners. Learning material publishing magnates such as McGraw hill and Persons have also launched electronic textbooks in succession to broaden their digital publishing market. In early 2013, McGraw-Hill first launched a new e-book named “Smart Book” in CES which is more suitable for students. It can adapt to different learners’ learning speed and level: all the readers see the same content in the textbook in their first 5-minute reading. However, later on, with the answers to the reviewing questions in the books, different words or paragraphs would be highlight to prompt the reader where he should take more notice. This type of e-book is able to run in desktop computers as well as tablet PCs using iOS or Android systems, and whether or not getting access to the Internet does not influence its function. Some educational institutions are also studying e-book. Take the Open University for example, it offers free downloadable e-books on its iTunesU channel, meanwhile, it is doing experiment on the application of e-book to teaching, and the experiment has not extended and applied to teaching practice on a large scale yet. The Korea National Open University (KNOU) is also developing and researching the e-book which is based on the hand-held mobile terminals.

- In China

e-books have developed through 3 generations: the first generation is e-book 1.0 pattern, and it is the digitization of the traditional paper-based books. The typical models were that the publishers release the electronic version for readers to download in charge mode; e-book 2.0 refers to those native e-books released on the network, and the Cloudary and China Mobile are typical examples; while e-book 3.0 is enhanced e-books containing interaction and games, which is still in its infancy. The e-textbooks can be regarded as a kind of form that e-books apply to the Education fields (Hongbing & Peng, 2001).

In the early times, there were other audio-visual learning materials also regarding as “electronic learning material,” such as those relatively complete and system recordings and radios (later became VCD and CD etc.). Zhou Qiong (1998) thought that e-textbooks were just an electronization of paper textbooks. To be specific, they adopted tapes, CDs and network as the carrier of textbooks, and used multimedia technology to enrich textbook contents and patterns of manifestation. Lv Zhenghua (2009) thought that the e-textbook is another version of paper textbook. With the development of the mobile internet, ubiquitous computing and other new technologies, the e-textbook has been given new connotation from its concept to function. In 2005, when accepting an interview, Professor Zhu Zhiting pointed out that through the ways such as changing the media, extend the content and providing the guidance, new electronic learning materials need to break the original subject’s structure mode of the course materials, which contains a part of the teaching work of preparing lessons, so as to alleviate burdens on teachers and make them better focus on how to optimize teaching designs and organize teaching implementation (Jing, 2011). From another point of view, students can break through various limitations of traditional written learning materials, change their learning modes and try new ways such as autonomic, inquiry and interactive learning with the help of e-textbooks.

Guang, Zhaohua and Ronghuai (2012) thought that: the e-textbook is a kind of e-book or e-reading which follows the reading habits of students, is good for organizing learning activities, accords with the requirement of course objectives and is arranged according to the styles of
textbooks; it has 5 basic functions: structured presentation, media controllability, notes, assignments and management. In practical terms, e-textbook can be understood as a kind of learning package in line with the rule of education and teaching, its main content should include the text, notes, pictures (static and dynamic), experiments, exercises and so on, and integrate a variety of auxiliary learning tool (such as a dictionary, calculator, a note-book, and some reference books) and some multimedia learning materials on the basis of its main content.

**The process of experimental study**

After forming the basic notion model that "on basis of the mobile terminal to develop a new learning materials," the research group and the technology team selected the experiment course, three high-practical and skill-orientation courses such as "Photoshop image map disposal" to develop and carry on the experiment of this new learning materials, explore a new way of learning and teaching, curriculum development technology and patterns, norms, standards, and processes of learning materials development, which meets the needs of national open university development, and so on.

Development process includes four stages, which are need analysis, learning design, media development and works release. On the basis of content analysis and learner analysis, we can draw knowledge figure and design learning path. The user experience design centers on the product prototype and has many iterations, including structure and interactive design, presenting interface design, format and layout design, etc. After examination and approval of the archetypal, we should perform a batch of media production, content packaging and works issuing.

- **Phase of needs analysis**

Content analysis and learner analysis is parallel working. The major task of content analysis is to characterize the capacity structure and learning objective of the course, analyze the core knowledge module and typical knowledge type of the course, analyze the relationship among knowledge modules, and identify the importance and the learning difficulty of knowledge of realizing the course objectives.

- **Learning and Designing Stage**

Knowledge points diagramming is based on the content analysis, according to the relationship between mapping rule and representing knowledge, expliciting knowledge level and its close degree with teaching objectives, forming the basic way of content organization. The drawing of the knowledge point graph is the base of learning path design.

- **Stage of system exploitation**

This stage mainly adopts user experience design and this is an iteration process which needs repeatedly review. Form excellent interactive mechanism and use experience by revising the original works repeatedly and presenting content structurally.

- **Works release stage**

Establish connections between digital textbooks and background database, accomplish the deployment of network server and guarantee the reliability and accessibility of the application of digital textbooks. Summarized evaluation plays an important role in revising digital textbooks and accumulating development experience. Knowledge graph runs through analyzing content, learning path design and users' experience design. Learners' analytical result act as the premise of drawing knowledge graph, learning path design and user's experience design which makes the whole
digital textbooks exploitation process not just a work frame of design and exploitation but also a set of logic-related and operative technology process.

In the process of experiment, the research group gradually got clear and united notions of this kind of new learning materials and understanding of their functions, and then reached a consensus. They are going to design a kind of “Digital Textbooks” suitable for remote learners to do selecting learning, which combine the ideas of all-round media and interactive electronic textbooks; they also reach a relative agreed plan for its pattern of building and developing and the following issuance and application.

The notion, functions and technology environment of Digital Textbooks in the background of any-media

The appearance of any-media, web 2.0, the technology of mobile Internet, cloud computing, ubiquitous computing, and other technologies and ideas provides the technical possibility for the intrinsic unification between human’s maximum demand of information dissemination and the realistic utility (Shuqiang et al., 2009). The spread of any-media not only initiate a revolution of human dissemination: the audiences replaces the spreader and their different needs for information content, tools and means of spreading actually become the logical start point of spreading activities; it also provides more space of possibility and imagination for the field of education, especially the construction of digital resources in the field of distance learning. For example, how to satisfy the learning demand which has more and more diversity and individuation, in order to provide support for U-learning. It helps us to think about the solution for the existing main problems of learning materials construction, to reconstruct the main processes such as learning resource design, production and release; explore a new type of “learning material,” which is with complete content, able to upgrade dynamically and which can take on different patterns with on demanded styles and constantly improving assisting learning function. Students can read and access by all kinds of terminals; it can be used under various environments such as off-line and on-line; it can provide necessary resource support for the achievement of u-learning and provide more options for students.

On the basis of comprehensive research, analyzing the development and change of various media learning materials of distance learning courses, domestic and overseas e-books, and electronic learning materials, the research group combined the advantages of media technological development and put forward the concept of “digital textbooks,” of which features can be summarized with 3 words: any-media, digitization and optional. The technical supports in behind are any-media, mobile internet, cloud computing, ubiquitous computing, etc. and the development of idea. Mobile internet technology expedites the emergence of new media, let us see the possibility of further enrich the teaching interaction can be used by the media, brings about a series of changes to the distance education in the digital resources construction and application, learning support, education management, provides the environment support for the spread and application of digital textbooks (Piret & Jaan, 2008). By applying cloud-computing technology to construct learning environment, learners can get data synchronously freely in various terminals, and to share with anyone. Cloud computing has good openness and sharing, is helpful to the study of resource construction, sharing and sharing, as much as possible to reduce the formation of a single learning resource island.

- Concept and application of any-media
The concept of any-media is not formally put forward in the academic circle, and it comes from the application level of media sector. It came to prominence in the field of domestic news spread around the year 2008, and it gets more attention and is applied in the field of media, publishing. With the
popularization and development of information technology and communication technology recently, it is a new form gradually deriving from the base of the concepts of “new media,” “media convergence,” “media,” “multimedia” and practice in the past. Yao Junxi and Liu Chunjuan (2010) thought that any-media was the integrative application of media form, media production and spread in broad sense; In a narrow sense, based on the development of modern technology and the communication concept of media integration, any-media refers to the comprehensive application of media generated content, media forms, communication channels and modes, ways of media operation, and media marketing.

The core connotation of the “any-media” spread is not only superficially big and complete, and it pursues to be small and differentiation. In the context of the any-media, the prototype of the learning materials must be “digital,” “digital” contains two meanings, one is the digitization of the traditional media learning materials, another is the learning-materials composed by the original ecological digital media. “Digital learning materials” are the any-media themselves, which are the integration of the pictures, words, sounds, images and paintings, and fit all kinds of spread and application. Meanwhile, it is the base of other media-type learning materials, that is to say, produce learning materials of various media types according to the needs; create printed and video learning material in accordance with the publication requirements; generate presupposition content of network course at PC end, presented as basic learning material for m-learning and u-learning on mobile phones and pads.

- **Concepts and functions of digital textbooks**

  Digital textbook is not a new concept (Choi & Shin, 2008). Strictly speaking, it belongs to electronic learning materials, but after research, the research group thinks that “digital” can better reflects that the material compositions are original digital media, namely, picture, text, audio, video and animation, thereby generating other media learning materials from the transformation of digital form, which is the idea of multiple output. Thus, the research group adopted the notion of “digital textbooks.” In the context of any-media, the notion digital textbook is defined as follows: It refers to the digital textbook which makes use of the Mobile Internet and the idea of the new media technology, regards the core knowledge points of the course as the basic unit, directly takes on by the digital medias such as picture, text, audio, video and animation etc., carries the course learning goals, teaching basic contents, main learning activities, learning reference contents, exercises and tests, and especially fits students to adopt the mobile terminal to learn and read in various environment (on-line and off-line environment). And it has the following functional characteristics:

  - Regarding the core knowledge points of the course as the basic unit, and integrating the digital media like picture, text, audio, video and animation and so on;
  - At least providing one most suitable learning path and also other non-linear learning paths so as to make it convenient for learners with different learning needs to select;
  - Supporting for multiple output means that the presupposed contents of printed textbooks, video learning materials, network courses and others could be generated on the basis of any-media digital learning materials;
  - Dynamic update and human-human interaction could be achieved under the on-line environment;
  - Learning functions such as bookmarks, labeling, the study notes, evaluation practice, learning, sharing, hyperlinks, etc. can be realized;
  - The main rendering styles are books, magazines and network video;
  - Application, spread and distribution can be cross-browser, across different systems and equipment.
In addition, the mobile internet device based digital textbooks possess all functions of printed textbooks. Moreover, they can do what printed textbooks cannot do, such as interaction, renovation, corrigendum, integration and we media; It can also bound learners with their learning process, realize the cloud service synchronization of learning data, record the learning process of learners, intelligently analyze the learning achievement of learners and imaging present the analytical result, and it can combine with teacher’s ideas to provide learners’ study with guidance and help.

- **How to understand “optional”**

Firstly, “optional” reflects in the design idea of digital textbooks, as far as possible to decompose major learning content of the course into little knowledge units or knowledge points, then logically select and scientifically combine the learning content and learning strategy of knowledge points with learning media. Designing modularized and structured system of learning materials aimed at different learners and providing excellent optional multiple media learning materials, fully exerting advantages of all kinds of media, which can improve learning effect and efficiency. Designed with the idea of “optional,” digital textbooks have optional learning contents. Learners can select corresponding knowledge to study according to their foundation and needs; Media are optional. Learners can choose to study by watching videos, listening to audio or reading texts; the learning path is optional. Learners can learn by linear path, namely, the optimal path and can also learn by case learning or other paths. In terms of the subscription of printed textbooks and digital textbooks, it is also optional. Learners can choose to subscribe the printed textbooks or the digital textbooks based on the mobile devices in line with their own reading habit to study.

- **Development tools and technology of digital textbooks**

EPUB standard. The manufacture of digital textbooks contents should conform to the industrial standard EPUB of international digital publishing, and the latest version is EPUB 3, supporting HTML 5, CSS 3 and JavaScript, etc., consequently makes E-learning materials support the cross-platform interoperability among different reading terminals. Moreover, the content, presentation and the appearance have consistency. In October, 2011, International Digital Publishing Forum (hereinafter referred to as IDPF) formally identified the EPUB 3 standard. EPUB 3 content is based on the strict or extensional HTML 5.

HTML 5. HTML 5 technology is used to replace the HTML standard versions of HTML 4.01 and XHTML 1.0 that were formulated in 1999, which is still in developing stage, but most browsers have supported some technologies of HTML 5. HTML 5 has two main features: first, it strengthens the expressing performance of the webpage. Secondly, add Web application function to local database. When talking about HTML5 in broad sense, it refers to a set of technical combination including HTML, CSS and JavaScript. It hopes to decrease the plug-in-based rich internet application (RIA) of browser, such as Adobe Flash, Microsoft Silverlight and Oracle JavaFX and provides more standard clusters which can efficiently enhancing network application.

**Analysis and Discussion**

Many on-line resource developers often make use of original materials, which become learning content based on tablet PC after simple adjustment and edit, for example, remove original network course to tablet PC like Pad after splitting knowledge points according to resources, does it count on digital textbook? We do not agree with this opinion, digital textbooks based on Pad should follow the idea of “precedence of m-learning and design,” which should accord with property of mobile Internet and possess at least one or two characteristics as follows:
Build optional digital textbooks for distance learners

Seen from the user experience in human-computer interaction, application programs or materials should be specially designed for the touch screen and the gesture, but not just convert from the original mouse and arrow.

- According to the technology of learning content use, we should utilize some special technology that mobile equipment possesses, such as, inductor including accelerated inductor, near field inductor, camera, NFC and so on (Sung-Moo, 2008).
- For the adaptability of the devices, the content on screen should self-adjust when the device is conversed or erected. The application of m-learning should be in good effect in either way.
- In addition, considering digital textbooks in different devices to synchronize updates learning record and synchronous notes, etc. is needed to be taken into consideration, and make learners’ user experience seamless.
- In terms of the design and development of digital textbooks, we should focus on studying how to reflect the above three features, instead of simply removing the on-line contents on homepage (Tan & Kinshuk, 2009). We should adapt to and utilize the features and functions of the device itself, develop more convenient, flexible and interactive learning materials and gradually achieve the transform from digitized to wise learning environment.

Conclusion

The research group only achieved primary development on the research of digital textbooks, m-learning, u-learning, and so on. The above experiment was still unfinished. We have a long way to go on the aspects such as how to lead learners who use digital textbooks into deep learning and how to apply it to practical teaching, and so on. At least now it appears that we are only providing distance learners with one more option when subscribing textbooks, which is digital ones or printed ones, while the learning pattern centering on digital textbooks has not yet to form. But we are convinced about one thing, that is, how we support different learners successfully in a digital age depends in significant ways on how well we use those new media and new technology when building smarter learning materials and learning environment. And we can see the bright future, the digital textbooks of OUC open to everyone who wants to learn.

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Promoting sustainable living in the borderless world through blended learning platforms

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**Abstract**

Student-centred learning approaches like collaborative learning are needed to facilitate meaningful learning among self-motivated lifelong learners within educational institutions through inter-organizational Open and Distant Learning (ODL) approaches. The purpose of this study is to develop blended learning platforms to promote sustainable living, building on an e-hub with sub-portals in SEARCH to facilitate activities such as “Education for Sustainable Development” (ESD), webinars, authentic learning, and the role of m-/e-learning. Survey questionnaires and mixed-research approach with mixed-mode of data analysis were used including some survey findings of in-service teachers’ understanding and attitudes towards ESD and three essential skills for sustainable living. Case studies were reported in telecollaborative project on “Disaster Risk Reduction Education” (DR RED) in Malaysia, Germany and Philippines. These activities were organized internationally to facilitate communication through e-platforms among participants across national borders using digital tools to build relationships, promote students’ Higher Order Thinking (HOT) skills and innate ability to learn independently.

**Keywords:** borderless world; Disaster Risk Reduction/preparedness Education (DR RED); living skills; Open Educational Resources (OERs); student-centred blended learning; sustainable living

**Introduction**

We are living in the world full of uncertainties! While Penang citizens feel grateful for the city as an Eco-Town (UNEP, 2013) being chosen as a retirement haven (ExpatGo, 2013), they are also deeply saddened by the recent haze and tragedies caused by man-made (e.g. negligence) as well as natural (e.g. storm) disasters (Goan, 2013; Jalleh, 2013). It is hence timely for educators to ponder ways to optimize the wise and critical use of scientific Information and Communication Technology
(ICT) to enhance quality educational leadership and promote essential skills for sustainable living with preparedness for disasters even in non-threatening environments.

There is an increasing awareness in the advent of digital era that there are wider potentials for learning spaces to serve the new learning paradigm with more collaborative learning activities that could be facilitated within and among educational institutions using inter-organizational Open and Distant Learning (ODL) approaches. The definition of learning space has become broader over the past decade with its design involving long-term building of self-directed/self-accessed activities through e-platforms involving the emerging digital/non-digital learning tools and Open Educational Resources (OERs). Since self-motivated lifelong learners are so tech-savvy, educators need to find alternative strategies to facilitate meaningful learning through blended learning approaches.

**Background and objectives**

An e-learning hub was launched to serve as blended learning platforms in “South East Asia Regional Capacity-enhancement Hub” (SEARCH) for investigative researchers collaborating with other project partners in the SEAMEO region and beyond. The e-forums of the sub-portals that were hyperlinked to this e-learning hub were provided to facilitate discussions and activities related to current issues including “Education for Sustainable Development” (ESD)(Ng, 2012a) in line with the Millennium Development Goals (MDGs) No. 7 (UNESCO, 2002). Though increasing efforts were made by the Ministries of Education in the region to reform science curriculum by including topics related to ESD, there are still much concerns about its successful implementation at grassroots levels. For example, “the teachers’ attitudes towards the concepts of ESD and their preparedness to promote sustainable living among younger generation” are the areas of concerns of this study.

In line with the recent efforts to develop intercultural lifelong learning through Borderless School (i.e. an area identified under the vision of Golden SEAMEO in the next decade), initial input during pilot phase was provided to a group of in-service teachers on topics “Developing essential skills for sustainable living, authentic learning, the roles of m-/e-learning” that were delivered through seminars and also broadcasted using webinars (http://engageteachers.connectpro.acrobat.com/r22693258) in ODL mode. Survey questionnaires (that were also accessible on-line) were distributed before input sessions to elicit respondents’ attitudes towards ESD related to their understanding of the concepts of essential skills for sustainable living and conceptual framework for Borderless School. This study seeks to examine the following Research Questions:

1. What are pilot teachers’ attitudes towards ESD and perception on the various aspects of implementation of ESD incorporating ICT in the educational system?
2. Have these teachers developed understanding on the concepts of ESD integrating ICT and Borderless School with better preparedness to promote essential skills for sustainable living among the younger generation after they have attended the input session?
3. Are there exemplary practices of their students demonstrating essential skills for sustainable living in line with the conceptual framework of Borderless School?

**Review of Literature for Framework of Study**

Numerous relevant theories and related research are reviewed to guide the framework of study.

**Promoting educational leadership through social constructivist blended learning**

Social constructivism posits that knowledge exists in multiple formats and varies from person to person. Learning as viewed from the perspective of social constructivist theory focuses on learners’
prior knowledge and how they construct their understanding based on their learning contexts that are influenced by the people who promote quality educational leadership.

Knowledge is embedded in authentic tasks in the living context and learning is an active process of constructing knowledge with learners engaged in using non-digital or digital tools both at individual and social levels. This learning is defined as social mediation with participatory knowledge construction (McConnell, 2000; Vygotsky, 1962). Fink (2004) revealed that social constructivist ways of teaching emphasize on student-centred learning involving problem-solving in daily life. Social constructivist teaching is significant in Project-based Activities (PBA) and cooperative learning because students are able to connect to their personal contexts as they discuss and scaffold their knowledge (Parahakaran, 2013). Strategies such as PBA and Problem-based Learning (PBL) could be adapted into disciplines such as science, mathematics and social science across other disciplinary knowledge with possible development of investigative projects. Interaction is essential among team members supported by teacher who plays the role as coach or facilitator to help them learn also aims to promote discussions and sharing of knowledge.

Social mediation could be elaborated by cultural scaffolding (in which the emphasis is on use of “blended learning” resources in mediating learning) and with the social entity as a learning system that may bring about changes in its underlying values and norms (McConnell, 2000). Blended learning (involving digital and non-digital or face-to-face mode) provides useful tools for effective and ever-expanding global learning platforms to promote web-based collaborative projects involving contextual problem-solving. These strategies were shown to be effective to widen learning opportunities in knowledge-based society leveraging on the effective use of Open Educational Resources (OERs) and new paradigms of teaching approaches. OERs are digitized materials that are free and comprehensive including different kinds of digital assets. The implementation of OER includes materials on best practices of various methods, processes and publication that are offered freely for educators and self-learners to use and reuse for teaching, learning and research purposes. These include intellectual property licenses that govern open publishing, design-principles, and localization of content. The “learning content” includes journals, learning objects, collections, courses with materials and content modules. “Tools” include software that supports the development, delivery, use, innovation and improvement of open learning content. The processes of searching and organizing content with its development tools, learning management systems, and e-learning communities through blended learning activities are also facilitated. In other words, users or online communities can actually learn, research, develop, reform, reuse, modify and adapt the information available online with limited restrictions and barriers.

**Enhancing positive attitude and skills for sustainable living in borderless world**

Attitudes determine whether we will respond to a given situation positively or negatively, with enthusiasm or reluctance. Attitudes are lasting patterns of beliefs and behavior tendencies toward other people, ideas or objects (Lefton, 1991). Attitudes are important attributes to determine people towards leading successful and sustainable living. Students’ attitudes towards learning and motivation to be involved in learning activities with development of skills for sustainable living are interrelated with various internal and external factors. Students’ learning is affected by teachers’ instructional practices, attitudes and use of effective pedagogies. Educational researchers revealed that an important contributing factor for students’ academic achievement is “teacher competencies,” including cognitive abilities (i.e. professional knowledge) and affective-motivational characteristics. The competencies consists of cognitive abilities (professional knowledge) [e.g. Subject Matter Knowledge (SMK) and Pedagogical Content Knowledge (PCK)]. The affective-motivational characteristics include professional beliefs, motivation, attitudes, willingness and self-regulation (Baba, 2013). These factors that are supported by affective teaching are the transfer of knowledge.
integrating human values, to inspire students and emulate examples of human values (Jumsai, 2003). For example, the review of studies involving federal, state and local policy on instructional roles as reported by Parahakaran (2013) revealed that Thai teacher-student relationships were impacted by culturally driven values-based water education. Kahn (2008) emphasised the importance of cultural literacy, which is to develop an ecopedagogy, because cultural literacy develops a broader understanding at an anthropological level of meaning about how people live within shared communities (Parahakaran, 2013). The cultural literacy aspects related to sustainable education can be elicited from students if Open Educational Resource (OER) platforms include elements from students’ cultural backgrounds in their educational contexts.

The study of teachers’ beliefs that included the cognitive and affective factors was complex because many disciplines such as scientific, cultural, academic, pedagogical and spiritual aspects had to be pulled together to provide a holistic picture of the problems and issues that was involved with the theme “sustainability” such as in water education. Issues faced in the field of sustainability in education can therefore be concluded to be culturally interconnected in the field of education. The pedagogical implications are varied in different ways by different cultures. The findings from the study of teachers’ beliefs revealed that there are difficulties to include and tailor relevant programs for teaching water issues in different cultural and academic contexts (Parahakaran, 2013). In fact providing opportunities for teachers’ Continuing Professional Development (CPD) is equally essential as other support given in educational services to enhance students’ meaningful learning.

In view of the current wide range of blended learning platforms that provide learning spaces and opportunities to be exposed to the new learning paradigms, students who are tech-savvy and self-motivated lifelong learners do not limit their learning activities merely at classroom levels. Hence educators need to find alternative approaches to facilitate meaningful learning beyond classroom. In fact more collaborative learning activities could be facilitated within and among educational institutions through inter-organizational Open and Distant Learning (ODL) approaches. An important area incorporated with ODL approaches identified under the vision of Golden SEAMEO in the next decade is the concept of “Borderless School” (BS) that is operationally defined as “a school that prepares students to become global players who are enterprising, creative, innovative, equipped with 21st century skills, and lifelong learners in cross-cultural learning environment” (Devadason, 2011). Among the visions of BS are that teachers should participate in CPD to be equipped with knowledge and essential skills (including thinking, technology and living) for sustainable living needed to facilitate the learning of students as global players who are expected to be fully engaged in active learning and community services (Ng, 2012b). Student engagement is defined as students’ motivation to participate in school and out-of-school related activities. They should be willing to pursue assigned intellectual activities even when these become difficult (Schlechty, 2001). In BS, they are expected to participate actively in blended learning activities demonstrating cooperative learning and communication skills that are developed through the sharing of resources in e-platforms and learning environment rich with easy access information or OERs and cross-cultural learning opportunities. Students should be provided with intellectually challenging and genuinely engaging learning activities more often (Baba, 2013) as their engagement or active involvement in learning will also directly or indirectly affect academic performance.

**Research Methodology and Data Collection Activities**

This article reports only the findings from pilot phase of the part of an ongoing study to set up “Borderless School” in the SEAMEO region [activities identified in the following areas No.(1) to (5)] using mixed-research approach (Johnson & Onwuegbuzie, 2004) involving surveys, observation, interviews and case studies with mixed-mode of data analysis.
(1) Piloting instruments and e-platforms with feedback elicited from participants to refine framework.
(2) Preparing resources and stable e-platforms within 5 years of Borderless School implementation.
(3) Revising cross-cultural curriculum to promote thinking and/or living skills in all subjects through ICT.
(4) Developing resources for cross-cultural understanding in all subjects integrating PBL and PBA.
(5) Conducting seminars with blended learning activities using ODL approaches to share knowledge and enhance thinking, technology and living (that includes work and survival) skills.

**Designing and piloting instruments to evaluate attitudes and refine framework**

The following validated instruments were administered during pilot study phase in 2013:

(1) The first instrument is a survey entitled “Survey on knowledge/attitudes towards sustainable living” for seminar on 19th April 2013 (Ng, Hazura, Corrienna & Nur Jahan, 2013). Part (A) of the survey on ESD (in Likert scale format, i.e. 1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree) was adapted and modified from a validated instrument in the larger scale survey studies conducted in various recent events since 2012 as reported by Hazura, Ng, Corrienna and Nur Jahan (2013). Part (B) was adapted from the conceptual framework “BORDERLESS” presented in the internal proposal presentation meetings (Ng, 2012b). This instrument could be downloadable from http://forum.sp3aceman.net/viewtopic.php?t=62343.

(2) The second instrument is “WebQuest as guide with monitoring and evaluation tools for teachers’ facilitation and students’ participation in Disaster Risk Reduction/preparedness EDucation (DR RED)” (Febro et al., 2012; Febro & Ng, 2013; Ng & Febro, 2012; Ng & Febro, 2013).

Image 1 presents the printscreen of a site for UNESCO APEID’s telecollaborative project (http://ict.unescobkk.org/groups/telecollaboration-of-teacher-educators/dr-red-japhilmiins/) with instructions to download WebQuest guide and other relevant tools for the DR RED activities.

![Image 1: Screenshot of e-forum site for DR RED as part of UNESCO telecollaborative project](http://ict.unescobkk.org/groups/telecollaboration-of-teacher-educators/dr-red-japhilmiins/)
Prior to administering the instruments in colloquiums conducted at RECSAM on topics “Developing essential skills for sustainable living” (19/4/2013) and “Authentic learning contexts: Implications for teaching and learning” (26/4/2013), instrument No. (2) was administered among students (N=9) in pilot local (N=6) and international (N=3) schools. Instruments No. (1) and (2) were also read by six educators who were mostly from in-service courses to ensure better content and construct validity.

Revising instruments and conducting field studies using blended approaches

After the aforementioned instruments were administered during the seminar, the researchers further communicated with the respective schools and encouraged the students to participate in one of the activities suggested to enhance life skills, i.e. DR RED telecollaborative project. Schools in the four SEAMEO member countries were also identified and information was communicated through the project coordinators using webinars, emails, e-platforms (e.g. http://forum.sp3aceman.net and http://elearn.recsam.edu.my in Image 2) for pilot studies on DR RED project. Based on the feedback from pilot samples attending the 1st seminar (N=33) and literature review [e.g. concept of “Disaster Risk Reduction” (DRR) (DepED, 2008)], the framework of study on “Borderless School” was refined. Then the revised instrument No. (2) was sent to pilot project schools in Malaysia (N=5), Philippines (N=2), Indonesia (N=2), Thailand (N=2) and blended learning partner school in Germany (N=1).

Image 3 illustrates WebQuest guide that was summarized on an illustrative file and uploaded onto e-forum by facilitator to help teachers monitor students. Case study approach (that includes findings from survey, observation, interviews and documentary analysis of output) was used to report on exemplary practices, anchored on social constructivist and socio-cultural theoretical framework.

Findings and Discussions

This section analyzes findings in response to Research Questions (RQs) 1 to 3.

Image 2: E-forum [http://forum.sp3aceman.net/viewtopic.php?f=14&t=62343] and e-LMS [http://elearn.recsam.edu.my] were prepared to facilitate DR RED telecollaboration
Positive attitude for sustainable living: The roles of teachers as facilitators

The survey was analyzed quantitatively for RQ1 (on the pilot teachers’ attitudes towards ESD and its implementation via ICT) using descriptive statistics, as well as qualitatively for RQ2 (about teachers’ understanding on ESD via ICT and preparedness to promote sustainable living). Out of 33 local teachers/educators and 12 foreign participants (participated through webinar and communication using emails) who attended the first colloquium, only a total of N=32 or 71.1% (i.e. 32/45) responded to Part (A) Likert survey [as illustrated in the participants’ responses for Question (1) “I teach about environmental or ESD issues because…” (Figure 1) and (2) “I do not teach about environmental or ESD issues because…” (Figure 2) respectively]. Only 22 out of 32 (68.8%) responded to Part (B) open-ended questions before and after the event.

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Most of the teachers involved in the pilot project and were invited in the seminar had positive attitudes towards environmental or ESD issues. None of them expressed “Strongly Disagree” (SD) on Part A (Q1) “I teach about environmental or ESD issues.” More than 50% of them expressed either “Agree” (A) or “Strongly Agree” (SA) in the statements listed in (Q1). Most of them (more than 50%) also consistently responded either “Disagree” (D) or “Strongly Disagree” (SD) on (Q2) “I do not teach about environmental or ESD issues.”

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Regarding "What is the meaning of sustainable living," 15 out of 22 (68%) and 18 out of 22 (82%) responded to the pre- and post-survey respectively. The following selected excerpts are extracted from the post-survey after the colloquium with evidence of their improved knowledge,

Holistic thinking...maximize human potential without...harm,...to decrease the impact of human...to earth’s welfare; Using resources (x2)...consider the need of future generation; The application of sustainability to lifestyle (x8) choice and decisions (x5) that meets the ecological, environmental, societal, economical for future generation (x8) without compromising these factors for future generations (x5);...simple life; Thinking+ living+technology skills = Sustainable living; Living without causing harm and not leaving the earth in a worse way...; Lifelong learning, cross-cultural diversity, capable of building relationship;...rising interest!...living...without so many risks...learn to talk to people across the world; Wider scope - coping with environmental issues-conservation of resources-proactive to continue life on earth... (Respondents of colloquium on 19/4/2013)

Since more than 80% have responded to the post-survey with elaboration, it can thus be inferred that sharing information on sustainable living through colloquium or seminar using webinar can be a useful approach to impart knowledge and skills to promote sustainable living.

Regarding question on "What are the essential skills for sustainable living," 12 out of 22 (55%) but 17 out of 22 (77%) responded to the pre- and post-survey respectively. The responses from post-survey with evidence of their improved knowledge after the colloquium are reflected below,

How to live...considering the need of future generation; HOTs (x2), Reasoning-productive thinking, ICT; Deepen...application why need to live in a sustainable way, sincere care and attention to earth’s resources, sensitivity among peers and others; Background knowledge, professional skills, personal qualities; Thinking skills (x8) e.g. Creativity (x4), Strategic attack, Critical perceptions (x2); Problem-based approaches, Awareness of the impact of action/behaviours on environment; Pattern recognition; Living (x4) skills, knowledgeable with ICT (x6) skills; Background knowledge, professional skills, personal qualities; Enterprising; Listening to a speaker from other country...knowledge and methodical skills (IT); Preparedness in facing disasters. Right attitude (x2) and purposeful action. Responsible member of society... (Respondents of colloquium on 19/4/2013)

It was also revealed that more than 77% have responded to the post-survey reflecting their understanding about the input they gained from the seminar. It can again be inferred that the conduct of colloquium/seminar was successful to share information on skills required for Borderless School (BS). The following excerpts further confirmed that most of the participants understood “the meaning of BS and its essential features” with 14 out of 22 (64%) and 19 out of 22 (86%) responded to the pre- and post-survey respectively. Their responses were closely similar to the input given,

“Borderless School” is anchored on Blueprint of Lifelong learning (L^3)(x5). The “Objectives” are to promote self-directed/motivated (x3) learners from diverse background and achievement (x6). The “Organization” of activities is authentic (x3), blended mode (x8) and “Rich” in cross-curricular and/or interdisciplinary (x7); “Derived” from values-based (x5) education with findings on advancement of ICT; “Educational” opportunities, exchange with partners (x5), enrichment (x2), evaluation (x6). Learning without border (x2) outcome “Results” in diverse groups (x5) of “Lifelong” (x7) learners who are “Enterprising” (x6), equipped with 21st century “Skills” (x2) that include thinking (x4), technology (x4), living (x2). They should always “Strive” forward continuously (x6) as successful global players (x6), innovative (x5) contributor of new knowledge (x6), understand cultural diversity with dissolved boundaries, collaboration (x5).... (Respondents of colloquium on 19/4/2013)

Again more than 50% responded positively as 14 out of 22 (64%) had certain levels of “aspiration towards BS.” Hence the seminar was successful to impart useful input on ESD and BORDERLESS.

Exemplary constructivist blended learning: The case of student project output

As stated before, the three skills to be imparted by teachers to promote sustainable living are thinking, technology and living skills. This section analyzes data in response to RQ3 (the exemplary
practices of essential skills for sustainable living demonstrated in students’ output). Image 4 is the print screen of an excerpt from the output that was uploaded onto e-forum (http://forum.sp3aceman.net/viewtopic.php?t=62343&#p91219) shared by one pilot project student in Malaysia. He demonstrated his thinking, technology and living skills by relating the use of effective microorganisms (EM) for waste management to curb problems of water pollution. He further designed “multi-function river and drain water filter” with lined up of arc shaped bottles that were filled with EM to clean polluted river by reducing oil and grease, neutralizing pH value of water, trapping rubbish that also helped reducing risk of flood and promoting DR RED.

The fourth author of this article who attended the seminar through webinar also led project team from Germany to make full use of e-forum site to share OERs (Image 5) and follow-up telecollaboration with project students asynchronously (Image 6) and synchronously with skype.

Image 7 is the print screen of the attached pdf files posted onto Dropbox for sharing of students’ responses to WebQuest activities playing the four roles identified as: (1) “meteorologists” to report on precipitation, temperature and sunshine; and “the social welfare officers” to report strategies to reduce flood [as shown in Image 7 the attached file DR RED Kassel2013.pdf]; (2) “ecologists” to
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Living skills include students’ attitudes and motivation that are part of affective learning. The above findings concurred with the study by Parahakaran (2013) that affective factors are significant for the understanding of how attitudes and motivation help students' academic learning. Research findings from blended learning with real life contexts in a school in Thailand revealed that students actually connect their experiences with academic learning for sustainable living to conserve the environment as reflected in the following excerpt (Parahakaran, 2013):

...We use oil from the kitchen for recycling...as a project in our school...then we tried to calculate profit or loss...we find very little profit compared to what we buy outside...but even if we have just done small project, we should carry on...because it is good not just for our school...to save...not only for environment but for everything...

(Grade 12 Thai student's response as reported by Teacher 1)

Conclusion and the way forward

This article reports pilot phase of an ongoing study to set up “Borderless School” (BS) in SEAMEO region. The researchers received relatively good responses from teachers whose attitudes are mostly positive and be prepared to impart knowledge to promote sustainable living. Through the coordination of some of these teachers and project partners, selected pilot student project teams also showed self-motivated learning with exemplary output accessible on-line.

Of course, there are still rooms for improvement for the way forward. Among the aspirations to be pondered for BS to be more appealing include “students” ability to utilize technology and blended learning needs to be improved; to consider International networking platforms and forums using “Science Project/problem/programme-based Activities inCorporating Experiment MANgement” (SP3ACEMAN) e-portal (http://sp3aceman.net/?p=95) hyperlinked to SEARCH (Image 8). This is
another platform for project teams to upload their WebQuest output as “OER an intercultural” DR RED by and for all, e.g. Google Map of zones of disaster risks and rescue centres in Philippines (http://mapsengine.google.com/map/viewer?mid=zIfyH_mMRA0U.k13r5KbORjF4) (Image 9).

Teachers or administrators should also be helped with the demands, management of and evaluation in BS with ethical responsibilities in ICT, 21st century skills for solving-problem that are needed. Schools must organize project, PBA and PBL under co-curriculum to give chance for students to collaborate with others. Mathematics and other interdisciplinary curriculum need to be considered and integrated in all the suggested blended learning. Full support is needed from the government. Blended learning with OERs such as YouTube, project clips and blogs integrating collaborative learning strategies to be considered to provide students with the learning based on both cognitive and affective experiences, also to understand the contexts in which this learning is situated. Users who use the Internet for learning or research should be able to succeed in developing their understanding of any topic using the vast information of various websites available (Parahakaran, 2013). Hence authentic and sustainable living should be taught regularly utilizing digital tools to start authentic or real communication about basic topics concerning our lives and attitudes.

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Open and Distance Education Systems: do they enhance Graduates’ Soft Skills? The results from 2009 Universitas Terbuka Tracer Study

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Abstract
The vision and mission of Universitas Terbuka (UT) is to become a highly qualified open and distance education institution and to provide higher education access to all communities. Graduates of UT are expected to acquire adequate knowledge, hard skills and soft skills. Soft skills play important roles in the world of work. The aim of this article is to describe: (1) whether the open and distance education systems are capable of providing graduates with soft skills, (2) how soft skills are acquired during the period of study, and (3) how are the range of soft skills acquired by graduates and required by stakeholders at work. This article uses 2009 UT tracer study, which employed survey and in-depth interviews to selected respondents and stakeholders. 2,417 pairs data (graduates and stakeholders) were analysed. The rating scales were from 1 (very poor) to 4 (excellent). The attributes analysed were personal, interpersonal and situational skills. The results show that learning systems that are based on individual learning and tutorial did provide graduates with soft skills. Graduates and stakeholders perceived interpersonal skills as fair. In general, soft skills required at work were time management, self-confidence, problem solving, creativity and team-work.

Keywords: graduates; interpersonal skills; ODL; personal skills; situational skills; soft skills; stakeholders

Introduction
Indonesia is an archipelago country consisting of 17,508 islands stretching from Sabang, in the most western part to Merauke, the most eastern. Indonesia has 7 major islands, separated by big oceans. There are many barriers in education access and equality when geographical situation of Indonesia is concerned due to not only space but also human resources and time. On one hand, the people are encouraged to pursue higher education but on the other hand, access is very limited. Another thing worth mentioning is that most of teachers in Indonesia are urged to pursue higher degrees mostly without leaving their responsibilities due to shortage of teachers in many places in Indonesia. Establishment of Universitas Terbuka (UT) is Indonesian government’s solution to solving the problem.

UT is the state institution that organizes open and distance education. The system does not require classroom interaction but utilizing media, such as printed (modules) and non-printed materials (various media). This enables students who resides far from UT learning facilities to still access learning by utilizing appropriate learning materials. The meaning “open” suggests that there are no restrictions to age, previous education, period of study, period of registration, examination frequencies (Anonim, 2013). UT provides learning opportunities and learning assistance service to anybody without time barriers. Open and distance education system has enabled UT to reach all communities in the most remote areas which are categorized as the most outskirt and the least privileged. To date, UT has 37 representative offices all over Indonesia. These representative offices are known as Distance Learning Units of UT. The locations of representative offices are shown in Figure 1.
As a higher education institution, UT is required to produce graduates with certain capabilities, such as knowledge and field-related competencies. Higher education graduates must be independent and competitive on the job market. Higher education graduates should not only master hard skills but also soft skills to be productive and competent. Education is supposed to provide graduates with a set of skills that will enable them to develop and adapt to the work places. UT as an education institution should be able to produce graduates with adequate hard skills and soft skills to be able to exist and be competent at work.

This article is aimed at describing: (1) whether the open and distance education systems are able to equip students with soft skills, (2) how graduates rate their soft skills that they acquired during the study period at UT based on the graduates and stakeholders’ perceptions, and (3) the level of soft skills required by graduates and those by stakeholders at workplaces.

Review of Related Literature

Soft-skill is a non-technical competence that refers to personal characteristic. Nikitina & Furuoka (2013) wrote that soft skills cover all aspects of generic skills, including cognitive elements that are related to non-academic skills. Soft skills needed by graduates at workplaces are: leadership, stress management, willingness to be put into further education and training, analytical skills, team-work, team management, target or goal oriented, communication skills, presentation skills, English mastery, and project management (Wahl et al., 2012). Soft skills are a person’s power to change or to overcome many work problems and serve as indicator to determine the graduates’ promptness to get employed. Ketter (2011) states that soft skills required by stakeholders in employment are social quotient, collaboration, communication, listening, adaptive thinking, creativity, communication, problem solving, critical thinking, leadership and team-work. Abduwani (2012) classifies soft skills into three groups: personal, interpersonal and situational. Figure 2 shows Abduwani’s soft skills (2012).

Soft skills masteries of UT graduates are the essence of competence which is a must and valued through application of learning process. Learning model at UT is synergized following the Figure 3 scheme. Figure 3 shows that independent learning and tutorial play important roles in the UT learning activities. Independent learning is the major pillar of open and distance education system (Ratnaningsih, 2013). Furthermore, Ratnaningsih explained shapes students’ learning independent behaviour.

Independent learning allows an individual to arrange their learning activities. They can manage time or place of study and which modules to learn and utilizes any kind of sources needed to

Figure 1: Distance Learning Units in Indonesia

Figure 2: Abduwani’s soft skills (2012)

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facilitate their accomplishment in study. This method shapes an individual’s capacity in learning management, high responsibility, competence in making use of learning sources (Tahar & Enceng, 2006). Pertiwi and Sadjati (2012) also showed that soft skills needed by UT Agribusiness study program graduates were communication, team-work, leadership and problem solving. These skills were achieved by accommodating courses with practices in the curriculum.

Another UT learning component to facilitate student learning is tutorial. It allows students to achieve certain competencies, such as, willingness, the ability to observe, think, shape their attitude towards science and technology concepts (Anonim, 2001). Other benefits of tutorials are increasing students’ ability to interact between themselves and with the tutors, thinking skills, class management, communication, discussion, presentation and team-work (Anonim, 2001). Krovi and Sulek (2001) also emphasise that tutorial helps students develop general analytical skills in decision making. In reality, decision making calls for qualitative and quantitative approaches in problem
solving. UT facilitates students with several learning services for different kinds of student needs: face to face tutorial, on-line tutorial, written tutorial, radio tutorial, and telephone tutorial. The most used tutorials are face to face tutorials and on-line tutorials.

Provision of different kinds of tutorials is needed because UT students come from various background, ages, level of education, socio-economic status, geographical situation and available learning facilities. Zulkabir and Thaib (2003) stated that tutorials increased students’ abilities in independent learning and certain skills. Research related to the tutorial method and independent learning have been done, among others, by Darmayanti et al. (2011) and Tahar and Enceng (2006).

2008 UT Tracer Study result (Listyarini et al., 2010) showed that most of UT graduates admitted that UT helped them in increasing their knowledge in IT and communication. This is proven true because UT facilitates its students through much media. Besides, on-line tutorial has been proven beneficial, especially for those working as teachers who would share their knowledge and skills in their teaching and learning activities.

There are, however, several barriers in tutorials, faced by students and tutors alike (Pardede et al., 2008; Yuliana & Winata, 2009). Pardede et al. (2008) have done some research about these barriers and stated that students experienced difficulties in account activation, initiation in on-line tutorial, dealing with tutors who could not carry their roles as study guide, and schedules. Yuliana & Winata (2009) supported the finding by proving that internet access is low due to geographical condition.

Methodology

Data used is from 2009 UT Tracer Study, collected from selected respondents by utilizing questionnaires and interviews. Respondents were graduates taken from the UT database. Populations were all UT graduates from 1998 to 2007. Total sample analysed were 2.417 pairs of data (graduates and stakeholders). Sample data per faculty is in Table 1.

Table 1 shows that most of the respondents (graduates and stakeholders) were from the Faculty of Education. Therefore, analysis in this article will be grouped into Education and Non-Education (Economics, Social and Political Sciences, and Math and Natural Sciences). Variables analysed are soft skills attributes needed by graduates, in the literature, such as, among others, self confidence, leadership, communication skill, presentation skill, writing skill, analytical skill, negotiation, problem solving, creativity, stress management, time management, team-work, work coordinating skill, and English proficiency.

Data were analysed through quantitative and qualitative analysis. Quantitative data were gathered from the respondents’ questionnaires in the form of every attribute analysed. Qualitative data were gathered from the results of interviews, transcribed and grouped into the kinds of questions for

<table>
<thead>
<tr>
<th>No.</th>
<th>Faculty</th>
<th>Frequency</th>
<th>Percentage (%)</th>
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<tbody>
<tr>
<td>1</td>
<td>Economics</td>
<td>178</td>
<td>7.4</td>
</tr>
<tr>
<td>2</td>
<td>Social and Political Sciences</td>
<td>277</td>
<td>11.5</td>
</tr>
<tr>
<td>3</td>
<td>Education</td>
<td>1826</td>
<td>75.5</td>
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<tr>
<td>4</td>
<td>Math and Natural Sciences</td>
<td>136</td>
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<td></td>
<td><strong>Total</strong></td>
<td><strong>2.417</strong></td>
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during the interviews, based on interview guidelines specially designed for this purpose. In discussion, quantitative data were elaborated with qualitative data to get a comprehensive and thorough analysis.

Soft skills needed by graduates at workplaces is ranked through significance analysis technique, measured with Relative Importance Index, $RII$ with the following formula:

$$RII = \frac{\sum W}{AN}$$  \hspace{1cm} (1)

where $W$ is the weighting given to each soft skill by the respondents (ranging from 1 = very poor to 4 = excellent), $A$ is the highest weight (ie. 4 in this case) and $N$ is the total number of respondents. Significance rate of stakeholder soft skills ware measured by Relative Competence Index, $(RCI)$ with the following formula:

$$RCI = \frac{\sum W}{AN}$$  \hspace{1cm} (2)

**Results and Discussion**

Discussion in this article is divided into 3: UT teaching and learning process, soft skills perception (according to graduates and stakeholders), and soft skills rates needed by graduates and demanded by stakeholders at workplaces.

**UT Teaching and Learning Process**

UT teaching and learning process refers to the model presented in Figure 3. The strongest point of this system is in independent learning and tutorial (Figure 4).

Figure 4 shows that independent learning was experienced by education or non-education graduates and it contributed significantly to the teaching and learning processes (good and very good). Ratnaningsih (2013) argued that other contributions through independent learning are self-confidence (77.60%), independence (75.99%), self-development (73.64%), and creativity (60.96%). Paul (1990) and Candy (1991) stated that distance education students were conditioned to practice their independent learning skills during study and this proved to improve their skills and brought it to their respective workplaces.

UT teaching and learning systems were specially designed to give freedom to students in selecting and determine their own time in registration, study time, looking from learning sources, study techniques and exam schedules (Anonim, 2013). Learning control is therefore in the hands of the students. For this purpose, however, students must have initiative, independence, and study regularity (Guglielmino & Guglielmino, 2003).

![Figure 4: Contributions of Tutorial and Independent Learning in Teaching and Learning Process](image-url)
Sugilar (2000) said that UT students had a full study control and high study attention and these have contributed to a high readiness to independent learning. Students valued participation (enrollment and engagement) in distance education because it contributed to high teaching and learning control and positively related to students’ readiness in independent learning. Ratnaningsih (2013) found that both graduates and stakeholders perceived that graduate independence in workplaces were good and very good. The average rates that graduates and stakeholders gave to independences were 65.90% and 63.61%, respectively.

Graduates, however, felt that tutorial contributed a little during the study process due to the limited variety between 1990 and 2000. Face to face and on-line tutorials were highly chosen by students although there were barriers in the implementation, e.g. tutor acted as lecturers not facilitators, dominant method of lecturing that gave an impression of regular classroom activities (Karuru, 2004). Barriers of the on-line tutorial have limited infrastructure facilities, limited internet access, low participation and low tutor responsiveness (Pardede et al., 2008; Yuliana & Winata, 2009).

Graduates, however, appreciated the positive impact of tutorials. The following were the results from the interviews:

- “Independent learning, books and tutorials made me independent and increased myself confidence; independent tasks also improved self confidence. We read and answer questions all by ourselves. We can study wherever we want.” (a graduate-Padang).
- “For me tutorials help a lot. Face-to-face tutorials help us better understand [a course]. I remember, it was Mr. X who explained clearly a Statistic course.” (a graduate-Samarinda).
- “Here I increased my knowledge in social sciences, and also my classroom action research. The UT modules are used to solve problems in my classroom.” (a graduate-Medan).
- “As elementary school teachers, I was greatly helped by tutorials and lab practice in computer sciences. Elementary school teachers must also increase their capacity in globalization of the internet as part of the technology advances. Unfortunately, my school has not yet been facilitated with the internet.” (a graduate-Samarinda).
- “The results of UT learning programs are used as a foundation to utilize technology and learning materials at school. UT shaped myself confidence and its learning media can serve as a foundation of attitude in learning.” (a graduate-Bandar Lampung).
- “. . .before I enrolled at UT, I studied at ITB, Math major, stopped at 5th semester. I wish I had known UT before I enrolled at ITB. I did not like regular classes, too restricted. I am a lazy person. I dropped out, Ma’am. I like distance education which has no time barrier. I freely choose when to study, so flexible but at the same time I was forced to learn independently; independent in many things.” (a graduate-Denpasar).

The above were in line with Krovi & Sulek (2001) and Anonim (2001) which argue that tutorials help students develop their general analytical skill in decision making. UT learning processes foster independence, responsibility, self confidence, innovation, and ability to solve problems. In other words, open and distance education system is capable of equipping students with soft skills. Student competence, however, plays an important role in increasing their independence skill: a beneficial starting asset in distance education learning activities.

**Description of UT Graduate Soft Skills**

Soft skill attributes analysed in this article cover: self confidence, leadership, communication skills, presentation skills, writing skills, analytical thinking, negotiation, problem solving, creativity, stress management, time management, team-work, work coordinating ability and English. The 14 soft skill
attributes are grouped into: personal skills, interpersonal skills and situational skills (Abduwani, 2012). Personal skills cover: self-confidence, analytical thinking, presentation skill, writing skill and English. Interpersonal skills cover: leadership, communication skills, creativity and team-work; while situational skills cover: time management, stress management, negotiation, problem solving and work coordination.

Descriptions of soft skills are defined according to the perceptions of the graduates and the stakeholders. Analysis of several attributes based on perception are shown in a form of pyramid figure (Figure 5). The figure shows that distance education contributes positively to soft skills acquisition, and the highest contribution is to self-confidence (3.26). This means, distance education which promotes independent learning contributes positively to self-confidence. Self-confidence is one of the important aspects in work related soft skills (Abduwani, 2012). Yani et al. (2012) stated that 71% agribusiness graduates developed self-confidence while studying at UT while Ratnaningsih (2013) argued that graduates’ self-confidence were developed during their study periods (77.60%).

Other soft skills that contribute to the graduates are: communication skills, time management, team-work, and project management. Soft skills evaluation according to graduates and stakeholders were not significantly, proven by a rather symmetrical figure 5. However, soft skills were grade low: English proficiency, stress management and report writing. Stakeholders confirmed English proficiency as low. The interviews with stakeholders of both education and non-education groups emphasized the low English proficiency of UT graduates. Figure 5 shows that contributions of distance education in general to graduate soft skills were assessed as fair, with a tendency towards good (between 2.68–2.93).

Abduwani’s soft skills grading (2012) according to graduates and stakeholders are presented in Figure 6 which shows that UT distance education system provided graduates, from education and non education groups with personal skills, interpersonal skills, and situational skills. Interpersonal skills were graded as higher than the other two, i.e. Education graduates by 2.84 and non-education by 2.87; education stakeholders by 2.86 and non-education by 2.86. Personal skills contributed lower compared to the other two due to low English proficiency.
To find out about the rank of soft skills needed by the graduates and stakeholders at work, Relative Importance Index (RII) and Competence Relative Index (CRI) were used. The pyramid graphic of soft skill ranks for the education group according to the graduates and stakeholders are presented on Figure 7 and the non-education group in Figure 8.

Figure 7 shows that of the top 5 soft skills needed by the education graduates at work are time management, self confidence, problem solving, and team-work, and also work coordination. This was emphasized in Wahl et al. (2012) which stated that soft skills needed at work are ranked as follows, English proficiency, time management, team-work, communication skills, project coordinating capacity and analytical skills. Graduates and stakeholders of the education group were not

Figure 7: Soft skills rank of Education graduates according to graduates and Stakeholders
significantly in line with it. Shakir (2009) formulated 23 dominant soft skills attributes at work and listed 7 important soft skills that are needed to be embedded within the curriculum.

For the non-education group, soft skills rank needed by the graduates and stakeholders were slightly different. Figure 8 shows that of the top five soft skills of the graduates are self confidence, leadership, problem solving ability, team-work and time management. This was perhaps because in general many non-education group graduates were promoted to higher positions after completing their studies at UT (35%). They worked in government and private sectors (Tim Tracer Study, 2009).

Based on stakeholders' evaluation, the top five soft skills ranks of non-education graduates were: time management, self confidence, problem solving ability, team-work and analytical thinking. Both evaluations were in line with the result of research Ketter (2011) about job seekers' character ranks demanded by the job market.

**Conclusion**

Open and distance education learning system is proven to have improved students' soft skills. This is made possible through implementation of a series of learning processes, i.e. independent learning and tutorials. Several soft skill attributes among others, independence, responsibility, self confidence, creativity, ability to solve problem, communication and time management were developed during their learning process.

UT learning activities contribute to meaningful soft skills acquisition. Graduates and stakeholders evaluated that UT graduates' interpersonal skills were as good or better compared to the other two skills, i.e. personal and situational skills, but graduates and stakeholders also agreed that English proficiency of UT graduates was still low.

The list of soft skills needed at work according to UT graduates from the education group were: time management, self confidence, problem solving, creativity and team-work; those needed by stakeholders were, among others, time management, self confidence, leadership, problem solving, team-work and work coordination. For the non-education graduates the importance of soft skills needed were self confidence, leadership, problem solving, team-work and time management.
Stakeholders’ top five soft skills of non-education graduates were time management, self-confidence, problem solving, team-work and analytical thinking.

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References


A Kenyan Cloud School. Massive Open Online & Ongoing Courses for Blended and Lifelong Learning

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Abstract
This research describes the predicted outcomes of a Kenyan Cloud School (KCS), which is a MOOC that contains all courses taught at the secondary school level in Kenya. This MOOC will consist of online, ongoing subjects in both English and Kiswahili. The KCS subjects offer self-testing and peer assessment to maximize scalability, and digital badges to show progress and completion to recognize and validate non-formal learning. The KCS uses the Moodle LMS with responsive web design to increase ubiquitous access from any device. Access is free and open, and the KCS intends to be a contextualized open educational resource for formal secondary institutions to support blended learning and a free source of non-formal education for lifelong learning. The expected outcomes are that this effort will reduce secondary school dropout rates, improve test scores, become a quality resource for blended learning, as well as validate and recognize lifelong learning in Kenya.

Keywords: Blended Learning; Digital Badges; ICT4E; Lifelong Learning; MOOC; OER

Introduction
Kenya, as many countries in sub-Saharan Africa, is extremely poor. 76 % of the population is rural, life expectancy is 56 years of age, and a remarkable 67 % live under the poverty line, which means that 2/3 of the population has an income of less than $2/day (World Bank, 2013). Primary school in Kenya is free since 2003, however, the reality is that formal schooling at the secondary and tertiary level is a pipe dream for many due to prohibitive fees. Kenya has a population of approximately 40 million habitants. The poorest quintile goes to school on average for 6 years, and the richest quintile goes to school on average for 8 years (World Bank, 2013).

However, access to the Internet and Internet connected devices is still rather limited but growing at an encouraging rate. Mobile devices are commonplace in developing countries and ubiquitous in Kenya. Kenya has around 29 million mobile subscribers, and mobile penetration is around 75% (Communications Commission of Kenya, 2012). Internet access in Kenya is around 27%, 15% access the Internet via smartphones, and the usage of mobile devices and the Internet is increasing (Kenya ICT Board, 2011).

Therefore, the combination of widespread poverty, school fees for secondary schooling, and fees for uniforms and learning materials contributes to high dropout rates. These issues create a need for some form of ICT solution to alleviate access to quality knowledge for anyone in Kenya. At the same time, a burgeoning infrastructure of desktop and mobile devices with Internet access is gradually increasing, so that the possibility to reach and utilize a web-based educational solution becomes feasible. This research intends to explore the feasibility and potential of using a Massive Open Online Course (MOOC) to reduce dropout rates and provide access to high quality knowledge in a Kenyan context for free.

Furthermore, existing research in the areas of Open Educational Resources (OER), MOOCs, and learning (blended learning, non-formal learning and MLearning) in developing countries typically
focuses on higher education and/or teacher education. Examples of research efforts in higher education and teacher education for OERs in Africa can be found for example in Ngugi (2011), Sapiere and Reed (2011), Murphy and Wolfenden (2013), Thakrar, Wolfenden and Zinn (2009), Wolfenden, Buckler and Keraro (2010), and studies regarding the OpenLearn Initiative such as McAndrew et al. (2009), Mwanza-Simwami, McAndrew and Madiba (2008), and Wolfenden (2008). Thus, there seems to exist a general lack of research that specifically addresses secondary schools in developing countries that use MOOCs or OERs. This research effort intends to even address this lack of research.

Related concepts and research

MOOCs and OERs

In 2008 Dave Cormier created the term MOOC (Massive Online Open Course) when analyzing a course offered through the University of Manitoba in Canada entitled Connectivism and Connective Knowledge (Mackness, Mak Sui Fai & Williams, 2010; Weller & Anderson, 2013). This course had 24 participants enrolled for credit and more than 2000 informal participants. Since this meager start, 2012 was recently crowned “The Year of the MOOC”, and a MOOC is now more loosely defined as a free, non-credit, massive course (Pappano, 2012). Despite MOOCs being a direct open and free competitor to traditional online courses that charge a tuition and provide credit, many traditional institutions have created MOOC platforms such as edX from Harvard and MIT (Pappano, 2012). There are now even private portals that aggregate various MOOC offerings under one umbrella such as Coursera and Udacity, and Coursera is growing faster than Facebook (Pappano, 2012). The growth and popularity of MOOCs is enormous, and they are highly disruptive for higher education (Weller & Anderson, 2013). Shirky (2012) states that MOOCs will be equally disruptive to higher education as the MP3 music file format was to the music industry by asserting “Higher education is now being disrupted; our MP3 is the massive open online course (or MOOC), and our Napster is Udacity, the education startup.” (p. 1). Shirky (2012) even elaborates regarding how this technology will be disruptive stating “MOOCs expand the audience for education to people ill-served or completely shut out from the current system” (p. 1).

However, everything is not perfect with MOOCs and key issues are assessment and recognition, validation, and accreditation (RVA). Regarding RVA, the use of certificates of accomplishment and digital badges are two of the most common ways for participants to show that they have completed a course or obtained a specific skill. Accreditation is a challenge for MOOCs, especially regarding how MOOC credit fits into the higher education landscape (Pappano, 2012). Weller and Anderson (2013) address this issue stating

More difficult are the broader issues such as ensuring a good student experience when there is no tutor present and implementing methods of informal assessment (such as Mozilla badges) and how these relate to official accreditation raise issues for a large scale institution with a global brand. (p. 58)

xMOOCs, cMOOCs and quasi-MOOCs

MOOCs have evolved overtime into three different variations: xMOOCs, cMOOCs, and quasi-MOOCs. Traditional learning institutions typically use an xMOOC, where the teacher is the expert and the learner is the consumer. These MOOCs primarily consist of little external materials, and mirror traditional learning by using video lectures and quizzes (McGreal, Kinuthia, Marshall & McNamara, 2013). A cMOOC is based on a connectivist pedagogical model. These MOOCs are largely open and decentralized with limited structure, and learners are autonomous and view
knowledge as generative with a focus on sharing and connecting with other participants through blogs, forums, and an LMS (McGreal et al., 2013). A quasi-MOOC provides web-based materials as OER. This MOOC type intends to support specific learning tasks and provides little or no social interaction or grading, and a representative example is Khan Academy (McGreal et al., 2013).

**Open educational resources**

According to UNESCO, the term open educational resources (OER) was coined in 2002 at the UNESCO-hosted Forum on the Impact of Open Courseware for Higher Education in Developing Countries (Johnstone, 2005). OERs are simply defined as any educational resources that are "openly available for use by educators and students, without an accompanying need to pay royalties or license fees" (Butcher, 2011, p. 5). OERs and Open Course Ware (OCW) are very similar, but OCW typically refers to high quality digital publications for higher education materials. A representative example is the Open Course Ware initiative from MIT (Butcher, 2011). For this research, OER falls within these definitions in that the course contents will be entirely free as well as digitized educational resources.

**Validation and recognition with digital badges**

The key aspects to be addressed for formalizing non-formal learning are recognition, validation, and accreditation (RVA). As Singh (2012) defines

Recognition, validation, and accreditation (RVA) of all forms of learning outcomes is a practice that makes visible and values the full range of competences (knowledge, skills and attitudes) that individuals have obtained in various contexts, and through various means in different phases of their lives. (2012, p. 8)

Furthermore, Singh (2012) states “the RVA of non-formal and informal learning is a key lever in making lifelong learning a reality” (p. 3). Singh (2012) defines these three concepts accordingly:

- Recognition is a process of granting official status to learning outcomes and/or competences, which can lead to the acknowledgement of their value in society.
- Validation is the confirmation by an approved body that learning outcomes or competences acquired by an individual have been assessed against reference points or standards through pre-defined assessment methodologies.
- Accreditation is a process by which an approved body, on the basis of assessment of learning outcomes and/or competences according to different purposes and methods, awards qualifications (certificates, diplomas or titles), or grants equivalences, credit units or exemptions, or issues documents such as portfolios of competences.

Validation of non-formal and informal learning is becoming a key aspect to lifelong learning, and the “purpose is to make visible the entire scope of knowledge and experience held by an individual, irrespective of the context where the learning originally took place” (Colardyn & Bjornavold, 2004, p. 69). Validation is a vital ingredient to ensure visibility and to indicate the appropriate value of the learning that took place (Colardyn & Bjornavold, 2004). Validation of non-formal and informal learning is often connected to formal education by providing a certificate or diploma, and it links the assessment of any form of learning to the validation proposed in formal education systems (Colardyn & Bjornavold, 2004). Furthermore, Werquin (2012) even defines the concept of recognition of non-formal and informal learning outcomes (RNFIL0) as a promising approach and that “the growing focus on learning outcomes and on non-formal and informal learning is a strong incentive for non-education actors and stakeholders to become involved in the definition of standards.”
Additionally, according to Mazoué (2012) “because of the wikification of knowledge, however, the notion that only certain forms of officially sanctioned learning count is no longer accepted as a given” (p. 83), and colleges and universities must accept competition from badge systems for accreditation. Moreover, Abramovich et al. (2013) found that participatory badges increase motivation and that different types of badges can affect learning performance.

A digital badge system is a nascent technology that intends to recognize, validate, and in some cases even accreditize non-formal learning and achieve the aforementioned concepts of RVA. One of the first and largest actors in this area is Mozilla with its Open Badges system (Surman, 2011). Digital badges allow badge owners to digitally show and publicize online an achieved knowledge or skill. As Carey (2012) mentions “the MacArthur foundation says it’s a validated indicator of accomplishment, skill, quality or interest” (p. 1). A digital badge system is more than just a simple list of merits like a CV or transcript. It is a way for students to build and display their own education using digital badges as the building blocks. Once again Carey (2012) reinforces this idea by stating that “Students won’t just earn badges—they’ll build them, in an act of continuous learning” (p. 1). Open badge systems and digital badge systems are legitimate competitors to traditional accreditation systems such as secondary and tertiary educational institutions and quite possibly threats to their dominance. “The biggest push for badges is coming from industry and education reformers, rather than from traditional educational institutions” (Young, 2012, p. 49). However, Matkin (2012) states that “the real proof of the badge concept will come with employer recognition.” (p. 10). Furthermore, large actors in the MOOC sphere such as Khan Academy and edX are using or intend to implement various implementations of digital badges (Young, 2012). Additionally, as of May 2013, Mozilla’s Open Badge system will be integrated into the Moodle LMS system. Lastly, a potential drawback inherent in online learning environments is dishonesty, i.e. matters dealing with verifying the identity of a learner and ownership of work. However, Gikandi et al. (2011) state that dishonesty can be minimized by enhancing the validity and reliability of assessment methods.

**Technical platform**

Responsive web design is the concept of using CSS (Cascading Style Sheets), which is a style sheet language for describing the presentation of web pages, along with media queries, to determine the resolution of the device being used and adjust the delivery and presentation of the website content accordingly (Marcotte, 2010). What responsive web design basically implies is that the use of device specific apps or web applications becomes unnecessary because the content is simply manipulated according to the CSS3 directives provided in order to adapt the content for the screen size of each device. Furthermore, responsive web design even expands/shrinks the content to use available space when a web browser window is resized.

The technical platform to be used for the design, implementation, and delivery of the Kenya Cloud School is Moodle 2.5 in combination with the bootstrap theme. Moodle 2.5 is an open, free, and feature rich Learning Management System (LMS). The bootstrap theme (based on Twitter’s bootstrap styling framework) is now standard in Moodle 2.5. This theme implements the aforementioned responsive web design to deliver content in a responsive manner, so that any type of device can optimally access, view, and use content. The Moodle 2.5 platform also provides all the necessary features to allow interaction, collaboration, and use of multimedia from any type of device. Finally, the Moodle 2.5 platform even has native support for Mozilla’s Open Badge system so that the creation, implementation, and delivery of digital badges for participants’ progress and achievement in the content can readily be realized.

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There are a variety of definitions for mLearning, but the definition used for the purposes of this research is "miniature but portable e-learning." This phrase implies that mobile, wireless, and handheld technologies are used as additional devices to access conventional e-learning, i.e. mobile technologies are adaptable substitutions for desktop technologies (John Traxler, 2007). Kukulska-Hulme (2007) also states that mobile learning activity continues to take place on devices not specifically intended for educational use, and this fact supports the need to allow and create seamless access to educational resources regardless of device. Using the definitions of mobile learning provided by Traxler (2007), this research effort is a mix of technology-driven mobile learning and remote/rural development mobile learning because this effort tests MOOCs and responsive web design in a developing country. Traxler and Leach (2006) found with the DEEP project regarding mobile learning in South Africa and Kenya that the potential for mobile devices was regarded as very high and portability was key. However, technical issues regarding mobile infrastructure, electricity, and device cost were noted, but these issues had diminished since this study was made.

Furthermore, Clough et al. (2009) concluded that mobile device users use their devices to support both intentional and unintentional informal learning, and that the portability and convenience of mobile devices means that they are always available to support spontaneous and planned learning activities. Unwin (2012) argues,

However, with the rapid development of mobile broadband solutions, with the creation of even better handheld devices in the future, and with the realization that such technologies can indeed transform education, then learners will increasingly demand access to appropriate and sophisticated learning resources that they can access through their mobiles to use the Web in innovative ways, especially for those who remain outside traditional educational systems. (p. 130)

Finally, Park (2011) presents and explains the concept of the shift from m-learning to u-learning where the physical devices disappear, computation and communication are blurry, and learning is flexible and dynamic. Park (2011) even classifies educational applications with mobile technologies into four categories: (1) high transactional distance socialized m-learning, (2) high transactional distance individualized m-learning, (3) low transactional distance socialized m-learning, and (4) low transactional distance individualized m-learning. The Kenyan Cloud School effort falls into category four, as it most accurately supports blended or hybrid learning efforts.

Kenyan secondary school

Secondary education in Kenya consists of four years that are entitled Forms I, II, III and IV. In Forms I and II students are required to take 12 subjects, and the 10 obligatory core subjects are Mathematics, English, Kiswahili, Biology, Chemistry, Physics, Geography, History and Government, and Physical Education (Elimu Networks, 2013). The students then choose one subject from Christian Religious Education, Islamic Religious Education, and Hindu Religious Education, and two subjects from Business Studies, Agriculture, Home Science, Arabic, French, German, Music, Art and Design, and Computer Studies (Elimu Networks, 2013). In Forms III and IV students study a minimum of seven subjects and a maximum of nine subjects. Students must choose three core subjects (English, Kiswahili, and Mathematics) and at least two science subjects (Biology, Physics, and Chemistry) (Elimu Networks, 2013). The remaining two to four subjects can be chosen from the list of electives in Form I and II. Graduation from secondary school and the basis for entrance into higher education is the Kenya Certificate of Secondary Education (KCSE). An exam is taken for each core subject at the end of the final year (Form IV) and graded on a scale from A-E where C+ is a passing grade. Support materials, i.e. textbooks, for the curriculum in Kenya is developed by
approved publishers and evaluated and approved by the Kenyan Institute of Education. Each year a revised list of approved support materials is provided to all secondary schools.

Related research studies

Concerning similar research studies, a comparable study combining MOOCs and mobile access was made in 2011 entitled MobiMOOC, which was a six-week course about mLearning. It was a non-formal MOOC that provided a certificate of participation for memorably active participation (de Waard et al., 2012). De Waard et al. (2012) concluded that “mLearning and the MOOC format have a great potential for informal and lifelong learning. Both learning forms allow for knowledge creation to happen overtime without being tied to a particular space and contexts.” (p. 44). Furthermore, de Waard (2012) called for further research in the two areas of mLearning and MOOCs, specifically calling for “more representation from developing nations” to “add depth to the dialogue” (p. 44). Additionally, de Waard et al. (2011) state that “more research should be undertaken into the realities, benefits, and challenges of MOOCs and mLearning in order to map all of their contributing dynamics” (p. 112).

Despite the fact that the majority of the research efforts regarding OERs in Africa focuses on teacher education and/or higher education, there exist some results and findings from various studies that provide guidelines and insights for MOOCs and secondary education that are the focus of this research project. The flexibility and literally unlimited possibilities of OER imply a potential to be an important part of the e-learning landscape (Kozinska et al., 2010). Additionally, “there is immense potential and promise in OER to operate in combination with the promotion of digital and online access in addressing major social problems” (Kozinska et al., 2010, p. 41). Liyanagawardena (2013) analyzes and discusses the viability of MOOCs in developing countries and concludes that access to digital technologies and a general lack of literacy in computers and English along with cultural aspects are key hindrances for using MOOCs. However, this study focuses on existing general MOOCs available from developed countries and not on MOOCs from developing countries given in the local language. Sapire and Reed (2011) conclude in their study of using a collaboratively developed OER for mathematics teacher education that “expert led collaborative materials design, drawing on the subject and pedagogical knowledge and existing materials developed at institutional sites, has potential for achieving quality, cost-effective, and multiple-use resources” (p. 209). Ngimwa and Wilson (2012) also find that the benefits of OERs in Sub-Saharan Africa were better teaching and learning outcomes, improved learners’ performance, and access to quality and cheap learning resources. They also find that the obstacles for OER adoption in Sub-Saharan Africa are socio-cultural and economic issues, academic pride, lack of awareness, negative attitudes towards OERs as a foreign initiative, lack of time/unwillingness to find time to participate, fear of loss of extra income, technology-related costs, and unsupportive institutional and national policies. Finally, “OER is of particular relevance for developing countries as OER combined with open, flexible and distance learning can contribute to easier and better access to education” (Mulder, 2008, p. 2).

Blended learning, non-formal learning, and lifelong learning are also frequent topics in related research. Olcott, Jr. (2013) summarizes and discusses the use of OERs for non-formal education, and presents emerging issues for research such as how OER can be expanded for non-formal education in developing countries. Wilson (2008) states that OER in developing countries fits in with the curriculum as a form of supplemental material. Further research that shows the potential and value of OER and education for blended and lifelong learning are examples in India of online school textbooks such as the National Council of Educational Research and Training (NCERT) and
eGyanKosh of IGNOU. These resources are widely used by curricula designers and used for various purposes by lifelong learner communities (Das, 2011). Finally, Mulder (2008) states that

Lifelong Learning does not receive much attention. The natural bridging between informal, non-formal and formal learning by OER and the paramount opportunities this offers to widening and increasing participation in Higher Education, however, make OER probably a most powerful instrument in the area of Lifelong Learning (LLL). (p. 9)

Also, the need to explore validation and recognition of learning can be seen by the general trend in the developing world to use OER to meet the demand for qualifications at all levels, secondary and tertiary. OERs are seen as a route to earning credentials and adding value to existing educational efforts (Umar, Kodhandarama & Kanwar, 2013).

Other studies promote the importance of personalized and localized content. A comparable study by Petrides and Jimes (2008) reviewed the Free High School Science Texts (FHSST) project that was a South African-based OER project created by graduate students to address the lack of science and math secondary school textbooks. The FHSST project was a collaborative effort to create content from the ground up. Applicable results from this study to the Kenyan Cloud School effort are that measures must be taken to ensure that the content of textbooks adheres to existing national curriculum guidelines and that content is localized and fulfills local teaching and learner needs.

In the LLL perspective, freely available content on the Internet should empower learners to really study on their own in an open and flexible learning environment, with no (avoidable) references to a teacher, a classroom or an educational institution. This requires structural and explicit learner-centered content design instead of the conventional teacher-centered content approach (Mulder, 2008, p. 9).

Methodology

Wang and Hannafin (2005) compare and describe a variety of terminology dealing with design research such as design-based research (Designed-based Research Collective, 2003), design experiments (Collins, 1992, 1999), design research (Edelson, 2002), and developmental research (J. van den Akker, 1999). Wang and Hannafin (2005) define design research as “a systematic but flexible methodology aimed to improve educational practices through iterative analysis, design, development, and implementation, based on collaboration among researchers and practitioneres in real-world settings, and leading to contextually-sensitive design principles and theories” (p. 6). This definition appropriately describes the intended approach to the Kenyan Cloud School research initiative because this effort takes place in a real-world setting and includes the three stages of design, development, and implementation. Furthermore the process is iterative and will be adjusted over time based on performance. Additionally, Akker, Gravemeijer, McKenney and Nieveen (2006) describe educational design research as the systematic study of designing, developing, and evaluating educational efforts as solutions to address complex problems in educational practice. Their definition further supports the use of design research because this effort takes place in the educational space.

The design and development segments of this design research effort consist of digitizing the curriculum material for Forms I-IV and making them available on the aforementioned course platform. Researchers from developed Western countries and Kenya will reproduce the content for each subject for Forms I-IV according to the most recently approved curriculum material. In addition to this reproduction of existing content, researchers will add video lectures, quizzes, and other supplementary material as deemed appropriate for each topic and subtopic to enhance the value of the existing content as well as take advantage of the capabilities of the learning management
platform. Finally, the design segment will include forums and/or blogs to promote and encourage interaction and collaboration among learners as well as the design and implementation of digital badges for each topic and subtopic to support recognition and validation.

**Results**

The Kenyan Cloud School is a current work in progress and the first iterations of subjects in Form I and II are scheduled for completion in the late fall of 2013. The Moodle platform is already deployed and a test course in Human Rights entitled Haki Zangu (hakizangu.org) that was part of a separate research project successfully used the platform in the spring of 2013 without encountering any significant technical issues regarding badges or mobile devices. The Kenyan Cloud School will have the following key characteristics based on the aforementioned related concepts and research:

1. **Contextualization**
   a. Provide each subject in English and Kiswahili
   b. Strictly adhere to the existing approved secondary curriculum in Kenya

2. **Learning**
   a. Combine learning aspects from the different MOOC types (xMOOCs, cMOOCs, quasi-MOOCs) such as structured lectures, interaction, and open resources
   b. Provide the ability to be used as a formal, blended, or non-formal (lifelong learning) learning resource
   c. Provide validation and recognition of learning with digital badges
   d. Provide a learning environment that supports collaboration, interaction, and socio-cultural learning

3. **Recognition and validation**
   a. Provide the ability for participants to show progress and achievement in each subject by earning digital badges

4. **MLearning**
   a. Ensure that the content is easily accessible and useful regardless of computing device type to promote ubiquitous access.

5. **Usage**
   a. Free, unlimited access for any Kenyan citizen
   b. Support use as a resource for formal secondary education institutions
   c. Support use as a resource for lifelong learning

The expected results are that the Kenyan Cloud School will be a mixture of the different MOOC types where the primary type is a quasi-MOOC, but traits from both xMOOCs and cMOOCs will be implemented in order to enhance the learning value. The Kenyan Cloud School will use: a) video lectures, self-tests, and quizzes from xMOOCs, b) interaction and collaboration such as forums and peer assessment from cMOOCs, and c) OER aspects from quasi-MOOCs. The goal is to not only duplicate the existing content in the official textbooks, but even enhance the content and hopefully create a community around the Kenyan Cloud School, so that both learners and instructors can use, update, and maintain the content to support formal learning, blended learning, as well as non-formal learning (lifelong learning). This MOOC version is envisioned as a Massive Open Online Ongoing Course (MOOOC) in that it is perpetual and has no planned termination date.

The key expected result is to show that the Kenyan Cloud School implemented as a MOOC with digital badges is a viable and cost effective means to address both the practical social issues of poor graduation rates and costly, printed textbooks, as well as the research issues of successfully utilizing OERs in developing countries to achieve lifelong learning.

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Discussion

The possible benefits and drawbacks of a proposed solution such as the Kenyan Cloud School are numerous. For the past 10 years researchers have debated the success and failures of OER efforts in developing countries with a common theme that OERs, and nowadays versions of MOOCs, are the panacea to educational needs in developing countries. Nevertheless, the use and effects of OERs have not yet achieved their potential. One discussable aspect is the fact that a MOOC is intended only for courses, while this research intends to digitize textbooks. The word course is simply part of the acronym, but the intention of this research is to use aspects from formal courses in combination with the content from the Kenyan curriculum textbooks as outlined in the results. Hopefully, this merging of MOOC types and OER concepts can provide a sustainable and beneficial solution that can both supplement formal institutions and address graduation rates and social issues in Kenya, while at the same time successfully prosper as standalone courses to provide an avenue for lifelong learning. The importance of blended and lifelong learning has been presented in the aforementioned research. Using MLearning aspects to reach as many potential users as possible and access the growing smartphone/tablet segment of society, along with digital badges to provide learners with a means of showing the outside world that they have learned and achieved something is crucial to both the blended and lifelong learning aspects of this effort.

Key aspects that can increase the likelihood of success for this research effort is sustainability and scalability. Regarding sustainability, the creation of an active community of both learners and instructors is essential to long-term success (Petrides & Jimes, 2008). Also, the eventual involvement and policy support from the Kenyan government is desirable, and the importance of government support is deemed a necessity (Umar et al., 2013). As Kanwar, Kodhandaraman and Umar (2010) point out "in order to promote the growth of the OER movement in education in developing countries, there is the need for greater support for the creation and use of OER by the national governments and the educational institutions themselves" (p. 77). Additionally, “Thinking of knowledge as a public good, indeed giving it for free, and the supposed responsibility of governments for access, quality and efficiency of HE (and education in general), would justify a ‘good’ debate on the funding role of governments” (Mulder, 2008, p. 9). Sustainability has two key aspects: 1) how to sustain the development and sharing of the OER; and 2) how to continue utilization by the target groups (Kanwar et al., 2010). The inclusion of native experts and expert participants in the creation and maintenance of the course subjects addresses sustainability. It is vital that the Kenyan Cloud School creates a community of experts and users to address the first point as well as involve and gain official support of the Kenyan Institute of Education, which develops and approves the secondary curriculum. The second aspect of maintaining utilization by target groups can be obtained, if the effort becomes successful and shows positive results on graduation rates and test scores. Most likely, aspects of community and government support will eventually be crucial in determining the sustainability and long-term success of the Kenyan Cloud School. Scalability is hopefully less of an issue. From a technical standpoint the Moodle system can handle tens of thousands of users.

A final key aspect is localization and contextualization of OER content. Kremer (2003) indicates that Kenyan textbooks seem to improve test scores, but are in English, which is the official language of instruction. However, this is the third language for most Kenyans after their native vernacular and Kiswahili. Examples using flip charts had greater results on test scores (Kremer, 2003). Additionally, Rivard (2013) points out a variety of cultural and contextual issues with MOOCs, and implies that one course and content do not fit all. The Kenyan Cloud School attempts to preempt these shortcomings by offering the secondary curriculum in English and Kiswahili as well as using native and Western experts to translate and develop content. However, further research will be needed once the platform is operational to evaluate the actual results.

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Concluding remarks

Hopefully, the creation of a Kenyan Cloud School using the MOOC concept to offer secondary curriculum for free with the reward of digital badges for achievement has the potential to reach the lofty goals for OER set by UNESCO, and improve secondary school graduation rates and test scores in Kenya, while also adding to the existing research in this area. Moreover, potential successes from this project can hopefully inspire and guide similar efforts in other developing countries and regions to further explore the potential of educational efforts that utilize MOOCs, digital badges, and MLearning.

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Framework for the Development of OER-based Learning Materials in ODL Environment

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Abstract
This paper describes the framework for the development of OER-based learning materials TCC121/05 Programming Fundamentals with Java for ODL learners in Wawasan Open University (WOU) using three main development phases mainly: creation, evaluation and production phases. The proposed framework has further been tested on ODL learners to promote greater use of OER repositories and further the acceptance of a wider range of learning resources. By using collective feedback sessions, the walkthrough of available OER resources to be integrated or assembled into the learning materials is illustrated in the course development cycle and the interaction among students and instructors and learning experiences of courses units’ content are evaluated at the end of each of the courses with the production of external course assessor’s reports (Quality Assurance). The learners’ interactions with OER materials in LMS have demonstrated the development of a model for effective knowledge transfer using OER.

Keywords: collective feedback sessions; course development; learning materials; OER development; quality assurance

Introduction
Open Educational Resources (OER) include full courses, course materials, modules, textbooks, streaming videos, tests or other tools that resides in the public domain with intellectual property license that permits free-use or repurpose by using attribution, no derivatives, share-alike, non-commercial or any combinations of these CC licenses to support access to knowledge (Atkins, Brown & Hammond, 2007). The development of digital materials movement has encouraged users to re-use, revise, remix and redistribute resources (Hilton III, Wiley, Stein & Johnson, 2010) through appropriate tools and made available through creative common licensing.

In preparation of the OER-based E-Learning course, workshops and seminars are held to develop capacity of participants for integration of OER in their own teaching and learning at Wawasan Open University (WOU). The OER-Asia initiative in 2010 under the auspices of the University for promoting and transforming the existing course development process is aim to increase the quality and efficiency of developing OER-based course materials (Menon & Ali, 2012). The OER Policy for WOU with implementation strategies are given as follows:

“WOU will promote and implement the creation, reuse, remix, repurpose and redistribution of Open Educational Resources (OER) within an Open Licensing framework”

The OER repositories are introduced to the course team members in development of the OER-based course for the initial development by Chung and Khor (2012), TCC121/05 Programming Fundamentals with Java who comprised of Course Team Coordinator, Academic Members, Course Writers, Instructional Designers, Editor and External Course Assessor (ECA) for searching, creating and customizing learning contents including content modules, articles, books and journals. TCC121/05 was scheduled for course development in July 2012 as an OER integrated course.
adoption of the WOU-Open License Policy (OLP) (Menon & Ali, 2012) and first presented in January 2013 semester. The course development for TCC121/05 has been conducted smoothly within six months duration and the course materials were made available to the students at its six regional learning centers via WawasanLearn—a LMS based on the open-source system called Moodle. With the experience and feedbacks acquired from four semesters’ presentations, the development of TCC121/05 is conducted based on the students’ and tutors’ experience that have gone through the course. The course module together and OER contents provided in WawasanLearn formed an adequate support for students’ learning.

According to McGreal et al. (2013), sharing OER can be a valuable way to disseminate knowledge, diversify teaching activities and gain new insights into other teaching methods for a particular subject. A number of technical issues relating to improving accessibility and usefulness of OER such as the use of open source software, increasing interoperability by using open standards and emerging technologies that affect the open educational resources movement are being investigated (OECD, 2007). Motivations for learners to participate in OER development are varied, and many struggle to engage with courses and keep motivated in the context of an online learning environment (Yuan & Powell, 2010). In order to overcome the aforementioned issues, the Collective Feedback Sessions are initiated through live virtual domain using WizIQ to play the important role in helping to increase and widen participation in accessing and reviewing OER repositories. Virtual sessions were initiated to improve and overcome issue of how to find the resources that are most relevant, adding enriched metadata to resources for classification of educational resources (MELT, 2010).

This paper presents the framework for the development of OER-based learning materials and the evaluation of the student achievement and the accessibility of the OER content in WawasanLearn. The first section overviews the course development phases including creation, evaluation and production phases. The next section describes the Quality Assurance (QA) implementation for the OER-based course development via Collective Feedback Sessions. The findings, surveys and evaluations are discussed in the third section. The final section describes the recommendation and conclusion.

**OER-Based Course Development Cycle**

Figure 1 depicts the development phases (creation \(\rightarrow\) evaluation \(\rightarrow\) production) of OER-based learning materials in this approach by the initiation of the creation of Course Syllabus, Course Development Timeline and Course Blue Print by Course Team Coordinator and respective course team members. In the creation phase, course units write up are produced and reviewed by the instructional designer before being sent to ECA to be assessed through evaluation of ECA (SOP for Course Development, 2010). It is important to ensure that QA standards were maintained in the development of the course materials. Thus, internal and external quality assurances are employed into the evaluation and production phases.

As shown below, TCC121/05 comprises of 5 units course write up, self-tests, activities, examples and unit practice exercises which are written based on the integration and assembly of OERs under a CC BY-SA 3.0 license.

- **Course Overview**
- **Introduction**
- **Unit 1**
  - Unit content
  - Self-tests
  - Activities, examples
- **Unit 2**
  - Unit content
  - Self-test
  - Activities, examples
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- Unit 3
  - Unit content
  - Self-tests
  - Activities, examples

- Unit 4
  - Unit content
  - Self-tests
  - Activities, examples

- Unit 5
  - Unit content
  - Self-tests
  - Activities, examples

- Course Summary
- Unit Practice Exercise

The details of the framework documents are illustrated in Table 1.

Quality Assurance via Collective Feedback Sessions

The assurance is made aware throughout course development phases associated with the OER-based course materials with the inclusion of course writer’s guidelines, academic members’ inputs, ECA’s role and guidelines, course team reports, tutors’ and students’ feedbacks. TCC121/05 course team members are invited to attend Collective Feedback Sessions to ensure the review of each interim reports are taken place. Learners’ feedbacks and peer review processes are incorporated in the course development cycle as one of the most used quality assurance processes in academia (OECD, 2007).

Learning environments that encourage active participation and dialogue session provide learners with opportunities to engage in a process of knowledge construction as they try to create meaning from new experiences (Jonassen, 1995). The discussions in the collective feedback sessions held during the course development focused on the “how to develop” and usage of OER particularly in Java programming related areas. Virtual Workshop Sessions engaged using the virtual domain via WizIQ are held with guidance and step-by-step OER creation sessions for the OER content.
### Table 1: Production of Interim Reports and QA Framework for Course Development Cycle

<table>
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<tr>
<th>OER-based related production documents</th>
<th>Course Development Team and QA Framework</th>
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<tbody>
<tr>
<td>Course Syllabus, Course Development Timeline</td>
<td>• Course Writers, Course Team Coordinator</td>
</tr>
<tr>
<td>Course Blue Print</td>
<td>• Minutes Meeting (Course Team Coordinator, Course Writers, Academic Members, Instructional Designers) • Course Team Report • ECA Report</td>
</tr>
<tr>
<td>Course Guide</td>
<td>• Minutes Meeting (Course Team Coordinator, Course Writers, Academic Members, Instructional Designers) • Course Team Report • ECA Report</td>
</tr>
<tr>
<td>Course Units write up</td>
<td>• Minutes Meeting (Course Team Coordinator, Course Writers, Academic Members, Instructional Designers, Graphics Designers, Learning and Library Services Members) • Course Team Report • ECA Report</td>
</tr>
<tr>
<td>Assessments (Assignments, Examinations)</td>
<td>• Minutes Meeting (Course Team Coordinator, Course Writers, Academic Members, Instructional Designers) • Course Team Report • ECA Report</td>
</tr>
<tr>
<td>Completed Course Units (Recommendations, Actions Taken)</td>
<td>• Final ECA Report (Final Evaluation Report)</td>
</tr>
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### Table 2: Collective Feedback Sessions

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<th>Collective Feedback Sessions</th>
<th>Collective Feedback Sessions</th>
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intellectual property issues, resources that can be reuse, remix, repurpose and integrate can be accessed in the following sessions links as shown in Table 2.

The study of adapting and remixing individual modules into courses (example illustrated using CNX) is presented in Figure 2. The creation of two modules illustrated in Figure 2 covers Module 1: Object and Classes (with image containing Symbols of Flowcharts), Module 2: Intro to Object and Classes (Pseudocode for Java) and Module 3: Java Programming (Control Structures, Arrays). The examples for the modules created consist of self-contained metadata which allows the users to choose varieties of language used and the subject categories. The creation module enable users to import CNXML documents (Words files, OpenOffice files, Latex, multimedia assets) and select specific elements of the module to edit. The three sample modules created through the Collective Feedback Sessions are:

- Module 1: Object and Classes [http://cnx.org/content/m41591/latest/]
- Module 2: Intro to Object and Classes [http://cnx.org/content/m41398/latest/]
- Module 3: Java Programming (Control Structures, Arrays) [http://cnx.org/content/m41396/latest/]

**Findings and Discussion**

**Key Findings: Summary of Key Information of TCC121/05 Programming Fundamentals with Java**

The summary of the key information of the students enrolled in undergraduate course *TCC121/05 Programming Fundamentals with Java* is presented in Table 3 below:

In quantifying the participation rate and total time of access, redundant data from the log files of the activities in the LMS have been eliminated to ensure a true reflection of the learners’ learning pattern with the online content. Table 3 shows the learners in OER-based *TCC121/05* were higher in average age, with slightly more female learners and it was observed that there is an increase...
in the learners' participation rate and higher average frequency of activity over a semester. The progress in the higher participation rate of learners in the LMS is also evident to the wider access to OER learning. The exchange of learning questions and experiences in LMS help learners to clarify any doubt they have with regards to OER repositories and helping to find the most relevant and highest quality of resources.

**Key Findings: Patterns of Access in Online LMS WawasanLearn (views and posts)**

The pattern of access and activity by the course participants are observed in two separate semesters as depicted in Figure 3 (OER) and Figure 4 (Non OER). It was observed that the average activity level for OER-based TCC121/05 was higher than non OER-based TCC121/05 throughout the semester. The learners enrolled in OER-based TCC121/05 are found to be more initiated in accessing the LMS for OER online resources while non OER-based learners' activity level is with a declining level towards the end of the semester. This indicates that the motivation for researching
and utilising open content among OER-based learners are high as shown in the activity level of Figure 3. The students found that the WawasanLearn is useful as it supports the learning and they found that the forum discussion is relevant to the course contents using OER resources.

**Key Findings: Learners’ Interaction with OER Content and Resources in LMS**

The evaluation and feedback capability of the OER content and resources were investigated in terms of whether it permits one-way non-interactive or two-way interaction between learners—OER content to evaluate the outcome of learning arising from the interaction. Figure 5 shows the students were actively using the online discussion forums in WawasanLearn throughout the semester (58%) for knowledge-sharing activities. Learners in TCC121/05 used more than 50% of their time participating in the online discussion forums that allow asynchronous exchanges of ideas among peers and with their instructors. This indicates that they value online resources which allow for two-way communication and also suggests that they are getting acquainted with active involvement in the online environment. It is also noted that the participants seek to acquire knowledge for self-enhancement and to apply the knowledge gained in their daily work.

Learners in TCC121/05 spent more time in accessing the OER course content (19%) as the material involves providing constructive feedback and detailed commentary on course content via critical thinking that leads to knowledge development. The interaction with OER course content demonstrates the knowledge and explains the essential concepts about the course through the entire semester. It was found that the learners preferred to view through the hyperlinks OER resources (13%) as compared to the E-Books and slides (10%). The viewing activity was usually influenced by the content of the WawasanLearn and the posting of message in the forum. In simple, the good use of the OER resources as additional supports in the WawasanLearn was able to attract students to view the LMS and was able to support the students’ learning.

**Key Findings: Continuous Assessments and Examination Score**

Students performed satisfactory in the OCAS (Overall Continuous Assessment Score) during January 2013 (OER) with a mean score of 75.14% and a standard deviation (S.D) of 8.82 as shown.
in Table 4 below. On the other hand, learners in July 2012 scored lower OCAS with a mean score of 68.84% and S.D 7.10. This reflects the learners tend to perform better in the January 2013 semester than July 2012 semester as the additional OER resources are perceived as a valuable learning resource to test learners' understanding and allow learners to be better prepared for the TMA and final examination.

The assessments of TCC121/05 comprises Tutor Marked Assignments (TMA), mini projects and problem-solving case studies which were given by the Course Coordinator and tutor in the LMS for more in depth Java learning. Mini projects in the TMA tested the students' programming skills, problem solving and analyzing skills, flow chart/diagram and apply major components in Java programming in producing solution design.

As observed in Table 5, the Overall Examination Score (OES) achieved is 54.18%, with a standard deviation of 12.56. The OER-based student performance on the OES is considered to be above average as compared with non OER TCC121/05 with a mean score of 50.98% and standard deviation 11.17.

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<th>Table 4: Comparison of Overall Continuous Assessment Score</th>
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<tr>
<td>Overall Continuous Assessment Score</td>
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<tr>
<td>Mean</td>
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<td>Standard Deviation</td>
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<th>Table 5: Comparison of Overall Examination Score</th>
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<tr>
<td>Overall Examination Score</td>
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<tr>
<td>Mean</td>
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</tbody>
</table>
The summary of the students’ overall performance is illustrated in Table 6 above. The mastery of the TCC121/05 course is evaluated via an assessment strategy that consists of assignments, OCAS weighted at 50% and a proctored final examination, OES weighted at 50% to be computed as overall Course Score, 100%. Relatively, the students scored better marks in the January 2013 semester as they can obtain supports from the additional OER resources in the completion of their TMAs. This has reflected that the learners of OER-based TCC121/05 have shown better results and achievements in overall assessment and examination score respectively.

**Key Findings: Student Survey on Teaching and Learning Effectiveness**

Table 7 summarizes the relevant statistics scored for the seven items in the student survey of TCC121/05 teaching and learning effectiveness conducted in January 2013 semester (OER). The pertinent data are the average (maximum of 5.00) of each aspect and comparison is done across courses in WOU. There were 95 students out of 124 students participated in the survey. The students were satisfied with the tutorials, course materials, TMAs, library, MyDigital Library and also supports provided via WawasanLearn.

**Recommendation and Conclusion**

This paper presents the development and evaluation of OER resources in WOU learning materials for delivery in ODL mode. The course development cycle includes the interaction among students and tutors with feedbacks sessions and learning experiences of courses units’ content as one of the way in mobilising the faculty to support the use and re-use of OER. The course team members recommend that subsequent revision will be carried out on the TCC121/05 OER-based course.

### Table 6: OCAS, OES and Course Score For Programming Fundamentals with Java

<table>
<thead>
<tr>
<th></th>
<th>OCAS (50%)</th>
<th>OES (50%)</th>
<th>Course Score (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Jan 2013 (OER)</strong></td>
<td>37.57</td>
<td>27.09</td>
<td>64.66</td>
</tr>
<tr>
<td><strong>July 2012 (Non OER)</strong></td>
<td>34.42</td>
<td>25.49</td>
<td>59.91</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>OCAS (50%)</th>
<th>OES (50%)</th>
<th>Course Score (100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Jan 2013 (OER)</strong></td>
<td>12.56</td>
<td>21.38</td>
<td></td>
</tr>
<tr>
<td><strong>July 2012 (Non OER)</strong></td>
<td>7.70</td>
<td>18.87</td>
<td></td>
</tr>
</tbody>
</table>

### Table 7: Students Survey (95 respondents)

<table>
<thead>
<tr>
<th>Item Descriptions</th>
<th>Average Score</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Face to face tutorials</td>
<td>3.99</td>
<td>4.01</td>
</tr>
<tr>
<td>2 Course materials</td>
<td>3.81</td>
<td>3.53</td>
</tr>
<tr>
<td>3 Learning Management System (WawasanLearn)</td>
<td>3.90</td>
<td>3.63</td>
</tr>
<tr>
<td>4 Library</td>
<td>3.51</td>
<td>3.01</td>
</tr>
<tr>
<td>5 MyDigital Library</td>
<td>3.54</td>
<td>2.92</td>
</tr>
<tr>
<td>6 Tutorial Assistance through Telephone, Email and WawasanLearn</td>
<td>3.86</td>
<td>3.67</td>
</tr>
<tr>
<td>7 Tutor Marked Assignments</td>
<td>3.92</td>
<td>3.82</td>
</tr>
</tbody>
</table>

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units subjected to changes in technology impacting the course. The findings have indicated that the development framework will speed up the creation of course materials (spans approximately 6 months) and eliminate the necessity of accompanying textbook to achieve long-term cost-effectiveness in educational practice. The implementation strategy used in this study is targeted to promote and encourage collaboration in the creation and integration of OER courses within an Open Licensing framework. The above findings have also shown that TCC121/05 OER-based course learners are adapting well to the open course in online distance learning environment. In fact, the learners have shown great participation in, and utilization of, the open course content and OER online resources in the LMS. This initiative have also provided opportunities for ODL educators to share experience and encourage further learning of OER integration via virtual workshops in widening the participation of OER learning environment and spreading knowledge through ODL environment.

Acknowledgments
This paper has been awarded an ICDE Prize for Innovation and Best Practice on the theme of Open Educational Resources and intercultural aspects at the 25th ICDE Conference, held in Tianjin (China) in October 16th–18th 2013.

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Designing an Interactive OER Course Development at Athabasca University Based on ODL Principles

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Abstract
Failure rates in first year calculus courses are high in most post-secondary institutions across North America and other parts of the world. This Inukshuk-funded open education project involved the development of five stand-alone pre-calculus learning modules. The design and revision phases of this project occurred between the fall of 2007 and late spring of 2009. These modules were designed to support learners enrolled in first year calculus by providing just-in-time instruction in five areas: algebraic operations, factorization, polynomials and rational expressions, radical expressions, linear and quadratic equations. One of the major challenges of the project was developing dynamic activities that could support the display of a variety of mathematical formulas. To this end an open source Flash-based authoring tool was developed called the Athabasca University Tutor Authoring Tool (AUTAT). This paper explores the design and development of the AUTAT based on the needs assessment and design principles discussed.

Keywords: Authoring Tool; Flash-based; Interactivity; Pre-calculus; ODL Principles; OER

Resource - Project Course Site: http://ocw.lms.athabascau.ca/course/view.php?id=5

Introduction
The primary goal of the project was to improve completion in first-year calculus in the distance education context. Introductory calculus is a popular course at universities across Canada as it is a prerequisite for higher studies in engineering, life sciences, medicine, technology and economics. It also has one of the lowest completion rates of all courses offered at the introductory level. The modules developed for this project were intended as stand-alone, open educational learning activities for learners registered in calculus courses requiring a refresher in algebra. Member institutions of the Canadian Virtual University (CVU) assisted in the evaluation of the modules and of the content.

Needs Assessment
Completion rates in first-year calculus at Athabasca University between the years 1999 and 2008 were reviewed as part of background research for this project. A literature review showed that low student retention and high failure rates in introductory postsecondary mathematics courses were also seen in other jurisdictions such as the U.S.A (Hoyt & Sorenson, 2001), Australia (Wilson & MacGillivray, 2007), Ireland (Hourigan & O'Donoghue, 2007), Europe (Brandell, Hemmi & Thunberg, 2008), and Asia (Tang, Voon & Julaihi, 2009; Lak, 2005). Low completion rates in introductory mathematics courses at the postsecondary level have been attributed to a variety of causes:

- Inadequate student preparation at the secondary level for postsecondary level mathematics (Varsavsky, 2010).
Focus on preparation for examinations rather than skill development.
Lack of adequate support for at-risk students registered in postsecondary introductory mathematics courses.

Design Process
Selection of a development platform
During the initial stages of this project a variety of authoring platforms were evaluated based on their alignment with a set of design parameters:

- Not reliant on server application, stand-alone
- Supports display of mathematics
- Can be used by novices with no programming skills (e.g. simple interface, documentation)
- Available for public use, not a single implementation
- Utilizes non-commercial open source software
- Sustainable over time
- Allows for the addition of metadata

Three different development platforms were selected for further analysis: ASPIRE, ActiveMath, and Carnegie Mellon University’s (CMU) Cognitive Tutor Authoring Tool (CTAT) Version 2.3 (Carnegie Mellon University, 2007). Only the CTAT was a stand-alone application, the other two were server-based. ActiveMath provided native support for mathematics display while the CTAT had no native support for mathematics. Two of the platforms (ASPIRE and CTAT’s example tracing tutor) did not require content authors to have programming skills. There was evidence that ActiveMath and CTAT were more sustainable choices because they were actively being used to create courses. Two of the platforms were open source (ActiveMath and CTAT). Only ActiveMath had a built-in mechanism for adding metadata. While ActiveMath met many of the criteria needed for this project a major barrier was the fact it was server-based. This fact led the team working on the project to select the CTAT.

Online mathematics display
MathML was selected as the format for displaying mathematics because it had several advantages:

- More accessible to learners with disabilities than other formats (e.g. PDF, LaTeX, images).
- Expressions can be copied into equation editors and computer algebra systems that recognize MathML.
- Expressions render quickly unlike images.
- Native rendering is available in many browsers (e.g. Firefox, Safari, Chrome and Opera) while freely available players (e.g. MathPlayer) allow for display in others (e.g. Internet Explorer).

There are some drawbacks of using MathML such as the lack of universal browser support. However, this problem can be resolved by using MathJax along with MathML.

Set of design principles
Stand-alone
One of the main considerations in the design of these modules was that they should be developed in a flexible format that could be utilized as stand-alone learning objects or incorporated into course materials in a learning management system (LMS).

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Adaptable content

The goal was to make the different components (assessment, instructional, practice) of the module as re-usable as possible. For example, a decision was made not to link between components in a module or between modules, as this would reduce the independence of modules and their components.

Opportunities for practice

The modules were designed with the intention of allowing learners to gain some content knowledge and to test their understanding through practice.

Timely feedback

Given that these modules were designed to provide timely feedback to students already registered in introductory calculus courses, the development team felt that it was necessary to provide learners with the ability to assess knowledge or skill deficits with pre-tests, and then allow the learner to choose the modules/learning activities that would best rectify those deficits. The design of feedback was modeled on the recommendations of Piccinin (2003). This author argued that feedback should be timely (Chickering & Gamson, 1987), provide specific suggestions on how to improve performance, and confirm what learners have done right so they can repeat effective practice.

Development of the OER Course

AUTAT (AU Tutor Authoring Tool) Design and Development

Why a New Tool Was Needed

As discussed early, the CTAT had many desirable features: stand-alone, open source, and a built-in mechanism for providing feedback. However, it did not support the creation of complex mathematical expressions with MathML, a mathematical display format that was used in this project. In the end, the developer concluded that a new tool was needed in order to achieve the learning goals mandated by the project.

An OER API Used for the New Tool Development

One of the major technical challenges associated with the development of the tool was the need to support display of mathematical expressions. Many different kinds of expressions were used in the modules: quadratic equations, long division, square roots, etc. As MathML was to be used, a MathML parser (Sorenson, 2009) was needed to generate these expressions efficiently and satisfactorily. The option of developing a custom parser was explored but not pursued because of the time that would have been required to develop it. Fortunately, an open source MathML parser capable of generating math expressions was found through an Internet search. The API was written in ActionScript3 for Flash. Testing showed that this API worked very well for almost any type of algebraic symbol. It was estimated that the API could reduce development time by two thirds. This showed that it was technically and financially feasible to create a new Flash-based authoring tool.

The New Tool Interface Design Ideas

Since the Cognitive Tutoring Authoring Tool (CTAT) had many desirable features, the new tool was based on the CTAT user interface design. The Hint button is located in the top, right-hand corner of the tool. Learners click on the button to view contextual hints that are intended to assist them in
solving the problems posed. Immediate feedback opens at the bottom of the screen once the user has selected an answer. Because it was inspired by CTAT, this new tool was named AUTAT—Athabasca University Tutor Authoring Tool.

**AUTAT Development Framework**

In order to ensure optimal re-usability of components and efficiency of the development process, it was necessary to separate content from presentation when using the AUTAT. This approach also meant that the tool had to be suitable for non-expert users with no programming skills. The presentation component was programmed in Flash with ActionScript, and the data contents were created as XML. In this project, the MathML is the actual data saved in the XML file. Data was read by Flash at the AUTAT initialization stage when running, and then the MathML was parsed as mathematical expression to the Flash stage. Figure 1 shows the framework for the tool development.

**AUTAT Interface and Features**

Exercises can be created by the AUTAT. Figure 2 shows the Exercise interface. The interface elements include:

- **Title**: (e.g. “Exercises” in this case).
- **Navigation Bar**: The navigation bar is automatically generated on the top-right of the screen based on the questions created in the XML file.
- **Question body**: The question number, question statement, and answer options are dynamically read from the XML file.
- **Hint Button**: Learners can select the Hint button to obtain help to solve the question.
- **Feedback**: Once the user selects an answer option, feedback displays. Most questions provide detailed feedback.

Features:

- **Question types**: Multiple-choice, true/false, and matching questions are supported by the AUTAT.
- **Number of questions**: The number of questions that display in an activity can be customized through the data file.
- **Images and Video support**: The tool also supports images and video. In the question body, images and video can be embedded.

![Figure 1: AUTAT Development Framework](image)

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Another Two Activity Types Created by AUTAT

Besides the Exercises, AUTAT also creates another two activities – Assessment and Tutorials. They both have similar interfaces and features to the Exercises, but also have their own functionalities as listed below.

**Assessment (pre-test, post-test)**

- **Randomization**
  Assessments consist of questions selected randomly from the question bank. This allows for diversity in the questions displayed in the assessments and allows students to re-take a test a few times.

- **Summative Feedback:**
  Results of the assessment are summarized in a table. Learners can re-attempt the assessment as many times as they want (see Figure 3).

- Unique feedback is provided based on the overall score.

**Tutorial**

- The tutorial structure shown in Figure 4 requires learners to work through a question or problem in a step-by-step manner.

- The tutorial activity provides the branching feature for learners to explore different solution paths.
Open educational resources (OERs) have the potential to reduce course development costs. The intention was to design the AUTAT in a way that would allow content to be created by content experts with no programming expertise.

Since the content is saved in XML file format, users can create XML content with text editors, such as Notepad or Dreamweaver. However, XML editors are not easy for non-experts to use. Thanks to contributions of a Flash designer, an AUTAT content editor was designed that works for non-experts. This tool allows questions to be easily added, modified and deleted in the design mode. The preview function provided by this editor further enhances data entry efficiency (see the interface in Figure 5).

The new interface makes use of another open source software - FMath Editor (Alexandru, 2011). The FMath Editor can edit equations or mathematical symbols on web pages using MathML, LaTeX or OMML (Microsoft Word) standards. By embedding this editor in the AUTAT, even novices can use this tool to create their own question banks.

**Sharing the AUTAT with the OER community**

This project benefited from open source/education movement in a few different ways:

- AUTAT was modeled on open source software (e.g. CTAT interface).
- Display of mathematical expressions was made possible by an open source API (i.e. MathML parser API).
- FMath editor gave non-experts a chance to develop their own content using the AUTAT.

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Athabasca University wanted to give something back to the open educational community because it had benefited from that movement. To that end the AUTAT and pre-calculus modules were made available on the following OERs: Curriki, WikiEducator, Merlot and the Athabasca University Open Courseware Website.
Module Structure Developed in the Course

This OER course was named Math Support for Calculus. Five modules were developed in this course:

1. Algebraic Operations
2. Factorization
3. Polynomials and Rational Expressions
4. Radical Expressions
5. Linear and Quadratic Equations

Figure 6 describes the structure of the modules. The colored boxes are the final components that can be accessed by learners. The blue boxes denote static contents, and the yellow dynamic contents.

Evaluation

The evaluation of the modules was undertaken by two different groups of reviewers who work at institutions that are part of the Canadian Virtual University (CVU): six instructional designers and two content experts. The reviewers were provided with a set of criteria upon which they were asked to evaluate the modules. The criteria included: ease of use, organization, effectiveness of instruction, value of the feedback provided to students, and learner support features. Reviewer comments are summarized in Table 1.

Conclusion

Completion rates in first year calculus courses are low in many jurisdictions around the globe. The modules developed for this project were intended as just-in-time learning activities for students.
enrolled in introductory calculus. Specifically, they were designed to address gaps in student understanding that content experts had identified as being particularly problematic (e.g. algebraic reasoning). After the modules were completed they were placed in a live calculus course. There is no definitive data at this point on whether these modules have impacted student outcomes. With improvements in learning analytics it is hoped that more data can be collected about whether students are accessing these modules and how students are using the modules in the context of introductory calculus. Work that was done on these modules has informed the design and development of mathematics courses, for example, in the use of MathML to display mathematical expressions.

The design requirements of the project necessitated the development of a new tool, the AUTAT. The AUTAT has been made available to the general public by submitting it as well as its documentation to a variety of open education sites like Curriki, Merlot, WikiEducator, and the AU Open Courseware (OCW) site. Modifications have been made to the AUTAT to improve its usability for people who are not technical experts.

**Acknowledgments**

This paper has been awarded an ICDE Prize for Innovation and Best Practice on the theme of Open Educational Resources and intercultural aspects at the 25th ICDE Conference, held in Tianjin (China) in October 16th–18th 2013.

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**Table 1: Summary of instructional designer and content expert comments on modules**

<table>
<thead>
<tr>
<th>Item</th>
<th>Rating</th>
</tr>
</thead>
</table>
| Feedback              | Immediate and provides clear direction to students as well as supporting independent learning | Improve quality in tutorials  
|                       |                                                                        | Disable hint button when no hint is used |
| Ease of use           | Easy to navigate                                                      | Inconsistency in numbering steps in tutorials |
| Learning objectives   | Clearly stated                                                         | Sustainability of technology (e.g. Flash) |
| Sustainability        |                                                                        |                                                                 |
| Instruction           | • Good ideas on difference and sum of cube in factorization module     | • Difficulty level too high for some exercises |
|                       | • Glossary good resource                                               |                                                                 |
| Learner support       | Technical support good                                                | • Provide legend to explain specific mathematical symbols  
|                       |                                                                        | • Provide concrete examples to illustrate proofs and theorems |
| Organization          | • Well organized                                                       | Needs master table of contents |
|                       | • Step by step setup good way to provide worked examples                |                                                                 |
| Assessments           | • Difficulty level appropriate for most part                           | Reduce number of questions in pre-test |

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References


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A New Interactive Method to Distance English Learning in Conceptual Age

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Abstract

Latest advance in information technology and innovative teaching confronts DEL (distance English learning) with new challenges and problems. According to the DEL analysis, the paper firstly presents cloud service's functions to the support service, which serves to distribute and store quality learning resources. Meanwhile, practice-focused conceptual learning is advocated, which inspires distance learners’ autonomy, initiative and subjectivity to the greatest degree. Then the paper discusses designing principles and orientations of conceptual learning for DEL based on cloud service. Finally, by presenting several successful DEL experiences, the paper puts forward new teaching methods and advocates students’ multi-dimensional learning experiences.

Keywords: Cloud Service; Conceptual Learning; DEL; Distance English Learning; Information Technology; Innovative Teaching

Introduction

Latest advance in information technology has engaged DEL learners in a significant learning way. Learners prefer to both convenient, flexible, personalized learning opportunities and sound learning environment in any time and place. Meanwhile, it provides the most optimized intelligent environment with knowledge acquisition, storage, editing, performance, teaching and creation, which would be in turn an improvement for DEL learners’ creativity and problem solving ability.

Cloud service-based mode of information processing is in response to intelligent environment, changing the way of information obtaining, sharing and communicating. Meanwhile, it’s readily accessible and low cost.

The innovation advocated by conceptual age will lead the whole world in the near future. Daniel H. Pink, a U.S. trend expert, brings forth an opinion in his book, A Whole New World. He believes that, information age dominated by left-brain as logic, linear and reasoned thinking will soon come to an end. Instead, a brand-new conceptual age will emerge, with its characteristics as right-brained, comprehensive, creative and contextual thinking-based.

The left brain is usually considered as the verbal dominant hemisphere, while the right brain as the silent, non-dominant one. Such kind of misunderstanding leads to the fact that foreign language teaching pay more attention to the left brain’s functions and behaviors, which stand in the way to the comprehensive utilization of the whole brain’s function and potential. Madan Kataria, an Indian psychologist, points out that: “The right brain is very powerful. When people feel happy, it will be stimulated to help people to be capable of anything.” As for DEL, learners should carry out the task of memory with the left brain while the complicated learning process with the right brain. In this way, the pressure of the left brain would be greatly released. At the same time, a sense of pleasure and achievement by right-brain learning can be fully enjoyed.

Therefore, it is necessary to integrate cloud service with conceptual learning for DEL. The determining factor lies in information technology and innovative teaching.
Distance Education

Distance education provides learners with diversified learning style of autonomous learning. In a matter of fact, learners prefer to both convenient, flexible, personalized learning opportunities and sound learning environment in any time and place. In a word, featuring as “anyone, anywhere, anytime, any resources, any methods and any ideas,” the distance education achieves the goal for real-time, convenient, highly-efficient and ubiquitous.

Through distance education, learners expect a tireless electronic teacher, a real-time response expert system, an ubiquitous learning place, a close and friendly learning experience.

Cloud Service

Latest advance in information technology has propelled the popularity of cloud service based on cloud computing, which is especially useful for distance education. Nowadays, cloud service enjoys wide spread. More and more distance education institutions and distance learners have their own information processed into “the cloud.” The basic working principle is that, the data that the user processes is not stored locally, but in the Internet data center. The company offering cloud service takes responsibility of management and maintenance of the normal transfer of data, provides a strong enough computing power and storage space. Users can enjoy these services in any time, in any place, with any terminal equipment connected to the Internet access, without the need to expertise with such kinds of technical problems as hardware, path, data, response, as well as which individual storage or computing cloud.

Functions of cloud service prevail in the distance education. It has cloud storage and distributive storage. Cloud service enables Internet architecture transfer from the “server + client” to “cloud service platform + client,” which provides dynamic division and release of storage space as demand. With countless software and services applied in the cloud server, distance learners can have easy access to the Internet, without the need to download or purchase resources. Moreover, software will be upgraded dynamically. With infinite space and speed, server cluster can provide a variety of solutions, regardless of learners’ physical location. Correlative resources, services and applications can be ordered and escrowed according to learners’ preference and demand. The standard sharing mode ensures the synchronous update and widespread use of data and resources. Learners’ extra demands can be expanded and satisfied.

Conceptual Learning

Innovation symbolizes a new trend to the whole world. In that sense, traditional teaching should be introspected in many aspects. Learning skills such as rote-memorization, standardized testing and chalkboards are out of date. In contrast, it is the brand-new teaching method that would be beneficial to develop learning potential and thinking, share teaching resources in distance education.

Typical right-brain characteristics as six senses of design, symphony, story, play, empathy and meaning are illustrated as the figure 1. By using the sense of design and symphony, together with conceptual thinking ability, connection in the complicated education links could be located precisely, not confined to the individual but on the whole. By using the sense of story and play, improvements can be made to make learning plan, study micro-courseware and discuss hot issues. By using the sense of empathy and meaning, students’ questions can be answered to communicate timely and monitor their learning progress.
Conceptual Learning emphasizes that the process of instructional design is no longer a single rational or creative one. Instead, it is the realization of the learner as well as the teaching designer’s autonomy, initiative and subjectivity to the greatest degree.

**Analysis of Distance English Learning (DEL)**

As far as DEL, various knowledge points have been integrated, so as to share the rich learning resource pool and testing practice bank. Multimedia experience for DEL is user-friendly. Miniature courseware can be used to realize modularized study. Teaching resources transmit fast, with various teaching network and communication paths available. Performance testing bank scopes to a certain extent, which requires daily practice and accumulation. With many knowledge points and tough learning task, it is difficult to memorize and easy to forget. Language courses depend on comprehensive ability to a great degree, so there is no necessary connection between learning effects and learning time.

As we can see from table 1, for the information technology-based cloud service and context-based conceptual learning, their opportunities and problems can be complemented and communicated with each other. As a consequent, a method of integration to DEL is explored.

**Design of Conceptual Learning for DEL based on Cloud Service**

It is strongly suggested that we make full use of cloud service’s contributions to the learning resources as well as conceptual learning’s promotion to the teaching service, so as to guarantee harmonious coordination and cooperation between left-brain and right-brain. In that sense, information can be obtained on or off class. Resources can be utilized for unlimited service, anytime and anywhere.
Table 1: SWOT Analysis of Conceptual Learning for DEL Based on Cloud Service

<table>
<thead>
<tr>
<th>Cloud Service</th>
<th>Threats 1</th>
<th>Opportunities 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance English teaching</td>
<td>All-round integration of the teaching platform involves enormous workload and lack of teaching links. It is necessary to introduce cloud technology to the teaching design process, which means high requirements for the school.</td>
<td>Teaching resource in the cloud, teaching service in the cloud. Ubiquitous cloud service, infinitely powerful cloud service</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strength</th>
<th>ST1</th>
<th>SO2</th>
<th>SO1</th>
<th>ST2</th>
</tr>
</thead>
<tbody>
<tr>
<td>course</td>
<td>Various knowledge points have been integrated. The teaching resource transmits fast. The Multimedia experience is good.</td>
<td>Sharing public resources, public data. Construction of online course, miniature courseware</td>
<td>Forming communication/feedback/dynamic mechanism</td>
<td>Joining the public education cloud. Building private cloud. Adding more data interface to curriculum resources</td>
</tr>
<tr>
<td>learner</td>
<td>Eager to study initiative. Experienced in language communication. Good at learning methods summary.</td>
<td>Enriching the online learning experience. Encouraging students’ participation in establishing and optimizing platform</td>
<td>Promoting initiative study. Promoting successful personalized learning experience</td>
<td>Making students’ participation in cloud computing and cloud services. Extending students’ learning space and freedom</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weakness</th>
<th>WT1</th>
<th>WO2</th>
<th>WO1</th>
<th>WT2</th>
</tr>
</thead>
<tbody>
<tr>
<td>learner</td>
<td>Overcoming the contradiction between study and work. Good at understanding but poor at memorizing. Tend to produce sense of learning anxiety</td>
<td>Guaranteeing the teaching design by the cloud. Individual learning to a “closed loop”</td>
<td>Combining working with teaching exploration. Making feasible study plan and goal</td>
<td>Enhancing multidimensional stimulus of memory. Enriching game function and entertainment function of learning</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distance English teaching</th>
<th>Opportunities 2</th>
<th>Threats 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptual learning</td>
<td>Playing teachers’ teaching dominant, beneficial to the realization of teaching design. Playing students’ personal initiative, beneficial to the learning effect</td>
<td>Lacking identity of reforming the exam-oriented education model of original English teaching. Difficult in the joint of teaching philosophy and teaching practice</td>
</tr>
</tbody>
</table>
through the cloud service for mobile learning. Considerate humanistic care support can be provided. What’s more, problems can be solved with customized service, through conceptual orientation for relaxed learning.

**Design Criteria of cloud service model**

As for DEL, cloud service should meet the demand of synchronized, socialized, intensive and intelligent.

Resources and services are compared to two basic paths to promote distance learning. The former characterizes as explicit, static and compatible; the latter features as virtual and dynamic, open and integrated. In the distance learning at different stages, however, there is a degree of convergence and directivity. Through virtualized technology and aggregation of services of various kinds, it is feasible to realize flexible, convenient and practical operations. Relying on unification of hardware and software resources, together with reducing hardware and software standards, it is possible to realize intensive, dynamic and elastic construction. With resources uploaded to the cloud, service provided to the customer, learners can enjoy coherent, consistent and friendly learning experience in different channel, time and location. At the same time, the problems such as scattered data of the multi-level learning platform, resource sharing and service conflict can be solved.

The network works as the main communication channel for DEL learners and close the relationship with each other. So, cloud service should be made full use of to promote the class from loose to close, from silent to active. Learners are also free to discuss hot issues, provide consultation and evaluation to each other, forming a sociable learning environment. Meanwhile, they can establish community interaction, seek help from alumni, evaluate by electronic portfolio, train collective intelligence, share learning experience, show work products, communicate between the school, teacher and students, etc.

It should meet the need of the multi-level management and classified guidance. Teachers have explicit responsibilities, permissions and appropriate implementation of cross and vertical management. The supervision mechanism should be set up from top to bottom for the system information management platform, as to close to the school management pattern and convenient for administrators’ evaluation.

The tracking, reminding and feedback function should be improved to help teachers achieve the teaching design and guide the student in learning plan, intelligent scene recognition, intelligent information processing, retrieval and push pull. For teachers, they offer oriented resources and customized service for students. For students, they enjoy these by powerful search engine, cross-database and cross-platform.

**Orientation of Conceptual Learning for Distance English**

For DEL, key elements of conceptual age can be combined with six objectives, to create an environment for original teaching, the group learning and autonomous learning.

We should exercise the students’ language understanding, improve their second language acquisition ability, help them get rid of thinking set and promote their ability of deconstruction and reconstruction of distance English learning. With the focus on design-based learning, we should encourage students’ participating in course and teaching design. Consequently, a new type of intelligent, expansive and creative class will produce. Meanwhile, students’ desire and motivation to language learning are promoted.
Distance English learning requires not only to bear in mind the knowledge, grasp the key points and use various tools flexibly, but also to fully use of situation, plot and story elements to communicate. Consequently, the ability of plot construction and innovative narration is advanced. Also, it is necessary to guide students to blog writing, narrative writing, digital-situational courseware and learning material producing, so as to promote such linguistic abilities as pronunciation recognition, word and grammar recognition, reciting and language rule inference.

To cultivate learner’s synthesized skill of English learning, it is key to enhance their ability to see the whole picture, explore the connection between knowledge and integrate learning materials. Through vivid audio and video courses, blog notes and photo journal, the connection between the knowledge points, skills of learning, perception and creation are strongly built. In that sense, a “symphony” of understanding (IQ) and scene controlling (EQ) for English learning is produced.

Life is not all about being serious; play is essential and exclusive. Similarly, learning does not always mean tough working. Pleasure is the ultimate goal of knowledge pursuit. Therefore, it is a learning subject to enjoy pleasure during the creative process. Such skills as development, study and anti-frustration are built internally with one’s own pleasure, not by external teaching. Especially for distance English learning, it would get into a serious and tedious long cycle and difficult to achieve the teaching effect, once giving up rich and colorful, lively game-based teaching style.

Expressed in symbol and metaphor, we experience different roles’ emotions, share their experiences and understand their situations and feelings. Empathy means experiencing from others’ standpoint, understanding their feelings and resolving the contradiction between each other.

It is also important to focus not only on consequence but also on significance. Distance English learning has the advantage, because knowledge of English is dominant skills, which is profitable and joyful.

**Combination of Cloud service and conceptual learning**

Resources and services have been united and aggregated respectively under the guidance of the sense of design in DEL (figure 2). All kinds of resources can be searched out in cloud platform according to the “push” instruction in course learning. Those primary resources can be classified according to difficulty and quality, as well as to subject and form. Students can make choices according to “evaluation index” such as active degree and attention degree to DIY in individual learning and thus enhance “story” experience of learning. The platform can also provide “push” services of text messages and email such as professional orientation, new arrival reminding and course examination, promoting interactive “sense of symphony” of learning and practice. Teachers and students strengthen interaction and communication in “pull” and “push” link during the learning process, to achieve a closed, two-way “fluid circulation” and enrich “sense of empathy” in learning. Cluster support such as class group, group discussion, live telecast classroom and two-way communication would enhance the connotation of autonomous learning interactivity and build “sense of play.” Therefore, the teaching goal of “sense of meaning” can be achieved under the condition of cloud service technology application, conceptual learning practice and teaching link development.

**New Method and Experience of DEL**

Cooperating with LanZhuo company, Shanghai Open University has adopted the “mobile” English learning system in 2006 firstly and began to use MMS (Multimedia Messaging Service) channel for the mobile teaching in 2010. Beijing Open University is set up for the world of mobile learning platform “iTunes U Beijing Open University” site for high quality education resources. A course, English phonetics, has been ranking first in iTunes U download in China for a long time. At present,
the Open University has made several experiences in exploring distance English teaching with the application of education cloud services.

**Changing Teaching Mode**

The data transferring is more accurate. The interconnected system guarantees data sharing between applications and fluent management process to the school. The real-time delivery of massive amounts of teaching data provides school system to obtain the data most accurately. In this way, teachers can focus on students’ learning status and demands, released from transforming from platforms. The optimized performance of cloud security mechanism promises high security levels and efficient operation of teaching resources. The private cloud solutions make applications and resources deployed on the cloud hosting and cloud database, which control student roles and permissions uniformly, guarantee double security of personnel and system, solve the big problem of data leak and system paralysis caused by the personnel and system risk.

The system work is more efficient. Users’ terminal learning equipment can be accessible by a desktop computer, or smart phone, laptop, tablet PC, PDA, or any other equipment capable of complete information interaction. The channel, for public cloud, mainly refers to the eight major telecom operators (including China telecom, Netcom, education, etc.) provided by the conventional broadband services, as well as all kinds of wireless communication network (2.5 G / 3 G / 4 G, etc.). For a private cloud, is refers to the internal communication of wireless campus network (WIFI). The cloud service refers to the cloud service provider. As for English learning, it can be provided with aforementioned LasS (infrastructure as a service) by Ali cloud, mobile learning SaaS (software as a service) by LanZhuo company, and PasS (platform as a service) by Google.

The management settings are easier. IT remains no longer the bottleneck of the background management. Those tedious operating processes and problems caused by system switching and
data obstruction can be solved. Elastic support ensures system quality at the time of large flow rates, guarantees promptness and integrity of data transferring, as well as the background processing speed and stability. Through professional service and comprehensive management, the cloud company takes charge of network infrastructure, software and hardware platform, responsible for all facilities maintenance, management and a series of services. Thus, it can release teachers and management personnel from the heavy burdens of background system maintenance tasks. Cloud technology manages all English teaching activities through the central position rather than from a single site or terminal, helping host teachers maintain through the Web, including wanted software quickly issued to equipment user. The expansion of bandwidth deals with more effectively the information transmission bottleneck of cross-regional, cross-network, cross-platform, thoroughly solving the problem of regional communication.

The basic resources are more flexible. The resources are shifted from rigid, inflexible, pure storage state into a full, rich, and active in delivery. A large integrated virtual resource pool can improve the utilization rate of resources according to different load dynamic allocation of resources and data flow. For cloud service-based school distribution, it is not necessary to allocate a large number of high performance computer mainframe, instead, distribute network bandwidth and release resource allowance according to season and time interval after the completion of the network channel construction. Taking advantage of the high elastic cloud resources, cloud resources configure to meet the actual demand levels in period of small and stable daily resource demand. When exam season (English unified examination, online examination) arises, resources can be upgraded by network to meet the business peak state in the shortest period. In period of equipment adding, debugging and application upgrading, by upgrading on the cloud, application characteristics can be successfully updated and issued, without having to manually upgrade on every desktop computer application within each individual school. Consequently, problem such as fund waste for disposable peak purchase of traditional resources can be solved.

The service mode is more secure. After solving the problem of bottleneck of IT background management, teachers will more concentrate on front-end service and teaching and have more support for the students. At the same time, with the sharing back-end resources, the students’ relevant preferences and behavior data can be controlled by school. More reasons can be provided for the teaching design, which ensures students better service and experience. Meanwhile, with digital integration principle of cloud service, it can be possible to construct unified norms and standards, realized resource elastic extension and flexible combination.

Improving Students’ Multi-dimensional Learning Experience

The learning method is more diverse. Hangzhou, for example, is the first city to offer city-wide free Wi-Fi in China, constructing 2000 hotspots in public areas. By connecting to “i-hangzhou,” users have Internet access via Wi-Fi free of charge. China Mobile has built the world’s first full coverage of 4G network in Hangzhou underground, with the highest rate of more than 40 MBPS. Urban network promises students an outlook in distance English learning, that is, it is no longer important to have a computer, fixed network access or to purchase and install a large number of software on your computer. With normal hardware configuration and operating system, users can browse cloud service website and enjoy its cloud service provided.

The learning process is more simultaneous. In Zhejiang Radio &TV University, for example, learning information is unified stored in cloud server. By any instruction through the network connection, relevant information in the lifelong learning digital public service platform and the lifelong learning digital repository in Zhejiang province, distance virtual laboratory and the digital library will be
Table 2: Conceptual Learning for DEL Based on Cloud Service

<table>
<thead>
<tr>
<th>Syllabus</th>
<th>Homework</th>
<th>Other tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Make syllabus online and</td>
<td>Assign test online</td>
<td>Score inquiry, campus culture, blog, personal</td>
</tr>
<tr>
<td>distribute to students and</td>
<td>check the schedule and give marks</td>
<td>space, survey, wiki, translate online, digital</td>
</tr>
<tr>
<td>other participants</td>
<td></td>
<td>library, paper base</td>
</tr>
<tr>
<td>Exercise and test</td>
<td>Questions answering</td>
<td></td>
</tr>
<tr>
<td>Encourage students to take</td>
<td></td>
<td></td>
</tr>
<tr>
<td>testing online and give</td>
<td></td>
<td></td>
</tr>
<tr>
<td>distance guide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calendar</td>
<td>Announcement</td>
<td></td>
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<tr>
<td>Release review question</td>
<td></td>
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<tr>
<td>answering,</td>
<td></td>
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</tr>
<tr>
<td>Video</td>
<td>Learning resources</td>
<td></td>
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<tr>
<td>conference</td>
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<tr>
<td>Interactive online course,</td>
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<tr>
<td>integrate video teaching,</td>
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<tr>
<td>electronic whiteboard and</td>
<td></td>
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</tr>
<tr>
<td>chatting room</td>
<td></td>
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</tr>
<tr>
<td>Other tools</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Syllabus</td>
<td>Homework</td>
<td>Other tools</td>
</tr>
</tbody>
</table>

automatically pushed to every device available, such as the most popular series products of iPhone, iPod Touch, iPad, or even Mac computers, don’t have to worry about in a number of divorces equipment in the process of learning.

The learning communication is closer. Login in learning platform based on cloud service, users can browse through various services such as syllabus, homework, test, questions answering, teaching calendar, announcement, video conference, learning resources and so on (Table 2).

The learning feeling is more considerate. Users can have more considerate learning feelings as the following:

(1) Not so long ago, users started to watch an English learning video through the iPad. If they want to turn to the iPhone to continue, system can allow an appropriate position to continue the study last time. When users highlight some of the text, take notes or add bookmarks while they are reading on the iPad, the cloud will automatically update those revised information in the iPod touch.

(2) Once users download English courseware, the system will automatically push it to other registered devices, which will be recorded.

(3) Users are allowed to record various learning experiences and processing resources in a variety of devices, which will have a backup copy by system quickly and efficiently under the condition of the network access. Moreover, system backup can take responsibility when users set up a new IOS device or restore information on original equipment.

(4) Users are able to edit and browse the same document in the different space position, if personal courseware, learning material, paper are stored in the network hard disk. When the user machine is out of order and the local data is missing, the data stored in the platform can be easily recovered from the platform to the local hard disk.

(5) By scanning the users’ collection of English learning resources, system will reserve, select and take compatibility of the resources according to the same level and the similar style. And then it provides users with a cloud-based version of the same quality, as to achieve the goal of guided learning.
Conclusion
As an advanced technology strategy, cloud service requires correspondence to advanced teaching concept. In the same way, as an innovative learning strategy, conceptual learning also needs leading teaching techniques as the backbone. With cloud service liberating left brain and conceptual learning developing right brain, DEL demands cooperation with both left and right brain. Therefore, we can draw a conclusion that conceptual learning based on cloud service is a good choice to two-dimensional interactive DEL.

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References
In their own words: Student stories of seeking learning support

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Abstract
Many Open and Distance Learning (ODL) providers report that their students are prone to lower rates of retention and completion than campus-based students. Against this background, there is growing interest around distance-specific learning support. The current research investigated the experiences of students during their first semester as distance learners at Massey University in New Zealand. The overarching methodology was Design-Based Research, within which phenomenological data gathering methods were used to study the experiences of twenty participants from their own point of view. Using video cameras, over twenty-two hours of self-reflections were gathered between July and November 2011 using a technique adapted from previous studies. A grounded theory approach was applied to the process of thematic data analysis. Results revealed how participants varied in their engagement with learning supports, including orientation events, outreach activity, cultural services, learning consultants, library services, fellow students, lecturers, residential courses, and other people. The discussion reflects on clusters of participants who utilised learning supports effectively, moderately and barely. The paper concludes by summarizing how the current research has had an impact on the design of learning support services at one of the world’s leading providers of distance education.

Keywords: distance learning; impact; phenomenology; study support

Introduction
Open and Distance Learning (ODL) has a key role in promoting the goals of access and equality of opportunity to education. It is noteworthy that higher education participation levels have increased considerably over the past 30 years, which is partly due to new ODL study options. On average across OECD countries, 38% of 25–34 year-olds have a tertiary attainment, compared with 23% of 55–64 year olds (OECD, 2012). However, the growth of participation in higher education is not even across regions and countries. For example, in Europe, many institutions are still struggling to democratize their traditionally elite educational systems (Deloitte, 2011). In the United Kingdom, young
people from the most advantaged areas are still three times more likely to enter higher education than those from the least advantaged areas (HEFCE, 2013). In the United States, graduation odds are especially low for students who are African American, Hispanic, older, or poor (Complete College America, 2011).

Universities and colleges are not always equipped to resolve these issues on their own; government assistance and regulation is a key component of making education more accessible (Deloitte, 2011). Nevertheless, governments around the world are being criticised for paying inadequate attention to the part-time student population, which includes larger numbers of non-traditional students. For example, in New Zealand most part-time distance students are ineligible to apply for interest free loans. In the United States, 4 of every 10 public college students are only able to attend part time yet the federal government do not track their success; as if they are invisible (Complete College America, 2011, p. 6). In the United Kingdom, recent government funding reforms appear to have catalysed a 40% drop in part-time undergraduate entrants since 2010–11; and this decrease is likely to have implications for equality and diversity (HEFCE, 2013).

In spite of government policy, digitally mediated ODL has enabled many institutions to explore ways of extending educational offerings to a broad base of students remote from campus (Deloitte, 2011). There is demand for further innovation in flexible and affordable education (HEFCE, 2013; Online Learning Task Force, 2011) in response to the exponential growth of students enrolled in online courses. It was estimated that online models of delivery had attracted 17 million students from around the world by 2010 (Guri-Rosenblit, 2010). In the United States, 32% of higher education students take at least one course online (Allen & Seaman, 2013). This figure compares with 26% in New Zealand (Ministry of Education, 2010) and 19% in Australia (DEEWR, 2010). Furthermore, Massive Open Online Courses (MOOCs) have quickly become one of the hottest topics in higher education with the largest, Coursera, registering 2.9 million users from 220 countries by March 2013 (Waldrop, 2013).

Digital technologies have overcome two traditional challenges of education by distance: the dynamic update of learning resources on an ongoing basis and the facilitation of new types of interaction between students and teachers (Guri-Rosenblit, 2012). Nevertheless, retention and completion have been problems for distance learning ever since the first correspondence courses in the nineteenth century (Dede cited in Waldrop, 2013). At the Open University in the United Kingdom, for example, it has been reported that only 22% of undergraduate distance students complete their study within eight academic years (HEFCE, 2009). This figure compares with 24% of part-time bachelor students in the United States (Complete College America, 2011). In the case of MOOC completion rates, figures are dismal and rarely rise above 7% (Waldrop, 2013).

The completions problem goes beyond the design of a particular course as only a small proportion of distance learners have the drive and perseverance to learn on their own—whereas most people need help (Dede; cited in Waldrop 2013). For example, Anderson, Lee, Simpson and Stein (2011) studied 176 distance students in New Zealand and observed a lack of self-regulatory skills in one fifth of their sample, which they labelled a dissonant orchestration. Dissonance has been associated with poor student attainment (Entwistle, Tait & McCune, 2000) and is the antithesis of intrinsic motivation and internal loci of control, which are critical to distance learner success (Simonson, Schlosser & Orellana, 2011).

While appreciating the importance of student self-discipline and the key role of academic faculty, Heyman (2010) promotes the importance of adequate and ongoing institutional support in an extensive range of areas. However, Simpson (2009) cautions against a “goulash” approach to institutional support services. In other words, if institutions try everything that might work, they fail to focus on the most important things and cannot ever discover what is working best. In the absence of an
effective support strategy, students who do not feel adequately supported by their institution may be more likely to drop out; especially in their first year of study (Kift, 2009; Venstra, 2009). New digital forms of ODL can be an impersonal exercise and online students are particularly at risk of feeling “eSolated” (Appana, 2008, p.15). It is therefore important to help online students cultivate a sense of connection or belonging with their institution (Heyman, 2010).

Teachers are in a central position to identify online students at risk and make decisions about whether to make referrals to study support services (Russo-Gleicher, 2013). Academic support and pastoral care is important for male and female online learners, to an extent that matches classroom students (Jones, 2010). In contrast to the traditional “out-of-sight, out-of-mind” model of correspondence, Dede (cited in Waldrop, 2013) advocates the importance of support networks within the online learning environment from professors and fellow students. In the case of MOOCs, Dede argues that peer-to-peer communication tools are inadequate and that MOOC companies are, “Just kind of hoping that people will figure out from the bottom up how to support each other” (p. 62). Liyana-gunawardena, Adams and Williams (2013) agree that neither the facilitator perspective nor the technological aspects of MOOCs are being widely researched.

One problem with the laissez-faire approach is that institutions should not assume distance students have the right skills or dispositions to be effective online learners because, while many are truly engaged in a wide range of digital activity at frequent intervals, others rarely utilise the digital resources at their disposal (Jones, Ramanau, Cross & Healing, 2010). Baxter (2012) draws a stark contrast between students who are able to initiate and sustain very successful online interactions and relationships with fellow students, and those to whom digital confidence is not intuitive. Baxter argues that, in the absence of adequate support services, feelings of exclusion precipitated by lack of ability to successfully form online friendships may be equally, if not more, powerful reasons than academic issues in terms of why distance learning students fail to progress.

Amid rising numbers of online learners, there is increasing interest in ways to support students from a distance. Distance students and campus-based learners have a very different student experiences and engage with their study differently (Poskitt, Rees, Saddaby & Radloff, 2011), which means that bespoke interventions are called for. Against this background, the objective of the current research was to investigate the nature of the distance learner experience in their own words at Massey University, New Zealand and the interactions they have with learning supports during the first semester of university-level study.

Methods

The overarching methodology was Design-Based Research, which was chosen to guide the development of enhanced educational outcomes. Design-based research has increasingly received attention from researchers in education for its interactive and integrative qualities (Reeves, 2006). It aims to make a grounded connection between research and real-world contexts. This methodology can be thought of as seeking to develop best practice in complex learning environments through the incorporation of evaluation and empirical analyses, from which multiple entry points for various scholarly endeavours arise (Anderson & Shattuck, 2012).

Within the overarching methodology, the research drew on phenomenological data gathering methods to study the experiences of first-time distance learners from their own point of view. With permission from Massey University’s Human Ethics Committee, enrolment data was obtained for 750 students studying via distance for the first time in Semester 2, 2011. The method of recruitment was by email from the Project Leader to all potential participants at the point when their enrolment had been approved. The invitation included a Participant Information Sheet, which explained why students might consider recording video diaries for the purpose of research.
One hundred and forty students volunteered to participate from which 20 were purposefully selected. The intention was to broadly represent the demographic and geographic diversity of first-time distance learners. The profile of diversity was informed by a demographic analysis of the University’s distance students during the 2010 academic year. Selection criteria included: age, gender, ethnicity, geographic location, subject of study, level of study, and entry qualification.

Using video cameras, video reflections were gathered using a diary technique adapted from previous studies. Riddle and Arnold (2007) used the Day Experience Method to investigate everyday life situations. They required participants to record written answers to specific questions sent at irregular intervals (between 30 and 90 minutes) between 8am and 10pm on three separate days. In contrast, Cashmore, Green and Scott (2010) adopted a free-form approach to video diaries in a longitudinal study with undergraduate students at the University of Leicester.

The present study adopted an approach that struck a balance between a structured and free-form approach. The expectation was for five minutes of video footage per week, although the key factor was not one of length but forthcomingness and insightfulness of the reflections provided. A reflective prompt protocol was designed to encourage free-flow reflections whilst providing fish-hooks to elicit targeted categories of information in a lightly structured manner. Within 48 hours of receiving a participant’s video file, the Project Manager would respond via email with a fresh set of reflective prompts for the following week.

Consistent with a phenomenological approach to understanding experiences in participants’ own words, a grounded theory approach was applied to the process of thematic data analysis. Thematic analysis is a technique for identifying, analysing and reporting themes within data. A theme captures something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data set (Braun & Clarke, 2006). By following a realist approach, the student voice was retained at the forefront of the analysis. In other words, participants’ experiences were described as fully as possible to retain a sense of context. Within the limitations of grounded theory, an inductive approach (bottom-up) was applied, which meant that the major themes arose from the data.

**Results**

Twenty first-time distance learners participated: Andy, Beth, Chris, Deborah, Emma, Fiona, Geraldine, Hannah, Ian, Jack, Kane, Libby, Maggie, Nathan, Olivia, Penny, Rachel, Susan, Tom and Ursula. All names are pseudonyms, which are arranged in alphabetical order to correspond with age. In other words, Andy was the youngest and Ursula was the oldest. Table 1 provides a summary of participant demographics.

Over the course of semester, participants submitted a total twenty-two hours of video diaries. From the thematic analysis of data arose an overarching theme labelled, “Interaction with Learning Supports.” Under this umbrella, the following sources of support were identified and are discussed in turn: orientation events, outreach activity, cultural services, learning consultants, library services, fellow students, lecturers, residential courses, and other people.

Orientation events typically took place before the commencement of data collection and therefore the research was mindful of retrospective recall. Orientation events were available to distance students both on-campus at three locations and off-campus at 15 geographically dispersed locations. Notably, three participants (Andy, Maggie, Olivia) were not new to the university having already studied during earlier semesters as campus-based students. Three participants (Tom, Susan, Penny) reflected on attending and enjoying an orientation event at one of three campus locations.

Susan: *Last weekend I went to campus for an Orientation course. I learned to write an essay properly and do referencing properly. This will be excellent because one paper [course] has three essays.*

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Centralised university support services reached out to some distance students in the first weeks. Phone calls from the university were mentioned by five participants (Beth, Geraldine, Hannah, Ian, Susan). All five remarked on the friendly nature of the phone call and appreciated knowing that support was available. However, Ian and Hannah noted that contact was too premature at a point in semester before anything had unfolded. Beth, despite working full-time and studying full-time, believed in her ability to research and resolve future problems independent from any centralised support system. Having just withdrawn from a paper [course] under the pressure of a full-time career, Geraldine reported that the phone call had not changed anything.

Geraldine: *The guy, while he was nice and everything (it was nice to know there are people looking out for you) the stuff he was telling me I already knew because the online content provided is really good.*

Centralized support services for Māori and Pacifika distance students contacted Emma and Penny. Emma admitted to ignoring Pasifika community emails amid the many other emails she received during a working day. Meanwhile, Penny thought about making better use of the service to connect her with other Māori students with whom she described a sense of comradeship. Notably, culture-specific support services were not mentioned by the five other participants of Māori and Pacifika descent (Chris, Jack, Libby, Olivia, Tom); four of whom either withdrew from or failed one or more courses.

Chris: *I have no idea how to find support. I wasn’t good at asking for help.*

Learning consultants were proactively contacted by five participants (Hannah, Ian, Olivia, Penny, Susan) to use their Assignment Pre-Reading Service. All five were very pleased with the constructive feedback that they received. In addition, Olivia, Penny and Susan attended campus-based meetings with Learning Consultants. Penny was dyslexic and relied heavily on her consultant for special needs support. Susan, following a period of thirty years since high school education, wanted all the help she could get. Olivia, an experienced student, was impressed by some learning strategies suggested by her consultant.

Olivia: *I met with my consultant and she showed me this technique for reading. I’ve just been thinking because I’ve done two degrees, I think I’m so proficient, why would I need to learn any other techniques. Thinking like that has stopped me going to learning centre, so I’m glad I’ve conquered that one. Old dogs can learn new tricks.*

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**Table 1: Summary of the participant demographics**

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male (7), Female (13)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>Pakeha / European (12), Māori and/or Pasifika (8)</td>
</tr>
<tr>
<td>Location</td>
<td>A Campus town (11), Remote from campus (9)</td>
</tr>
<tr>
<td>Mode</td>
<td>Distance only (17), Mixed mode (3)</td>
</tr>
<tr>
<td>Total courses</td>
<td>Undergraduate (16), Postgraduate (4)</td>
</tr>
<tr>
<td>Subject</td>
<td>Business (8), Humanities (6), Education (3), Sciences (3)</td>
</tr>
<tr>
<td>Prior education</td>
<td>High school (8), Diploma (2), Degree papers (5), Degree (5)</td>
</tr>
<tr>
<td>Employment</td>
<td>Full time (11), Part time (4), None (3), Full time mother (2)</td>
</tr>
<tr>
<td>Dependents</td>
<td>None (11), One (1), Two or three (5), Four or more (3)</td>
</tr>
</tbody>
</table>

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Open Praxis, vol. 5 issue 4, October–December 2013, pp. 345–354
Library services were used by five undergraduates (Hannah, Maggie, Penny, Susan, Ursula) and all postgraduates (Emma, Nathan, Rachel, Olivia). It’s worth noting that Deborah and Fiona also mentioned the need to investigate what library services were available but never got around to doing so. In contrast, others reflected on their experience with distance-specific library services from the outset of semester. Nathan reported that the library “how to” online podcasts enhanced his experience from China. Olivia was amazed by the fantastic online learning resources, including the APA Referencing tool. Rachel and Susan were amazed by their ability to order books for overnight delivery at no cost. Ursula’s books were sent to the wrong address but she was impressed with how efficiently the problem was resolved via email. Hannah was struggling to access journals but was grateful to find helpful librarians on the other end of a phone line. Most reflections on library services were complimentary although criticism was not unheard of.

Penny: I’ve spent a FULL three days trying to figure out how to use my library on the Internet. I even went in to the library and got the librarians to show me but even they weren’t really sure how it was working themselves.

Fellow students were engaged in online discussion via Moodle by four participants (Beth, Maggie, Olivia, Susan). Maggie displayed a particularly strategic approach, which included setting mobile phone alerts whenever someone posted a comment on a discussion forum. In Olivia’s case, Moodle was not initially used to support her course so she initiated a discussion group via Facebook; while Beth used a Blog to generate discussion. Notably, as well as online interaction, these four participants also recognised the value of face-to-face interaction with fellow students via campus based study groups, residential courses and other social events.

In contrast, three participants (Fiona, Penny, Ursula) explicitly rejected the online forums. Fiona felt disadvantaged by living in a different time zone, which she believed would negatively affect the relevance of her contribution. Penny found herself frustrated around computers and described a preference for face-to-face interaction. Ursula was overwhelmed by technology as well as the culture of online discussion, the significance of which she could not understand. Meanwhile, five participants (Hannah, Ian, Jack, Kane, Nathan) were only interested in reading the discussion forums rather than participating. Nathan hypothesised that this trend was due to a lack of social confidence online.

Nathan: The online forums are available but peoples base fears of putting something out there and being wrong; I’m sure that is in the back of people’s thinking. It’s very different to leaning over to a peer and checking for immediate reinforcement.

Lecturer participation in online discussion was observed by four participants (Hannah, Maggie, Nathan, Susan). Maggie was reprimanded by her lecturer for a comment that she contributed to a discussion forum. That said, Maggie valued the online presence of her lecturer, which she appreciated wasn’t universal among teaching staff. This message was supported by Susan, who enjoyed the online contribution of one lecturer but was deeply frustrated by the absence of another. The tone adopted by Hannah’s lecturer in an online forum deterred her from contacting her lecturer altogether.

Hannah: My paper [course] coordinator writes real mean in the forums... and there’s been a couple of times I’ve wanted to write on there but I’m a bit scared of her reaction so I figure it out myself.

For around half of participants, email remained the most common method of communication with lecturers. The other half (Andy, Chris, Deborah, Fiona, Geraldine, Hannah, Jack, Rachel, Tom, Ursula) made no mention of contact with their lecturer other than for rare administrative purposes. Libby did not initiate contact but did receive an email from her lecturer that accused her of not taking study seriously enough. Emma admitted to being lazy about making contact with her lecturer but eventually did so to seek advice on some “struggles.” Kane, Ian, Nathan and Susan were content...
with directing questions to their lecturers via email and were motivated by the responses they received. In contrast, Beth was disgruntled about the length of time it took lecturers to respond to emails as well as the quality of feedback that they provided.

Beth: *My tutor was not very helpful. My question was apparently irrelevant... I was always brought up that no question is a dumb question and to be quite honest, that does nothing for anybody being told that your question is irrelevant.*

Penny, despite being enrolled as a distance student, attended several campus-based lectures and sought out her lecturer for meetings. Four other participants (Beth, Maggie, Olivia, Susan) met lecturers and fellow students on their campus-based residential courses during mid-semester break. It is worth noting that Nathan was unable to attend his residential due to a work commitment in China but, overcome with disappointment, booked tickets for the subsequent semester. Fiona was also frustrated at being overseas at the time of the residential and suggested that future sessions could be videoed and streamed online. Libby was aware that her residential was compulsory but was unable to attend due to caring for seven children and a terminally ill mother-in-law. Jack dismissed his residential because it was not compulsory and he simply did not have time amid full-time work alongside full-time distance study. Deborah, who had chosen distance education because previous campus-based undergraduate papers [courses] had not stimulated her sufficiently, was a self-confessed procrastinator.

Deborah: *I think one of my papers had a contact course during semester break but because of work and stuff like that I didn’t go... I couldn’t make the time.*

Colleagues, family and friends provided external sources of support. Academic discussion with and feedback from colleagues was particularly important to Nathan whose postgraduate study was highly relevant to his career. Emma, Ursula and Susan had family members who were also engaged in tertiary-level studies. These family extended support especially in terms of proof reading assignments and guidance with technology. Five other participants (Deborah, Fiona, Hannah, Ian, Kane) described their partners as their main source of support. However, while many partners were compassionate, learning support was not necessarily their forte.

Ian: *I’ve been trying to integrate my wife in to talking about what I’m doing but it’s hard as it can be quite technical with writing essays and stuff.*

**Discussion**

The current research has provided a deep insight into the engagement of distance students with learning supports. Albeit based on a small sample, findings highlight clusters of participants who utilised learning supports effectively, moderately and barely.

The most effective support seekers were identified as Maggie, Olivia and Susan who welcomed interaction with the majority of learning supports at their disposal. They typically fitted the description of Jones *et al.* (2010) as those who were truly engaged in a wide range of digital activity at frequent intervals. They appreciated the value of ideas exchange and co-construction of knowledge. To this end, as Baxter (2012) suggested, initiating online interaction with fellow students was a central feature of their weekly study activity. Furthermore, they valued the online presence of lecturers for the purposes of discussion; rather more than for instruction.

Beth, Hannah, Nathan and Penny were identified as moderate support seekers who reflected at length on learning supports. Their depth of unprompted recall is interpreted as a sign of their desire in principle to interact with the services and resources at their disposal. However, in common, this cluster reported inhibitors that narrowed their study and support options. This finding highlights some fertile ground for further investigation.

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In complete contrast, more than half of participants barely reflected on seeking support and, in concurrence with Jones et al. (2010), rarely utilised the digital resources at their disposal. Instead, their stories pointed towards ambivalence and even ignorance towards the existence of university support services. Thus, despite the dynamic progress that digital technology has afforded ODL (Guri-Rosenblit, 2012), the majority of participants told a story that echoed back to the static learning model of correspondence. In other words, those who barely sought support tended to solely rely on their study guide and, in this sense, were syllabus-bound as described by Anderson et al. (2011) in their definition of surface learners.

It is worth noting that digital literacy per se was not a limiting factor even among those who barely sought support. Instead, social confidence in a digital learning environment is worthy of further research. This finding echoes Baxter’s (2012) conclusion that some students need support to develop successful online interactions and relationships with fellow students. The idea that teachers have a role in shaping the social culture of a digital classroom is aligned with Jones (2010) who argues that academic caring is important for online students to an extent that matches classroom students. Furthermore, the current study also supports Russo-Gleicher’s (2013) argument that teachers could do more in their central position to refer at-risk students to learning supports. In other words, participant stories indicate that a teacher, even from a distance, can influence how students seek support.

Finally, the objective of the current study was not to correlate support seeking with grades as a measure of distance learner success. However, the current study observes that the most effective support seekers, despite the pressures of everyday life, told the most positive stories about distance learning. In stark contrast, those who barely sought support were those whose stories were most commonly littered with frustration and admissions of waning self-regulation (Anderson et al., 2011). That said, it is worth noting that anomalies always exist. Ian barely reflected on learning supports yet his story was unequivocally as positive as his most interactive peers. This example highlights the danger of over generalising from the findings and underscores the importance of retaining a highly personalised dimension to ODL in new digitalised experiences.

**Conclusion**

The impact of this research should not be underestimated as it sheds new light on a significant gap in the literature. The public and private cost (direct and indirect) of the failure to complete ODL courses has worldwide significance. More locally the study reported in this paper has influenced and helped to substantially redesign many of the existing student support services at Massey University. Massey is New Zealand’s leading distance education provider, with over 50 years experience in supporting diverse and geographically remote distance learners. A new Student Success Framework has recently been launched by Massey University (Shillington et al., 2012) and implemented university-wide to support both campus-based and distance learners. Notably, in terms of the participants, the video diary intervention played an important role in fostering reflection and scaffolding individual student success; in this regard the study has helped to change participant’s lives. Furthermore, the current study employed a novel method of phenomenological data collection that has yielded high-impact results, which in turn has attracted international attention from other ODL providers. As a next step, Massey University is collaborating with a UK Russell Group university to undertake doctoral research that will adopt and extend the same video diary method. Without doubt, the study has helped to open a whole new line of enquiry and the student voice turns heads; nothing creates greater impact than their own words.
Acknowledgments

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References


Supporting Learning Through the Use of Self-Reflection Blogs: A study of the experience of blended learning students in the United Arab Emirates

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Abstract

This exploratory study seeks to examine how the use of student-written blogs support student learning through the student perspective. The blogs were introduced to provide support in four distinct areas: as a medium for facilitating learning; as a medium for interactivity; as a medium for metacognitive thought and reflection; and as a learning tool. This study was conducted over the course of one academic year with undergraduate and postgraduate students enrolled in a blended learning university located in the United Arab Emirates. Results indicate that for the students in this study, the use of blogs provided support in all four identified areas, as well as in additional areas not expected by the researchers. This paper provides details of the results of the data analysis, provides suggestions for classroom implementation, discusses the limitations of this research study, and proposes research questions which can guide future research studies on this topic.

Keywords: blogs; learning facilitation; online learning; student perspectives; United Arab Emirates; Web 2.0 technology

Introduction

As our world grows smaller and increasingly more connected, technological tools become embedded into the social fabric of our cultures and enable greater sharing, collaboration, and interaction among individuals and groups. In particular, the advent of Web 2.0 technology has increased the rapidity of adoption of such tools into our everyday lives. Of course, such technology has not only changed our social interactions but has also had a great impact on instructional strategies, and it is critical as these tools are so rapidly adopted into our pedagogies that they be critically examined for evidence of the type of impact, if any, they have on the learning process and outcomes of our present and future students. This paper reports on an exploratory study that seeks to illuminate student perspectives of using a particular Web 2.0 technology, blogging, in enhancing the learning process.

Web 2.0 technology in support of student-centered learning

Proponents of constructionist theory posit that learning is both an active and a reflective process (Paily, 2013) and that for learning to be truly student-centered, the student must play an active role in their learning activities. In other words, students are not only given autonomy and control over their learning, but indeed must also take responsibility and ownership of their learning process, and not rely just on the instructor’s direction (Neo, Neo & Kwok, 2009). Therefore, as online education continues to become increasingly present in higher education, it is critical that it is used in such a way as to support best practices in learning, and not just as an online replication of the traditional, teacher-centered classroom.
Web 2.0 technology is noted for its critical characteristics of enabling user-generated content by any user, as well as promoting sharing and collaboration of knowledge, regardless of knowledge of programming language and/or sophisticated technological skill. Because of these features, the use of Web 2.0 technology enables online learning to move beyond a teacher-centered approach to promote more active learning by students (Avci & Asker, 2012; Neo et al., 2009). Indeed, such technology provides instructors with the opportunity to “provide opportunities for students to take ownership of the learning process” (Martin & Noakes, 2012, p. 288). Of the various Web 2.0 technologies available, the weblog, or blog, has gained increasing interest and traction in educational use and research.

**Blogging in higher education**

As Web 2.0 technology becomes increasingly prevalent as a non-extraordinary part of social life, it is inevitable that scholars have sought to understand the role it can play in education. In particular, weblogging, or blogging as it is more commonly known, is a Web 2.0 tool which is steadily gaining acceptance as a viable tool in the learning process. Over the past decade, scholars have demonstrated multiple uses for blogs in enhancing student learning (Churchill 2009; Ducate & Lomicka 2008; Goldman, Cohen & Sheahan 2008). It has been found that blogs help to create a more student-centered instructional site, almost in the guise of an extension of the classroom through which students are encouraged to continue in interaction with each other as well as the instructor (Higdon & Topaz 2009; Neo & Neo 2010; Williams & Jacobs 2004). Kerka (1996) highlights the usefulness of blogs in a learner’s documentation of their learning, acting as a collection point for knowledge aids in self-analysis and reflective activities at a later date. Furthermore, blogs allow a high degree of customization, which Goh, Quek and Lee (2010) theorize leads to a greater sense of ownership of the learning process. There is also evidence that blogs can help to improve literacy skills in learners (Downes, 2004).

A growing body of empirical research is also demonstrating evidenced outcomes from the use of blogging. The outcomes which have been reported include: greater student to student interaction (Neo & Neo, 2010); students taking greater ownership of their learning process (Martin & Noakes, 2012); an enhancement of reflective thinking (Farmer, Yue & Brooks 2008) and deeper learning and knowledge construction (Ferdig & Trammel, 2004; O’Donnell, 2006); as well as increased teacher-learner social interaction, creativity, and high-level thinking skills (Avci & Askar, 2012). Undoubtedly, the studies published so far on the use of blogging to facilitate learning demonstrate that from a pedagogical perspective, blogging is a valuable tool in an instructor’s arsenal.

**Research question**

Scholars have used varied theoretical models to explore the impact of Web 2.0 technology, and specifically blogging, on the learning process. These range from a reflective thinking perspective (Dos & Demir, 2013; Kukkonen et al., 2011), social constructivism (Li 2010; Namwar & Rastgoo, 2008; Paily 2013), and a community of inquiry framework (Daspit & D’Souza, 2012; Garrison et al., 1999, 2001; Garrison & Arbaugh, 2007; Jimoyiannis & Angelaina, 2012). Regardless of which varied theoretical model is used, as discussed in the previous section there is widespread evidence from a pedagogical perspective of the usefulness of blogging in the learning process. However, what is missing from the academic discourse on this topic is the student perspective of its usefulness. In other words, while instructors and researchers alike are becoming increasingly convinced of the usefulness of blogging, do learners share this conclusion? Therefore, the intent of this study was
guided by the following research question: *From a learner’s perspective, in what ways does the use of blogging enhance and improve the learning experience in a blended-learning environment?*

**The study**

The exploration of the impact of blogging on learner perceptions of enhancing the learning experience was conducted during one academic year with 24 undergraduate and postgraduate learners studying at a blended-learning medium university in the United Arab Emirates during the academic year of 2012–2013. All learners were working toward degrees with a human resource management concentration, and all were taking required courses in their respective degree programs. All learners spoke English as a Second Language, and all courses in the university are conducted in English.

The blogs were introduced to provide support in four distinct areas: as a medium for facilitating learning; as a medium for interactivity; as a medium for metacognitive thought and reflection; and as a learning tool. Learners were required to publish weekly blog postings in their individual blogs while adhering to posting guidelines for each week in the semester, excluding exam weeks.

Learners were assessed on the basis of a rubric which awarded points as follows:

<table>
<thead>
<tr>
<th>Rating</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Good. The blog post is focused and coherently integrates examples with explanations or analysis. The entry reflects in-depth engagement with the topic.</td>
</tr>
<tr>
<td>Low (1)</td>
<td>Satisfactory. The blog post is not focused; and/or engagement with the topic is limited; and/or does not go in depth or provide analysis.</td>
</tr>
<tr>
<td>0</td>
<td>No Credit. The blog post is missing or consists of one or two disconnected sentences.</td>
</tr>
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</table>

The total assessment for blogging was incorporated into the participation grade for the course, with the blogging component accounting for four percent of the total course grade. Data was collected through the instructor as participant observer; analysis of the blog content and artifacts generated by the learners; an anonymous, voluntary survey administered to learners at the end of the academic year; and a voluntary focus group of participating learners. The voluntary survey contained 16 items to be answered on a 5-point Likert scale (from 1—Strongly Disagree to 5—Strongly Agree) which were designed to collect perceptions regarding learning in the course taken; how blogging contributed to the learning process; reasons for blogging; and willingness to blog in the future. In addition four demographic questions were included in the survey. The survey items were adapted from the survey instrument used by Churchill (2009). Participants were also provided with two open-ended questions about their blogging experiences. Multiple sources of data were included to ensure a more comprehensive understanding of the phenomena under study.

**Results**

Out of 24 learners enrolled in the targeted classes, 20 participated in the quantitative survey (an 83.3% response rate), and six participated in the follow-up focus group session (all of which self-reported that they answered the quantitative survey). The results therefore discussed in this paper will concentrate on those learners that gave feedback through the survey and/or focus group.

Of the 20 survey respondents, half were undergraduates and the other half were graduate students. Eighty-five percent of the participants had an overall grade point average (GPA) of 3.00
or above on a 4.00 scale. Eighty percent of respondents were female, while the largest age category was between 22–29 years of age (see Table 2 for detailed demographic information). Results of the survey are presented in Table 3. In Table 3, the survey choices of Strongly Agree and Agree are collapsed into “Agree.” Similarly, the survey choices of Strongly Disagree and Disagree are collapsed into “Disagree.” Furthermore, the Cronbach Alphas by section are as follows: 1. α = .99; 2. α = .95; 3. α = .94; 4. α = .77.

Responses to the open-ended questions, as well as feedback provided during the focus group, support the survey data and also identified a number of unexpected benefits of blogging. The open-ended responses and comments made during the focus group, when analyzed, fall under six distinct themes: 1) study/review aid; 2) learning/analysis tool; 3) allowing for personal expression and interaction; 4) providing connections between the studied content and real world application; 5) building self-confidence; and 6) improving writing skills. Student perspectives for each of these themes are provided below.

Data from the survey suggests that the learners surveyed believed that blogging aided their learning in many ways. For example, over 70% believed that blogging facilitated and contributed to their learning. More specifically, learners indicated that blogging supported their learning in the following ways: interaction with the instructor (75%); as a self-reflection tool in reviewing learned content (75%); and as a study aid for exam preparation (66.7%). Indeed, the learners more strongly agreed with blogging for these reasons rather than just for fulfilling assessment requirements in the course. There was also strong indication that learners would continue to blog in future classes, even if not necessarily required as a part of a course assessment.

Several participants described how useful blogs were in reviewing learned content and preparing for exams: As one student commented, “Blogging encouraged me to pay more attention to the lecture during class and read the materials more carefully during self-study weeks.” Another student reported that the benefits of blogs can be evident during exam preparation period, with one student

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Age Category</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>80%</td>
<td>18–21</td>
<td>15%</td>
</tr>
<tr>
<td>Male</td>
<td>20%</td>
<td>22–29</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>30–39</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40–49</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50–59</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Average GPA</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.75–4.00</td>
<td>15%</td>
</tr>
<tr>
<td>3.50–3.74</td>
<td>45%</td>
</tr>
<tr>
<td>3.25–3.49</td>
<td>10%</td>
</tr>
<tr>
<td>3.00–3.24</td>
<td>15%</td>
</tr>
<tr>
<td>2.75–2.99</td>
<td>15%</td>
</tr>
<tr>
<td>2.74 and below</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 2: Demographics of survey participants
Table 3: Data on survey items as completed by participants (n= 20)

<table>
<thead>
<tr>
<th>Survey Item</th>
<th>Agree % (n)</th>
<th>Disagree % (n)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Learning in this course</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 Compared to other courses, in [this instructor’s] course(s) I am learning much more.</td>
<td>75% (18)</td>
<td>8.3% (2)</td>
<td>4.35</td>
</tr>
<tr>
<td>1.2 In this course I believe I will get a higher final grade than in other courses.</td>
<td>62.5% (15)</td>
<td>8.3% (2)</td>
<td>4.05</td>
</tr>
<tr>
<td>1.3 Overall in this course, blogging facilitated and contributed to my learning.</td>
<td>70.8% (17)</td>
<td>8.3% (2)</td>
<td>4.25</td>
</tr>
<tr>
<td>1.4 Due to the blogging requirement in this course, [this instructor] was involved in supporting my learning more than professors in other courses.</td>
<td>72% (18)</td>
<td>8.3% (2)</td>
<td>4.40</td>
</tr>
<tr>
<td><strong>2. Blogging contributed to my learning in the following ways</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Accessing and reading blogs of my classmates.</td>
<td>58.3% (14)</td>
<td>16.7% (4)</td>
<td>3.65</td>
</tr>
<tr>
<td>2.2 Encouraged me to review the weekly slides and other Virtual Learning Environment materials.</td>
<td>75% (18)</td>
<td>8.3% (2)</td>
<td>4.35</td>
</tr>
<tr>
<td>2.3 Receiving comments from other classmates about my blog postings.</td>
<td>37.5% (9)</td>
<td>12.5% (3)</td>
<td>3.45</td>
</tr>
<tr>
<td>2.4 Receiving comments from [the instructor] in relation to my blog postings.</td>
<td>75% (18)</td>
<td>8.3% (2)</td>
<td>4.35</td>
</tr>
<tr>
<td>2.5 Accessing and reading my blog when studying for course exams or assignments.</td>
<td>66.7% (16)</td>
<td>8.3% (2)</td>
<td>4.10</td>
</tr>
<tr>
<td><strong>3. Reasons for blogging</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1 Because of assessment requirements.</td>
<td>62.5% (15)</td>
<td>16.7% (4)</td>
<td>3.85</td>
</tr>
<tr>
<td>3.2 Because it contributed to my learning.</td>
<td>75% (18)</td>
<td>8.3% (2)</td>
<td>4.30</td>
</tr>
<tr>
<td>3.3 Because it was a useful study tool.</td>
<td>66.7% (16)</td>
<td>12.5% (3)</td>
<td>4.15</td>
</tr>
<tr>
<td>3.4 To have one-on-one interaction with [the instructor].</td>
<td>70.8% (17)</td>
<td>12.5% (3)</td>
<td>4.20</td>
</tr>
<tr>
<td><strong>4. Willingness to blog in the future</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1 In future I will continue blogging on my own to support my learning.</td>
<td>45.8% (11)</td>
<td>12.5% (3)</td>
<td>3.80</td>
</tr>
<tr>
<td>4.2 In future I will blog if it is required by a professor.</td>
<td>66.7% (16)</td>
<td>12.5% (3)</td>
<td>4.10</td>
</tr>
<tr>
<td>4.3 In future I will blog if it is a part of a course assessment.</td>
<td>70.8% (17)</td>
<td>12.5% (3)</td>
<td>4.15</td>
</tr>
<tr>
<td>4.4 In future I would prefer not to have to do blogging.</td>
<td>16.7% (4)</td>
<td>58.3% (14)</td>
<td>2.10</td>
</tr>
</tbody>
</table>
going so far as to say “I mean, I barely had to study for my midterm exam thanks to the blogs. I mean, without those blogs, it would be like other courses . . . where study material just piles up.”

Moreover, another student provided a description of how blogging aided in meta-cognitive activities: “[Blogging] helped me in linking previous knowledge and experiences with current ones and creates an enjoyable learning situation.”

The participating students reported that the blogs not only helped prepare them for exams, but actually aided them in building their learning and analytical abilities. One learner expressly stated this: “I feel it is extremely crucial for the learning process,” while others expressed this sentiment more personally. For example, one student commented that “I just feel that [blogging] allows me to think deeply.” Another student mused about the transformational nature of learning through blogs: “I start out by wanting to answer the 3 questions you provided initially but then I go deeper, why is that? Blogging tends to provoke questions.”

The students who participated in the focus group greatly enjoyed the expressive and interactive aspects of blogging. One learner, when asked about her favourite part of the blogging experience, reported that “I get to express my feelings about the topic.” Another student stated “I like the interaction and reading your comments is always a pleasure,” while a third most enjoyed “… the feedback because it encourages me a lot.” Another learner expressed pleasure in that “if we need advice from [the instructor] we can address our problems or the challenges we are facing.”

Participants also provided meaningful feedback with regards to the use of blogging in connecting their acquired knowledge from their class to real world situations in the HRM field. One student mentioned that blogging “enhances my experience and lets me search for more information about any topic and how it affects my reality.” Another student said that she would advise new students in the program to embrace blogging, as “it’s the way to understand what is going on with HR knowledge by combining all that information with their experience.”

In addition, although the building or reinforcement of self-confidence and improvement of writing skills were not considered as potential outcomes when blogging was added to the courses in question, several students reported that blogging did provide these benefits. One student discussed how the blogging experience “made me confident on what I was writing and made me analyse things,” while another student pointed out that she felt blogging was “cool because you know it’s ok to make mistakes.” Indeed, one student reported how blogging provided benefits that spilled over into other areas such as time management: “I used to worry about the deadlines and would wait till the last minute, but now I started managing my time and doing them a few days before the deadline.” Another student stated that blogging forced her to improve her writing skills.

Discussion and recommendations for future research

Based on the results of this study, learners found blogging to be a beneficial tool with regards to their learning experiences, and described benefits beyond those which that were imagined by the instructor when adding blogging to the required assessments. In particular, participants in this study reported how blogging helped to increase their self-confidence and also tangentially helped to improve other skills such as writing and time management. If these benefits are taken into consideration in combination with the willingness shown in responses to the survey that many of these students would be willing to continue to blog in the future, could blogging perhaps be a Web 2.0 technology that learners could rely on outside of the classroom? In other words, can learners be encouraged to take control over their blogs, or take ownership of them and use them for further self-development in other aspects of their education or personal lives? Would students be motivated by such empowerment? Such questions indicate possible foci for this research stream to explore.
Suggestions for classroom use

From a practical standpoint, this study demonstrates that blogs add value to the learning experience not only from the instructor’s standpoint but from the student perspective as well. It is recommended that blogs can be incorporated into any class, regardless of content or delivery method. The blogs that were written by the students in this study all focused on answering three questions on a weekly basis: 1) What was my biggest take-away from this week’s topic and activities?; 2) What would I most likely share with a colleague about this week’s topic and activities?; and 3) What comments and/or recommendations do I have about this week’s topic and activities? These three questions are designed to, respectively, encourage self-reflection and review of learning activities and content for the week; encourage ownership of learning through the dissemination of content to other parties; and encourage immediate and personal feedback to the professor regarding what of the weekly content and activities are supporting the learner and what could improve the learning experience.

Limitations of study

As with any study, the one described in this paper has limitations which prevent a broader generalization of results to all learners. The participant sample was small, despite being very representative of the classes in question. However, for an exploratory study the sample sized used was adequate to generate data which, in turn, provides impetus to continue this research stream with larger population samples, particularly with students in different fields of study and geographical locations.

Conclusion

The purpose of this study was to explore the effect of blogging on the students’ experience of learning. The professional consensus amongst educators is generally positive, but we were concerned that there is a lack of evidence from a learners’ perspective: hence this study.

This study provides evidence that the use of the Web 2.0 technology of blogging aids in student learning, not only from a pedagogical perspective but also from the student point of view. Indeed, students who participated in this study reported more benefits than were anticipated by the researchers. As Web 2.0 technology increasingly becomes an integral part of our social lives, its use in the educational and learning arenas cannot be understated.

A number of unexpected findings emerged which we believe provide good signposts for future research, specifically on how Web 2.0 technology can assist in developing greater learner ownership and self-management of learning.

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