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At the end of the long journal process of submission, review, revision and final publication comes the editorial task of ordering the articles in some sort of logical way so as to increase the issue's accessibility and attractiveness to readers. However, as an editor, I ask myself if it matters that I do this. Given that we all approach learning tasks with our own sets of tools and pre-existing knowledge and assumptions, it must be highly unlikely that any two readers will extract the same meaning from whatever article-order is implemented. Years ago, I learned from a colleague that all lists should be prioritized in order of importance or urgency. Although I took that to heart when making my own lists and although that advice has served me well, the journal's playing field does not afford us that type of prioritizing. In this issue, therefore, I have made a division between articles based on topic area; the predominant division separates distance learning articles from OER articles, the latter being presented first. Within the "distance" pieces, I pondered whether to separate macro to micro, teacher/learner, or geographically. I leave it to you to discern whether I managed any of these!

And as always, there are the outliers, articles whose topics are so unique within a collection. In this issue, I would thus classify Cunningham's and Koole's articles. Cunningham has used activity theory to conclude that student beliefs and expectations lead to hidden challenges associated with mixing distance and campus-based students. Koole, writing on identity, has described a preliminary study of the kinds of strategies that students draw upon for interpreting and enacting their identities in online learning environments. Her study results indicate that online learners actively employ a variety of strategies in interpreting and enacting their identities.

In the OER camp, Oyo and Kalema give us insight into a new era of universal access to higher education in Africa, achievable through MOOCs, but only if initial requirements are met by respective governments. And from Turkey, Kursun, Cagiltay, and Can's findings show that even though the majority of their study's participants' perceptions of OER benefits and their attitudes toward publishing their course materials were positive, legal issues were perceived as an obstacle to effective application. Both articles articulate important considerations for the furthering of educational accessibility.

Addressing the K-12 sector, Kimmons sought to understand how to use formal learning activities to effectively support the development of open education literacies among K-12 teachers and concluded that various misconceptions must be overcome to support large-scale development of open education literacies in K-12, and that open education advocates should recognize that all teachers, irrespective of time teaching, want to innovate, utilize open resources, and share in an open manner.

Also investigating the K-12 sector, this time in a Turkish study and on the distance side of the ledger, Randler, Horzum, and Vollmer's research has shown that anxiety and willingness towards distance learning are moderated by personality. Their study sought to investigate whether distance learning willingness and distance learning anxiety were associated with personality in a large (n=769) sample of vocational students.

Many of the distance-themed articles concern themselves with "how to make things better." Cole, Shelley, and Swartz's study on student satisfaction tell us that convenience was the most cited reason for satisfaction and lack of interaction was the most cited reason for dissatisfaction. The authors conclude that their study's findings support the literature to date and reinforce the significance of student satisfaction to student retention. From another part of the world but on a similar theme, Muuro, Wagacha, Kihoro, and Obok recommend, from their findings on learners' perceptions of online collaborative learning, that further research should focus on how to improve peer interaction and instructor involvement in online group activity.

From Spain, González-Sanmamed, Muñoz-Carril, and Sangra analyzed perceptions on the level of proficiency that online teachers have regarding their peripheral roles (social, evaluator, manager, technologist, advisor/counsellor, personal, and researcher), and their professional development needs required to improve their online teaching competencies. The researchers conclude that professional development programs should be based on a balance between central and peripheral roles to better train online teachers and thereby increase the quality of their teaching.

From their research at a Costa Rican University on how to improve student performance and engagement, Joo, Andrés, and Shearer's findings indicate that design revisions positively influenced both students' cognitive engagement and learning outcomes within this distance higher education context. They note, however, that student performance represented by their assessment grades might not always reflect this improvement, raising once again the issue of effective assessment in the learning process.

Calling on the expertise of 10 senior European distance educators, Volungeviciene, Tereseviciene, and Tait present a qualitative study documenting their intent to develop a theoretical framework for quality assurance of TEL integration into educational organizations. The authors report on the development of the TEL concept, success indicators for TEL integration in an educational organization, while identifying the quality parameters of TEL integration into an educational organization and developing a model for TEL integration into an organization.

Han and Han have studied how to make things better through the adoption of new technology by examining what factors facilitate and hinder the students' adoption of the mobile campus. Their study used Rogers' diffusion of innovation model and compared the perceptions of mobile LMS users and nonusers.

Khan and Khader also tackle a technology issue – how to externalize content experts' expert subject knowledge so that learners may more easily access this expertise. Read about the query management system that they propose as a solution to this knowledge management problem.

Khor's article investigating ODL students' perception and adoption of SCORM Compliant Learning Object (SCLO) sought to determine whether a better understanding and implementation of effective instructional resources was necessary to meet the diverse needs of ODL students and enhance learning performance. The results of this study confirmed that users' perceptions have contributed significantly to the acceptance and adoption of SCLO, thereby providing a better understanding of students' behavior on SCLO .

Using a design-based research study, Harrison and West explored whether a sense of community was maintained in a course while increasing course flexibility through the adoption of a unique blended learning model, and their findings indicate that transitioning to a blended learning environment may indeed increase flexibility while maintaining community.

Last but not least, in a large study with over 1,600 participants, Salyers, Carter, Carter, Myers, and Barrett examined how elearning is defined and conceptualized,whether or not we like it, and whether or not it is as meaningful to us as face to face learning.

This issue wraps up our publication for 2014. Rory, Terry, Brigette and I would like to thank IRRODL's many contributors, our hundreds of reviewers, the Editorial Board, Athabasca University, AU Press, and our thousands of readers (over 2,000 readers on some days) from all over the world. To you all, the best for your holiday season and a happy, healthy new year.

THE INTERNATIONAL REVIEW OF RESEARCH IN OPEN AND DISTANCE LEARNING

Massive Open Online Courses for Africa by Africa


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Abstract

Africa is known for inadequate access to all sorts of human needs including health, education, food, shelter, transport, security, and energy. Before the emergence of massive open online courses (MOOCs), open access to higher education (HE) was exclusive of Africa. However, as a generally affordable method of post-secondary education delivery, MOOCs place the developing countries at the centre of universal access to HE. This paper provides the strategy for MOOC implementation in the context of limited resources in Africa. The strategy is clustered under five baseline requirements: national accredited MOOC curriculum, electronic content development, development of an online and offline eLearning platform, establishment and funding of MOOC coordination units at public HEIs, and establishment of MOOC access hubs at strategic locations. Emerging from this paper is the insight that a new era of universal access to HE in Africa is achievable through MOOCs only if initial requirements are met by the respective governments.

Keywords: MOOCs; higher education; eLearning; African governments; low bandwidth

Introduction

The shared vision of Africa seems to be a poverty free people in the next two decades. This is implied by the respective African countries' vision statements, such as Rwanda's vision 2020 that aims to transform Rwanda into a middle income nation with healthier, educated, and generally more prosperous people, while Nigeria's vision 2020 seeks to position Nigeria as one of the top twenty economies in the world. Similarly, Kenya's vision 2030 seeks to create a globally competitive and prosperous nation with a high quality of life. South Africa's vision is to eliminate poverty and reduce inequality by 2030, and Uganda's vision is to transform the Ugandan society from a peasant to a modern, prosperous, and competitive upper middle-income country by 2040. This shared vision may, however, not be possible with the current largely illiterate society and weak science and technology environments that can only be strengthened by open HE training. This paper therefore seeks to demonstrate that a good design of MOOCs could widen HE access to disadvantaged students in Africa thereby promoting holistic economic emancipation.

Given the pervasiveness of information technologies in education, researchers and governments are beginning to visualise a paradigm shift towards higher education for all, anytime and anywhere (Jordan, 2014; Economides, 2013; Materu, 2007). This is the type of education that MOOCs can deliver. MOOC is a model of educational delivery that is, to varying degrees, massive (no limit on enrolment), open (optional admission requirements and usually no tuition), online, and a course with defined curriculum leading to an award of a completion certificate (EDUCAUSE, 2013). The "open" aspect has also been argued from the perspective of openness of learning content and learning process, giving rise to two major forms of MOOCs: xMOOCs and cMOOCs. xMOOCs are structured similarly to traditional online higher education courses in which students watch video lectures, read assigned material, participate in online discussions and forums, and complete quizzes and tests on the course material, while cMOOCs are based on connectivist pedagogy allowing learners to construct the learning process through their interactions (Grünewald et al., 2013; Rodriguez, 2013). In this paper we emphasise xMOOCs because they are easily adoptable from the traditional face-to-face and/or blended learning settings.

MOOCs have shown themselves to be an effective innovation, helping uncover new best practices that could be used in other online, face-to-face, or blended pedagogies. Perhaps MOOCs' most important contribution to date has been to raise important questions and spark essential conversations about curriculum design, accreditation, what constitutes a valid learning experience, and who has access to higher education (EDUCAUSE, 2013). If African governments commit to MOOCs through solid curricula, instructor training and electronic content development and content delivery platforms, and provision of modern access hubs, public HEIs are likely to support open access agenda and even seek additional funding from development partners to strengthen their niche. There is no doubt that MOOCs are suitable for Africa since they reduce the need for costly large lecture rooms, eliminate student accommodation and transportation costs, and, above all, enable massive access with tuition fees waived or set relatively low and within reach of poor students.

The Case for MOOCs in Africa

The argument for MOOCs in Africa is driven by the need for affordable HE access solutions. Access to HE in Africa is a long standing problem, stemming from the ivory tower era where access was only for the elite state funded students and the majority of students dropping out of education into low skilled or casual employment. Following the enactment of educational laws for provision of private higher education during the early 1990s, Africa has witnessed sporadic increase in access to higher education through both the private window in public universities and private institutions. As a result, the mode of access became more flexible for students preferring to study during day, evening, or weekends as well as those on distance programmes. Despite these developments, the majority of students with minimum entry grades in Africa still cannot access higher education due to poverty (Materu, 2007; Osokoya, 2007).

Africa is not only a silent player but also a silent spectator in the ongoing MOOC revolution. Perhaps the silence of Africa is justified given the prevailing reality in the developed world where MOOCs are failing to reach disadvantaged students who would not ordinarily have access to educational opportunities (Emanuel, 2013). On the other hand, the fact that MOOCs are intended for mass enrolment with usually no tuition required from the students is more appealing to developing countries than the developed countries. A key question to pose at this point is: why are MOOCs not featuring in Africa? This paper does not merely attempt to answer the latter question but a more strategic question, that is, how should MOOCs be designed for developing countries such as those in Africa?

Throughout the world, the cost of education increases by the level undertaken. Lewin (2004) reports that the cost of secondary education per pupil in sub Saharan Africa is five times that of primary education. The net effect of this reality is reflected by larger government funding for primary education in Africa compared to lukewarm government support to secondary education and subsequently HE. It seems therefore possible for African governments to reconsider financing HE if affordable access solutions are available. MOOCs present an affordable post-secondary education delivery method for the majority poor/needy students in Africa. Indeed MOOCs could eliminate Africa's nightmare of large school dropouts after secondary school education. Figure 1 depicts the relevance of MOOCs in enabling open access to HE while simultaneously eliminating post-secondary school dropouts/exclusions.

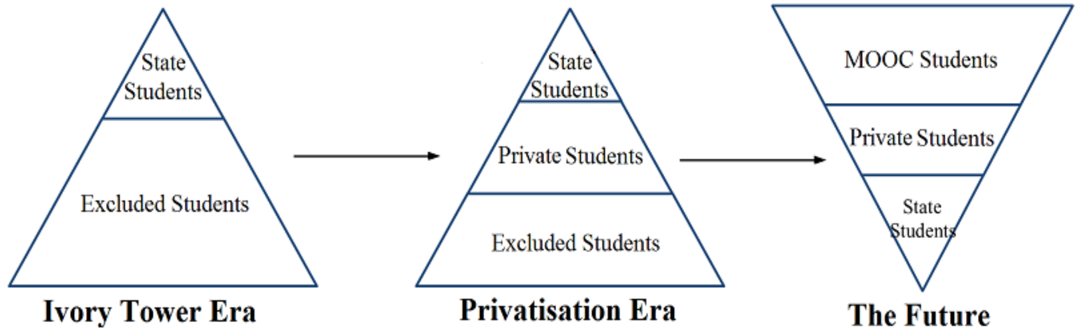

Figure 1. Perspectives of higher education access in Africa: past, present and future.

As illustrated in Figure 1, the challenge of exclusions from HE training has persisted since the inception of HE in Africa and could only be eliminated by adopting MOOCs. In the past, students in Africa were excluded from HE training due to the ivory tower mentality that restricted access to only the elite society. The current transition in HE access trajectory through massive privatisation, though highly commended for expanding access, has excluded a large section of the needy/poor students in Africa who cannot afford tuition (Osokoya, 2007; Materu, 2007). Now is the time therefore to investigate other HE access options such as MOOCs that are exclusive of the financial abilities of students. Providing a design of MOOCs in the context of Africa's situations, such as low internet bandwidth, weak professional competencies, and lack of political support, is the first step in ensuring a future of open HE access in Africa. This future underpinned by MOOCs resonates with Africa's educational vision of affordable HE access as a means of eliminating poverty through development of human resource capacity (Pityana, 2009).

Strategy for MOOCs in Africa

Africa in the current state is not ready for MOOCs due to a number of factors, including but not limited to weak instructors' readiness for digital education, scarce locally developed electronic content, low bandwidth Internet connectivity, limited access to computers, computer illiteracy of HE entrants, and frequent electricity blackouts. In light of these challenges, Africa's approach to MOOCs must be rooted in government support at the initial stages while building capacity of the participating HEIs to independently manage their MOOC programmes. At the initiation stage, the African governments should focus on formation and funding of national coordination secretariat, content development and programme accreditation, content delivery mechanism, provision of access to computers and Internet, and funding of MOOC coordination departments in public HEIs. The details of this strategy follow.

Formation of the National MOOC Coordination Secretariat

MOOCs present a rare opportunity for African governments to provide universal access to HE without direct dependence on international grants or loans. The fruits of MOOCs could turn sour right from the outset if MOOCs are not properly coordinated in Africa. The respective African governments are therefore obliged to form a national MOOC secretariat tasked with initiating and regulating the MOOC agenda. This will involve activities including spearheading curriculum development and accreditation, electronic content development, development of an online and offline eLearning platform, formation of MOOC access hubs for needy students, and coordination of MOOC implementation in collaboration with MOOC departments in participating HEIs.

Programme Accreditation and Content Development

The pioneer MOOC programmes, such as Coursera, edX, Udacity, and Udemy, have independent content delivery platforms for video lectures, multimedia instruction, online forums, and online tests/quizzes. African HEIs already have accredited programmes delivered under the traditional lecture method. These same programmes will be pooled and digitised by involving top academicians coordinated by a national MOOC secretariat. The resultant MOOC programmes will then be accredited. This will ensure that quality assurance issues are addressed from the onset without compromising national and international programme standards. Future content reviews and improvements should be coordinated by the national MOOC secretariat in collaboration with implementing institutions and guided by a consolidated continuous quality improvement framework.

Online and Offline eLearning Platform

Fully functional eLearning platforms are not common in African HEIs. More often than not, eLearning platforms are only operational in certain departments, such as computing, engineering and education, where computers and Internet are most used. Eka (2010) reports of wasted externally funded eLearning resources in African universities due to ineffective implementation and lack of sustained commitment by university administrators. Therefore, successful adoption of MOOCs by African HEIs requires an eLearning platform developed and maintained by a third party which in this case is the MOOC secretariat. The participating institutions would then customise their environments according to their preferences, while supporting their students learning. The same institutional eLearning environment could be used to connect students on traditional programmes with their MOOC counterparts. At the same time, the eLearning platform should have an offline function to cater for places with slow or no Internet connection. Details on the aspect of offline access is given in the next section.

Ubiquitous Access to Computers and Internet

Access to computers and access to Internet are two separate issues in Africa, with the former more abundantly available than the latter. Within education, the introduction of computer studies in secondary school curriculum is boosting access to computers in many parts of Africa. In Uganda, for instance, all public secondary schools irrespective of their location now have access to state-of-the-art networked computers (Oyo & Williams, 2014). Rwanda and Nigeria are unique cases with access to computers both in schools as well as through ICT buses (mobile Telecentres or Internet units). The latest report by the government of Rwanda indicates that students and the general public can now access Internet through 94 mobile Telecentres across all the 30 districts (Republic of Rwanda, 2014). Similarly, the mobile Internet units in Nigeria are effective in providing access to Internet in primary and secondary schools although their number is still limited (Adomi & Kpangban, 2010). In Ghana, ICT has been part of the senior high school curriculum since 2008 (Amenyedzi et al., 2011).

As African governments contemplate investing in MOOCs, access to computers and Internet could initially be through sharing existing computer labs in secondary schools with MOOC students. This means that a needy/poor student from any village chooses to enrol under a MOOC programme at the nearest public HEI, and studies online by accessing Internet from the nearest secondary school. With this mode of education, the needy students live in their villages and do not pay tuition since access to Internet which translates into access to higher education is provided by government.

It is worth reiterating that sharing computers in secondary schools should only be used as a temporary intervention for enabling access to Internet at the inception of the MOOCs. During this time, regional MOOC enrolment demand can be established and strategic locations earmarked for future construction of MOOC access hubs fully equipped with Internet connectivity, book bank, and reading/discussion room.

In contrast, low Internet bandwidth is considered the biggest nightmare for access to e-resources in Africa. The traditional content access method for MOOCs through high speed Internet and constant connectivity is not realistic to Africa even in the near future following the slow pace in implementing African submarine cables and terrestrial fibre optic networks projects that have slacked for more than a decade. Interestingly in some cases where governments have laid terrestrial fibre optic networks, beneficiary institutions have ignored their responsibility for last mile connections (Wright, 2014). Indeed the high levels of abject poverty still reported in most parts of Africa renders poverty eradication interventions more prominent over Internet access. This points to the need to deliver MOOC content under both online and offline modes and therefore the eLearning platform should be developed in consideration of these capabilities.

The offline platform could be developed similar to the eGranary resource (eGranary is a digital library that provides educational resources via a local area network). In the context of Africa and owing to the fact that a drum is a symbol of communication or knowledge sharing, we propose the eDrum digital library as the metaphor for the offline platform. The eDrum platform should integrate resources from the national eLearning platform, relevant open educational resources, articles from open access journals, and educational video clips from other online sources like YouTube. In addition, the eDrum should provide an applications space for graphics, text editing, video recording, games, and animations to enable learners not only to complete their assignments easily but also produce high quality re-usable content. Figure 2 gives a holistic insight of content access options available to a MOOC student, that is, through a MOOC access hub using either online or offline access modes and through communication devices that are commonly available in homes, such as radios, cell phones and televisions.

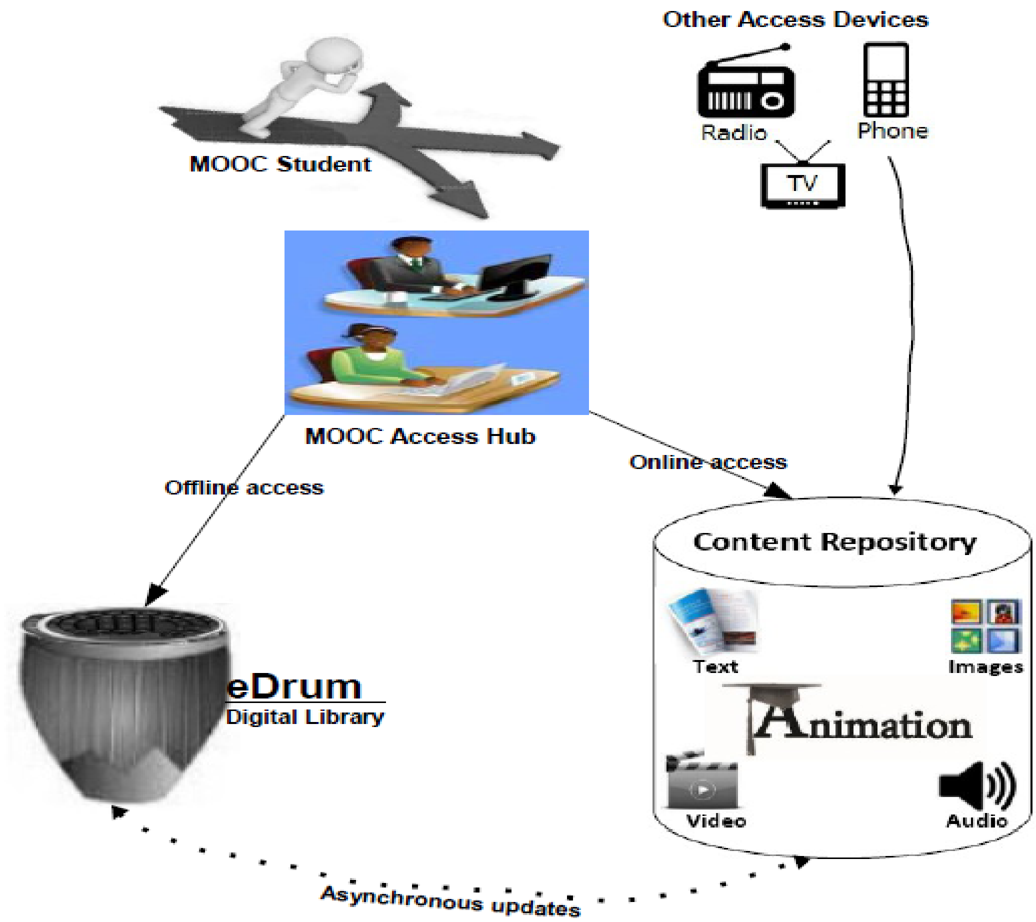

Figure 2. Access options for MOOC students.

As shown in Figure 2, a MOOC student is presented with several access options that suits his/her environment and interest. Apart from using the MOOC access hub resources, the student can learn or participate in an interactive discussion from home using available technologies (cell phones, radio, and TV). This is in line with the growing debate to develop MOOCs that can be delivered on mobile phones which are ubiquitous among African students (Boga & McGreal, 2014; Gaebel, 2014).

Aware of the fact that MOOC content is predominantly multimedia, yet Africa is still largely covered by slow or no Internet connection, offline access is an important requirement for the MOOC delivery platform. At the same time, new technologies, such as scalable image and video coding for delivery of multimedia on small displays and HTTP adaptive video streaming (Akhshabi et al., 2012) that enable video transfer in low bandwidth environments, should be implemented at the content repository end. Ultimately, the key requirements for a MOOC delivery platform in the context of resource constraints in Africa are: content delivery technologies for small displays and slow Internet connections, technologies for interactive radio/television instruction, and technologies for offline access. In light of the aforementioned requirements, a new eLearning platform is necessary since the existing systems, such as Moodle, Coursera, and edX, do not adequately address these requirements and would require significant extentions to effectively function within the contexts of Africa. Moreover, developing a new system that uniquely serves an established need promotes visibility of the developers' institution.

MOOC Implementation Baseline

As already argued, successful implementation of MOOCs in a developing country would require first and foremost a national coordination secretariat, then a HEI MOOC coordination department. From this common ground, other requirements including content development and programme accreditation, content delivery mechanism, and provision of access to computers and Internet can be met. Table 1 gives the activities and responsibilities distribution for successful implementation of MOOCs in resource constrained environments such as Africa.

Table 1

MOOC Implementation Activities for Developing Countries

Item	Activity	Responsibility
1	MOOC curriculum development and accreditation	Contracted academics from public universities coordinated by national MOOC secretariat
2	Development of an online and offline eLearning platform for MOOC delivery	Contracted local firm coordinated by national MOOC secretariat
3	Development of electronic content corresponding with MOOC curriculum	Contracted academics from public universities coordinated by national MOOC secretariat
4	Formation of MOOC coordination units at HEIs	HEIs with funding from Education Ministry
5	Creation of MOOC access hubs at strategic regional centres	National MOOC secretariat with funding from government

Many of the responsibilities for successful implementation of MOOCs as shown in Table 1 lie with the national MOOC secretariat on behalf of government. Given the varying backgrounds of HE entrants, MOOCs should be designed to support multiple learning styles and again this requires institutional leadership that could be provided by the MOOC secretariat. The design of MOOCs for multiple learning styles, however, is beyond the scope of this paper; literature on this subject can be found in Grünewald et al. (2013).

Lessons for Africa

Following from the previous discussions, five lessons can be drawn for stakeholders seeking to pursue MOOCs for Africa.

Lesson One: Centrality of Government Funding

The consolidated insight from Table 1 and Figure 2 can be used by government to perform a cost benefit analysis upon which to execute a MOOC adoption agenda. Fortunately for MOOCs, there is no need for the expensive unit cost per student approach but rather "mass" cost for regional needs. The aspect of one investment serving a large number of students should prompt the respective African governments to consider a phased funding strategy beginning with the regions where the greatest impact is expected.

Lesson Two: Robustness of MOOC Coordination

The aspect of a central MOOC coordinating secretariat has already been exhaustively discussed in this paper. The robustness implied here is both structural and financial. In terms of structure, the MOOC secretariat should interface with a government ministry for education, HEIs, accreditation agencies, and industry. This would ensure that the functions of a MOOC secretariat are not restricted to enabling access to HE only but also ensuring quality of MOOC programmes and employability of MOOC graduates. The financing of a MOOC secretariat rests primarily on government, that is, the respective African governments should innovatively establish a solid funding mechanism either through charging a nominal functional fee from MOOC students or through direct funding from the central government or both. Once this is achieved, the impact of MOOCs could be realised in a short time.

Lesson Three: Readiness of HEIs

HEIs are the main drivers of MOOCs at least from the perspective of the developed countries where MOOCs are thriving. The same trend cannot be expected from developing countries whose institutions are heavily underfunded and lack the minimum resources to effectively deliver traditional face-to-face education, let alone online education. If HEIs in Africa are to embrace MOOCs, they must be prepared for it through general awareness about MOOCs, establishment or upgrade of multimedia labs, training of staff on the use of modern educational technologies, establishment of MOOC coordination departments, and provision of incentives for MOOC instructors.

Lesson Four: Preparedness of High School Graduates

The high school curriculum will need to be revised in order to produce students who can engage in MOOCs after secondary education. Some foundational courses currently offered at university level will need to be moved to high school to better prepare students for learning styles supported by MOOCs. Three subjects seem to be most relevant in this respect: communications skills, research methodology, and ICT. While some of these subjects, for example, ICT is already offered in secondary schools as previously discussed, in preparation for MOOCs, a review is necessary irrespective of the prevailing circumstances. For instance, the eDrum platform once developed should be integrated in the secondary school ICT curriculum.

Lesson Five: MOOC Sustainability Strategy

The concern in promoting the MOOC agenda for Africa lies in the likelihood of its failure. The dilemma surrounding MOOCs in Africa is its reliance on government funding at a time when African governments are more supportive of private than public initiatives. In fact, African governments were quick to implement HE privatisation policy because it relieved them of the burden of financing HE. Viewed differently, integrating MOOCs into the mainstream public education system would definitely ensure its sustainability. In this respect, the existing public student scholarship either through direct funding or student loans or both would be revised and part of the funds allocated to building and running MOOC programmes. At higher education institutional level, cost effective measures for MOOC student support could also be explored. These include:

- Alumni volunteer initiatives, whereby fresh graduates without employment provide instructional support to MOOC students using MOOC access hub facilities as part of their service to community and professional development. In return, the respective HEI awards its volunteer alumni additional community service certificates.

- Instructor outreach. Under the traditional programmes, instructors are engaged in field supervision of students on internship and school practice. During these field engagements, the instructors could be scheduled to interact with MOOC students from the MOOC access hubs without additional costs.

- Requested support, whereby students attached to a MOOC access hub place online requests for face-to-face interaction with their preferred instructors and the HEI MOOC coordination department arranges for these interactions after pooling requests from all its MOOC access hubs.

Conclusion

MOOCs as an educational delivery model is already about half a decade old, but with lukewarm presence in Africa and only one documented case, that is, the "New Economy Skills for Africa ICT" MOOC in Tanzania. In Africa where resources are scarce and HE provision is limited, the need for MOOCs is stronger, yet Africa is the most passive entity in the global MOOC debate on which affordable HE currently lies. At the same time, HEIs in Africa do not seem to be planning for MOOCs let alone in knowledge of MOOCs at institutional level. This paper articulates a flexible roadmap for successful implementation of MOOCs that should allow Africa and the developing countries in general to initiate MOOC programmes using available resources in the short term while scaling-up in the long term. The paper is therefore intended to provoke a new wave of debate and experimentation on mass HE access using MOOCs in the developing countries. What remains to be seen is how the individual African governments and HEIs will react to the insights provided in this paper and previous calls that point to the same direction of affordable HE access for poor students.

The global view of MOOCs as open to anyone who has Internet access is not relevant to Africa where the challenge of Internet access has persisted for over a decade despite implementation of African submarine cables and terrestrial fibre optic cables. The focus of this paper on the design of suitable MOOCs for Africa is therefore timely. Emerging from this paper is the MOOC implementation strategy in the context of limited resources in Africa, clustered under five baseline requirements, including national accredited MOOC curriculum, electronic content development, development of an online and offline eLearning platform, establishment and funding of MOOC coordination units at public HEIs, and establishment of MOOC access hubs at strategic locations. In addition, the sustainability of MOOCs in resource constraint environments of Africa will depend on the robustness of its operational, financial, and technological structures. From the discussions on content access strategies for disadvantaged MOOC students, we can safely conclude that the technological structure centred on eLearning infrastructure that is optimised for low bandwidth and/or offline accessibility provides a feasible solution to electronic content access challenges in Africa. However, the feasibility of the proposed MOOC operational and financial structures can only be evaluated when MOOCs for Africa are implemented on the basis of these structures.

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The International Review of Research in Open and Distance Learning

An Investigation of Faculty Perspectives on Barriers, Incentives, and Benefits of the OER Movement in Turkey



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Abstract

The purpose of this survey study is to investigate faculty's perceptions of the main incentives, barriers, and benefits to publishing their course materials for free within the open educational resources (OER) movement. Data were collected from an online survey of 1,637 faculty from 56 universities in Turkey. Results showed that even though the majority of the participants' perceptions of OER benefits and their attitudes toward publishing their course materials were positive, legal issues were perceived as an obstacle to effective application. Intellectual property protection mechanisms were perceived as the most important incentive to facilitate their contribution.

Keywords: Open educational resources (OER); OpenCourseWare (OCW); barriers; incentives; benefits

Introduction

Advancements in technology and science are mainly based on the shared knowledge of people who have lived in the past. Although the goal behind science and education is to build, improve, and share knowledge (Questier & Schreurs, 2008), numerous barriers limit access to and use of educational materials. The open educational resources (OER) movement was launched in the late 1990s to overcome those barriers. The movement primarily resulted as a progression from information and communication technologies (ICT) and has expanded rapidly during the last decade (Sclater, 2010; Hilton, Wiley, Stein, & Johnson, 2010; Conole & McAndrew, 2010; Schaffert & Geser, 2008). A number of noteworthy international organizations such as UNESCO, OECD, The World Bank, The European Union, and The Commonwealth of Learning have supported this movement (Taylor, 2007; Ives & Pringle, 2013).

The Massachusetts Institute of Technology's (MIT) OpenCourseWare (OCW) has played a critical role in expanding the movement around the world (Atkins, Brown, & Hammond, 2007; Sclater, 2010; Smith, 2009) as a model for providing free-to-use OER (Carson, 2007). Although it was not the first OER initiative, it was the first to be conducted on a large scale; almost all MIT undergraduate and graduate course materials were published on the Internet for free.

The OER movement has had a significant impact on Turkish tertiary institutions as well. Yazici, Ozkul, and Cagiltay (2008) stated that the Turkish OpenCourseWare consortium (UADMK) was established under the leadership of the Turkish Academy of Sciences (TUBA) in 2006 . While it started with only 24 universities, this number has increased to 60 as of 2014.

Drawing from categorizations in the literature, OER initiatives in Turkey can be organized under three levels: First is the nationwide OER initiative led by UADMK within the body of TUBA. It has an allocated budget provided by the State Planning Organization (DPT), and a quality assurance process is employed before publishing courses. The second level is institution-based initiatives started by universities who publish their course materials independently. They have no strict quality assurance system, and faculty are responsible for their own materials. Finally, the third level is the personal attempts of individual faculty to publish free course materials online.

Although OER offers great promise, it is not possible to benefit from this potential without effectively addressing possible barriers and identifying key elements (Bissell & Boyle, 2007). For successful implementation and management of OER projects, one crucial factor is faculty and administrative support (Henson, 2005). Faculty can be considered the key players of the OER movement because they are the producers and owners of the course materials. It is therefore important to understand their concerns and establish strategies in line with their perspectives to support the Turkish OER movement. Research on the identification of barriers, incentives, and benefits of OER from the perspective of faculty can provide policymakers, administrators, and other stakeholders with guidance about its implementation in higher education institutions.

Several studies have reported possible barriers, incentives, and benefits of OER in higher education institutions as perceived by faculty. However they were not large scale studies, and the quality of the instruments used is questionable. Furthermore, existing OER studies have mainly focused on the experiences of top English-speaking institutions, largely ignoring non-English speaking ventures (Cobo, 2013). The OER experiences of these universities need to be explored from the perspectives of the faculty with a large scale study and a tested instrument.

Therefore, the purpose of this study is to investigate the perceptions of faculty in Turkish universities on incentives, barriers, and benefits of publishing their course materials for free. Specifically, this study has three research questions:

1) What are the perceived barriers to faculty sharing their course materials?
2) What are the perceived incentives for faculty to share their course materials?
3) What are the perceived benefits for faculty sharing their course materials?

Review of Literature

In this section, barriers, incentives, and benefits of the OER movement as reported in the literature are presented, and relevant studies regarding faculty perspectives are examined.

Barriers of OER

For the purpose of this study, a barrier is defined as any obstacle to publishing and sharing educational materials. The OER movement holds diverse promises for teaching and learning, yet obstacles have stifled its growth (Bissell & Boyle, 2007; The Cape Town Open Education Declaration, 2008). To overcome these barriers, it is essential to first understand them in detail.

In the literature, many barriers have been reported that affect OER negatively: lack of awareness of copyright issues, existing copyright laws, quality assurance, quality assessment and enhancement, sustainability, interoperability, lack of technological innovation and tools, cultural and language barriers, lack of institutional policies and incentives for educators, high costs of content development and maintenance, resistance from faculty, and lack of connectivity and computers for re-use (Hylén, 2006; Matkin, 2006; Casserly, 2007; OLCOS, 2007; Yuan, MacNeill, & Kraan, 2008; Pena, 2009; Sclater, 2011; Mulder, 2013).

The following studies investigated faculty perspectives about the barriers of OER.

According to Carson (2006), when MIT faculty were asked to state reasons for non-participation in OCW, they most often reported insufficiently polished materials, lack of time, and concerns over future marketability of their prospective books.

A study conducted by Lee, Albright, O'Leary, Terkla, and Wilson (2008) to examine faculty concerns about the Tufts OCW initiative found that faculty felt that excluding copyrighted materials from their content would diminish the quality. They also felt that in comparison to rich, internal course materials, initial OCW courses were not mature enough and may therefore devalue their reputations as educators. Other issues included time commitment and loss of control over materials.

In its report, *Giving Knowledge for Free. The Emergence of Open Educational Resources*, OECD (2007) reported on a survey targeting teachers and researchers; 193 people from 49 countries responded. When asked to value nine possible barriers for engagement of colleagues in the production of OER, the most significant issues were lack of time (67%), lack of skill (61%), and lack of a reward system (58%). The least significant problem was lack of access to computers and other kinds of hardware and software (15%).

Incentives for OER

In the context of this study, incentives can be defined as any factor that encourages faculty to publish their course materials as OER.

In OECD's 2007 study, incentives for teachers and researchers were grouped into four categories: "altruistic motivation of sharing," "personal non-monetary gain," "as a way of getting publicity," and "value to other people" (p. 12). Items rated as most important were "to be acknowledged as the creator of a resource when it is used" and "to have a quality review of the resource" (p. 67). The least important factors were financially oriented items such as monetary gain, promotions, or awards. However, since the participation rate of the study was low, results must be interpreted carefully.

Albright (2005) has listed different incentives for faculty members as suggested at the UNESCO forum, including adding OER to portfolios for academic promotion and tenure, providing awards for outstanding material, embedding open content in scholarly training and practice, and developing relevant institutional policies.

Sclater (2011) divided motivations for launching an OER initiative into three categories, altruistic, commercial, and transformational. For altruism, freely publishing course materials provides a number of benefits for individual learners who would not otherwise have such opportunities, especially in developing countries. Commercially, OER may increase the visibility and reputation of an institution on a larger, global scale. As an example, Sclater stated that 7,000 students registered for fee-paying courses immediately after viewing Open University UK's OER content. As for transformational incentives, an OER project may have a positive impact on an institution's processes, structure, and content. For example, faculty who publish their course materials can receive valuable feedback from experts around the world.

On the other side, Pena (2009) sees absence of incentive for faculty as a social barrier, and she suggests higher education institutions should arrange such programs in line with teaching and learning policies so OER is not seen as a burden.

Benefits of OER

The potential of the OER movement has been well documented and demonstrated in important national (JISC in UK, NSF in USA) and international (OECD, UNESCO, the EU) organizations' reports as well as in academic literature (Sclater, 2011; Smith & Casserly, 2006; Johnstone, 2005). In this section, the benefits are highlighted according to stakeholder status, such as self-learners, faculty, and institutions.

For self-learners.

An MIT OCW evaluation report found that the great majority of visitors were self-learners (49%) who used the site for improving personal knowledge (56%), keeping themselves up to date in their fields (16%), and planning future study (14%; Carson, 2006).

In his paper, Stacey (2007) explained that OERs are valuable to individuals who are willing to educate themselves because they have a coherent structure that provides broad choices in accessing educational resources. Individuals are not responsible for tuition fees, prerequisites, or strict learning methods, making OERs very convenient for self-regulated learners. He further argues that to use digital material by seeking legal permission can take too much time (weeks, even months); on the other hand, in OERs, educators can use these recourses without these time and effort taking permission procedures.

According to an OECD (2007) report, OER is likely to change the traditional teaching structure and create more independent learners, increasing demand for assessment of competencies gained outside of formal learning settings.

For faculty.

Faculty is another group who can benefit from the OER movement. As found in the evaluation study conducted by MIT OCW staff, 16% of visitors to the site were educators, 32% students, and 49% self-learners (Carson, 2006). Although the percentage of educator users was the lowest, results indicate that approximately 2 million educators have used MIT OCW, with 96% of educators who participated in the study saying it helped them to enhance their teaching (Carson, 2007). Preston (2006) further reported a number of benefits for MIT faculty who participated in the MIT OCW initiative, such as providing an archive, increasing academic recognition, and making connections with other academicians (Preston, 2006).

Johnstone (2005) explained some faculty benefits of the OER movement by claiming that it may offer new collaboration opportunities between and across departments, since viewing OER content can illustrate overlaps in content. On most traditional campuses, faculty do not see syllabi or teaching materials of others, even in the same department, but OER allows faculty to see how colleagues approach the same concepts.

For institutions.

The OER movement can significantly reduce curriculum development by providing both time and monetary savings. This benefit is particularly valid for courses that include multimedia materials such as illustrations or animations (Potter, 2003).

OER could also help institutions in other countries establish new curriculums (Sclater, 2011). For instance, as suggested by Smith and Casserly (2006), the John Hopkins School of Public Health could use OER to guide the design and development of public health programs in developing countries.

D'Antoni (2009) pointed out numerous benefits of the OER movement for institutions:

> Sharing knowledge is congruent with the academic tradition; Taxpayer's money is leveraged through the free sharing of resources; the cost of content development can be reduced and quality may be improved; the public image of the institution may be enhanced and new students attracted; with increasing competition, institutions need to identify new cost-recovery models. (p. 6)

In a recent OER report by UNESCO and the Commonwealth of Learning (COL), three main benefits to institutions were highlighted. First, with the OER movement, institutions can attract new students. It may also enhance the reputation of an institution by promoting public service. Finally, dissemination of research results can attract funding.

Method

In this study, a survey method was utilized to gather information about the barriers, incentives, and benefits of the OER movement from the perspective of faculty in Turkey. Creswell's (2005) guidelines for survey research were considered in the design.

Participants

The population of this study was faculty working in Turkish universities involved in the National OpenCourseWare Consortium (UADMK) who taught at least one traditional course. At the time of data collection, there were 56 UADMK member universities with a total of 73,954 combined faculty, but it is not possible to determine the number of faculty teaching at least one higher education level course. In total, there were 3,142 responses gathered through two steps data collection. After data cleaning, the respondents of this study decreased to 1,637 faculty (4.5% participation rate), 65% male and 35% female. Regarding their academic titles, most were assistant professors (31%), instructors (21%), and professors (16%).

Table 1

Participants

Gender	*f*	%
Male	1070	65.4
Female	567	34.6
Total	1637	100
Academic Position		
Professor	265	16.2
Associate professor	213	13.0
Assistant professor	512	31.3
Instructor	343	21.0
Language instructor	67	4.1
Research assistant	176	10.8
Specialist	21	1.3
Other	40	2.4
Total	1637	100

Instrument

The survey was developed based on 10 semi-structured interviews with faculty who were purposefully selected based on their experience publishing course materials. Moreover, a series of unstructured interviews were conducted with UADMK university representatives, using a literature review to guide the writing of the questions.

To establish its content and face validity, subject and measurement experts reviewed the survey in terms of content and format. The reviewers were six Turkish OCW consortium executive members and three faculty. Two measurement and assessment experts also reviewed the survey scales, question structures, and appropriateness of directions. Finally, a language expert reviewed the survey for Turkish language usage. A pilot test was conducted with 41 faculty.

The final survey was converted into an online format consisting of five main sections: general questions (7 items), barriers (13 items), incentives (16 items), benefits (17 items), and demographics (9 items). To increase the reliability and validity of the results, a long scale was used (Krosnick & Fabrigar, 1997). The main questions used a 6-point, unipolar agreement scale format (6: Completely Agree to 1: Completely Disagree).

An exploratory factor analysis (EFA) was also conducted on the actual data to examine the internal structure of the survey (Johnson & Christensen, 2004) and to determine whether a single dimension or multiple dimensions underscored the items in the survey. EFA results showed four factors as barriers to publishing course materials freely through the Internet (legal, technical, institutional, and personal), four factors for incentives (supporting mechanisms, intellectual property protection mechanisms, compelling mechanisms, and reward mechanisms), and one factor for benefits.

Data Collection

The online survey was sent to the administration offices of all 56 Turkish OCW consortium member universities through a formal letter signed by the chair of UADMK. Name of the related university president, background information for the study and web links directing users to the questionnaire were presented in this formal letter. A paragraph about the survey was also included in the letter to make announcement of the study by universities easier. The questionnaire was administered in two rounds. In total, there were 3,142 responses gathered through two steps data collection. However, after data cleaning this number decreased to 1,637 respondents.

Data Analysis

In order to analyze gathered data, a cleaning process was first performed in order to detect problematic responses and missing values. Then, descriptive statistics were conducted. For data cleaning, various parameters were taken into consideration. For instance, each respondent's survey completion time was examined, and responses completed in a short time were deleted. Data sets were also scrutinized in case of outliers and minimum and maximum scores; no problems were detected.

Results

In this section, details about the faculty’s digital course materials and their willingness to publish those resources via the Internet are presented, followed by the findings of this study regarding the perceived incentives, barriers, and benefits.

The majority (82%) of the faculty reported that they benefited from course materials (syllabus, reading pack, presentation files, quizzes, etc.) available on the Internet. They generally accessed those resources via search engines (76%). Considering digital course materials versus non-digital ones, 41% of participants indicated that most of their course materials were in digital form, while 17% of participants reported that all of their course materials were in digital form (Table 2). It is found that, regardless of the amount, all participants had some amount of digital course materials available.

Table 2

Amount of Faculty's Digital Course Materials (i.e., .pdf, .doc, .swf etc.)

Items	*f*	%
All	281	17.2
A great proportion	668	40.8
About half	295	18
Small amount	299	18.3
None	94	5.7
Total	1637	100

Regarding web publication of course materials, 23% indicated that they were already publishing their course materials, 61% were not but wanted to, and 16% had no plans to do so (Table 3).

Table 3

Publishing Course Materials Via the Web

Items	*f*	%
Yes, I publish	359	23.2
No, but I want to do	946	61.1
No, I do not intend to publish	243	15.7
Total	1548	100

Research Question 1: Perceived Barriers to Sharing Course Materials

The greatest perceived barrier to OER for faculty was having or expecting problems protecting the intellectual property rights of their own materials (M = 4.27, SD = 1.61). They also had or expected problems about providing intellectual property rights of others' materials that do not belong to them (M = 4.19, SD = 1.51). Lack of necessary incentives to share course materials (M = 4.07, SD = 1.67) is another important barrier for faculty. On the other hand, required hardware such as computers or scanners (M = 2.25, SD = 1.51) and lack of technical skills required to develop digital materials (M = 2.45, SD = 1.55) were not perceived as significant barriers. Table 4 shows all means and standard deviations for the barrier section of the questionnaire in descending order by mean scores.

Table 4

Perceived Barriers of Sharing Course Materials

Items (Likert Scale: 1= Completely Disagree to 6= Completely Agree)	Mean	SD
I have / expect some problems protecting the intellectual property rights to my own materials.	4.27	1.61
I have / expect some problems providing the intellectual property rights to materials that do not belong to me.	4.19	1.51
There is / will be no required (necessary) incentives.	4.07	1.67
Faculty at my university do not / will not have willingness to share course materials.	3.98	1.40
Sharing course materials with everyone will increase plagiarism.	3.74	1.65
My course load is too heavy.	3.58	1.59
I do not think my university has a policy about publishing/sharing course materials.	3.55	1.67
I do not have enough time.	3.55	1.56
There is / will be no support from my university for publishing course materials.	3.27	1.64
There is no necessary technical infrastructure at my University.	2.96	1.68
It is risky to share my experiences with everyone in today's environment where competition is high.	2.90	1.66
I do not have the technical skills to develop digital materials.	2.45	1.55
I do not have the required hardware (computer, scanner, etc.).	2.25	1.51

Research Question 2: Perceived Incentives of Sharing Course Materials

The greatest incentive for faculty was being informed about changes someone else makes to their materials (M = 5.27, SD = 1.18). This incentive was followed by protecting materials against plagiarism (M = 5.25, SD = 1.22). Providing a usable platform for sharing course materials (M = 5.22, SD = *0.97*) was another important perceived incentive for faculty. On the other hand, making course material sharing compulsory (M = 2.95, SD = *1.60*) and sharing course materials via a single platform in Turkey (M = 3.70, SD = *1.68*) were perceived as the least important incentives. Table 5 shows the mean and standard deviations for the incentive section of the questionnaire in descending order by mean scores.

Table 5

Perceived Incentives of Sharing Course Materials

Items (Likert Scale: 1 = Completely Disagree to 6 = Completely Agree)	M	SD
I should be informed when someone makes changes to my materials.	5.27	1.18
Course materials that I share should be protected from plagiarism.	5.25	1.22
A usable platform should be designed for sharing course materials.	5.22	0.97
Hardware (computer, scanner, Printer, etc.) should be provided to faculty for developing their course materials.	5.18	1.13
Instructional technology centers should be established to support materials development.	5.13	1.10
A rewarding system should be established to encourage faculty to publish their course materials.	5.12	1.19
Financial support (i.e., copyright fees) should be provided to faculty for developing course materials.	4.98	1.24
Trainings / workshops about material developments should be arranged for faculty.	4.91	1.22
Material development efforts of faculty should be rewarded with improved academic ranking.	4.91	1.43
I should be informed about who uses my course materials.	4.65	1.49
Faculty should be supported with the help of student assistants.	4.44	1.46
Course materials that I share should not be altered in any way.	4.39	1.67
Course materials should be published via a single platform in Turkey.	3.70	1.68
Sharing course materials should be compulsory.	2.95	1.60

Research Question 3: Perceived Benefits to Sharing Course Materials

All mean scores were higher than 4.75, showing that academics have a very strong consensus regarding the possible benefits of freely publishing course materials. As shown in Table 6, the most agreed upon benefit of OER among participants was the opportunity to learn from experienced faculty (*M* = 5.30, *SD* = .93). Establishing scaffolding for inexperienced faculty to design their courses (*M* = 5.29, *SD* = .87) and an increase in the amount of Turkish resources on the Internet (*M* = 5.29, *SD* = 1.02) were the next most agreed upon benefits, sharing the same mean score. The other leading benefits were making contributions to universities where educational resources are scarce (*M* = 5.26, *SD* = .96), the opportunity to see different aspects of courses (*M* = 5.23, *SD* = .92), helping faculty to archive their course materials (*M* = 5.21, *SD* = .97), and supporting life-long learning (*M* = 5.21, *SD* =.97).

Table 6

Perceived Benefits to Sharing Course Materials

Items (Likert Scale: 1= Completely Disagree to 6= Completely Agree)	M	SD
It is / will be possible to benefit from experienced faculty.	5.30	.93
It builds scaffolds for inexperienced faculty to design their courses.	5.29	.87
It increases the amount of Turkish resources on the Internet.	5.29	1.01
It contributes to universities where educational resources are scarce	5.26	.96
It provides opportunities to see different aspects of any course.	5.23	.92
It supports life-long learning.	5.21	.97
It helps faculty to archive their courses.	5.21	.97
The quality of a course's resources will increase since more people will have a chance to examine them.	5.16	1.05
It helps university students to decide on course enrollment.	5.13	.99
More reliable resources will be on the Internet, since universities are providing the content.	5.13	1.08
It provides transparency.	5.13	1.06
It compels / encourages faculty to design their courses with the greatest of care.	5.10	1.05
It contributes to the advertisement of my university in the national and international arena.	5.05	1.12
It enhances the quality of education in universities.	4.98	1.13
It provides an environment where courses can be controlled.	4.96	1.23
It enhances communication among faculty.	4.90	1.16

Discussion and Conclusion

While a majority of participants reported that more than half of their course materials were in a digital format, only about 23% actually shared them freely on the Internet. About 18% did not intend to publish their materials at all. Usluel, Askar, and Bas (2008) found similar results: Turkish faculty use ICT most frequently for communication and searching for information about their courses and least frequently for publishing their lecture notes and announcing course assignments or projects on the Internet. The OECD (2007) report also underlined this issue; there appears to be a paradox in academia where a faculty member may strongly emphasize the importance of openly sharing, but he or she "often takes an unresponsive attitude towards sharing or using educational resources developed by someone else" (p. 60). As the findings of this study and a review of the literature revealed, there may be several reasons for this unresponsive attitude towards sharing. First, although many faculty are willing to share their work, they do not know how to protect their rights (Hylen, 2006; Yuan, MacNeill, & Kraan, 2008). This finding also confirms the results of this study, as participants rated legal issues very highly as barriers. Other reasons indicated in the literature include difficulty in copyright clearance for their course materials, the negative effect of publishing their course materials on the marketability of future books or publications (Carson, 2006), lack of adequate experience in using OER (Okonkwo, 2012), lack of self-confidence about the quality of their course materials, fear of being criticized by their colleagues, decreased value of course materials in the OCW platform (Lee et al., 2008), lack of time, and high workload (OECD, 2007).

One of the most significant findings of this study is that most of the items related to legal factors were perceived as important barriers. The greatest barrier for faculty was having or expecting problems protecting intellectual property rights of their own materials, and the second greatest barrier was clearance of others' copyrighted work used in their course materials. Copyright problems are often documented in the literature as well (i.e., Hylen, 2006; Pena, 2009; Matkin, 2006). Bissell (2009) stated that open licensing is the core infrastructural element of OER, and licensing issues rank among the top concerns for the movement. It is crucial to understand the reasons for these concerns and develop strategies to address them. Studies have revealed several reasons copyright issues are seen as a barrier for faculty: concern about others using their materials without attribution (Sclater, 2011; Smith & Casserly, 2006), understanding the complexities of existing copyright laws (Pena, 2009; Browne & Newcombe, 2009), difficulty in gaining clearance of copyrighted material within their own content (Hodgkinson-Williams, 2010; Amiel, 2013), and lack of awareness about copyright issues (Yuan, MacNeill, & Kraan, 2008). Therefore, actions should be taken to facilitate the sharing of course materials, and institutions should assume an active role in resolving copyright clearance problems. Possible solutions are to seek permission from the copyright holder, provide a link to actual resources (Ives & Pringle, 2013) or replace the copyrighted materials with new ones. Wizards, which enable faculty to choose the best licensing options for their works in an easy and quick way, can be developed or existing tools can be adopted into the Turkish language. However, concerns related with machine-attribution indicated in Amiel's (2013) study should be taken into consideration. Regulation in copyright is the most important step that might be taken for this movement. Explicit information about Creative Commons (CC) licenses should also be available in project portals. CC licenses, which are based on US legislation of intellectual property, should be integrated into Turkish copyright law. Therefore, licenses should be adopted by Turkish lawyers, made compatible with Turkish legislations, and translated into Turkish. On the other side, required hardware such as computers or scanners and lack of technical skills required to develop digital materials were perceived as the least significant barriers. This finding is also founded in OECD (2007). That is, the least significant problem was lack of access to computers and other kinds of hardware and software. However, this finding is not consistent with Mtebe and Raisamo's (2014) study in which lack of technical equipment and of technical skills required to develop digital materials are found to be important barriers in higher education institutions in Tanzania.

Legal issues also affected the results of the faculty's perceived incentives. The most agreed upon incentive was being informed when someone makes changes to faculty materials, followed by protecting course materials from plagiarism. Considering the significance of legal issues as a barrier among faculty, it is not surprising that the greatest incentive is about intellectual property protection mechanisms. This finding provides further explanation to the copyright problem by establishing a technical mechanism that monitors and reports changes to their materials.

Results indicated that the majority of the faculty have benefited from course materials (syllabus, reading pack, presentation files, quizzes, etc.) available on the Internet. They have a very strong consensus on potential benefits of freely publishing course materials. The most agreed upon benefit of OER among participants was the opportunity to access and learn from more experienced faculty members' materials. Providing scaffolding to inexperienced faculty members when designing their courses and increasing the amount of Turkish course materials on the Internet were the other most agreed upon benefits of OER among faculty. These perceived potential benefits of the OER movement have also been well documented and demonstrated by the reports of important national (JISC in UK, NSF in USA) and international (OECD, UNESCO, the EU) organizations as well as academic literature (Sclater, 2011; Smith & Casserly, 2006; Johnstone, 2005).

Future Studies

Although this survey study was a large scale survey that collected data from 1,637 participants from 56 universities, due to a low participation rate, the sample may not represent the population. Therefore, further studies are needed to confirm the results of this study to help policymakers make better informed decisions. The instrument developed in the scope of this study can be administrated to the same population at another time with better safeguards for improved participation. Besides this, the instrument can be administrated to a similar population in another country. For improved participation, faculty can be directly contacted instead of administration offices and data can be collected face-to-face or through telephone interviews. However this is likely to increase the cost of the study and make data collection difficult. Universities' OCW representative might have played an active role in the data collection process.

Since OER is a relatively young movement in Turkey, there is an essential need to increase the quantity and quality of research studies in this field. First, despite its promises, little is known about the impact of the OER movement on teaching and learning activities. Therefore, one important research topic to be investigated is OER's instructional impact. In these studies, researchers can try to understand how those resources are used in teaching and learning activities and how they can facilitate and enhance learning. Another fruitful research area can be learner-centered studies. User behaviors of OER use and production can be explored by assessing visitor statistics for materials.

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Teaching the Disembodied: Othering and Activity Systems in a Blended Synchronous Learning Situation

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Abstract

This study examines what happens when online and campus students participate in real time in the same campus classroom. Before this study, postgraduate students studying online in a course intended primarily as professional development for language educators were taking the course through reading the course literature including assigned articles, writing reflective texts in the asynchronous forum and doing the course assignments. They had a very different experience than the campus students who met weekly for discussion of the reading. Some online students were not active enough in the course, and showed low levels of engagement. The online students were invited to participate in scheduled campus classes via Skype on iPads. After some hesitation, four of the six online students took up this real-time participation option. Initial difficulties with the technology were addressed after seeking input from campus and online students. A series of adjustments were made and evaluated, including a move to a model in which three online students in different locations participated in a single Skype group video call on a laptop in the campus classroom rather than on multiple individual Skype calls on iPads. After the course, the online and campus students were asked to evaluate the experience of having physical and virtual participants sharing a physical space and to relate this experience to the asynchronous channels previously available to the participants. The comments of both groups of participants were interpreted in the light of previous work on social presence and of activity theory. It appears that student beliefs and student expectations lead to hidden challenges associated with mixing these groups of students, and the study concludes that unless teaching assistance is available, it is not easy to afford online students the same right to speak as campus students.

Keywords: Distance; campus; blended; flexible; synchronous; Skype; VOIP; activity theory; othering; social presence

Introduction

Those who watched the UK TV-series, Doctor Who, in the 1970s (or who have seen some of the countless re-runs) may remember the Brain of Morbius, the title role in a set of episodes of the series. The evil Time Lord, Morbius, had been reduced to life as a brain in a plastic bowl. He could not move unaided, though he could speak and was actually quite demanding of those around him. The plight of Morbius came to mind in the particular approach to blended synchronous learning adopted in the postgraduate course that is the focus of this study. Campus students sitting around a seminar table in class were joined by a handful of online students, each occupying an iPad, placed so they could see their campus and online classmates and be seen by them. The online participants, like Morbius, were fairly helpless, needing assistance from another student or the teacher to move to another table to take part in small-group discussion or to turn to face the talker or the screen at the front of the room. Their ability to hear and be heard was at the discretion of the physically present. These were postgraduate students, studying online on a course intended primarily as professional development for language educators. These students are referred to here as online, rather than distance students as they are often not geographically removed at all, but prefer to study online because of the flexibility of online study in this particular postgraduate course, using various permutations of synchronous and asynchronous communication as they wish.

The problem under investigation is the reluctance of some online students to participate actively in the course asynchronous discussion forum on the university's Moodle-based learning platform. This apparent lack of engagement in the course meant that these students were not interacting. There was little rapport between the teacher and the online students and none at all between the students. Many online educators have considered ways to increase student interaction in online courses (Murphy & Rodriguez, 2012). A study by Power and Vaughan (2010) claimed that synchronous online interaction between students will "reduce learner isolation through real-time dialog and co-construction team activities (p. 23)". They further suggest that students will get more out of a course if there is real-time contact between students. Student isolation and failure to engage with the course materials and activities may mean that the flexibility offered by online studies is sometimes countered by a lower completion rate (Power & Vaughan, 2010). It is often difficult to engage remote learners, who may have chosen online study because of work and family obligations (James, Krause & Jennings, 2010), meaning they have little time for their studies.

Previous experience on this course was that some online students who interacted with their fellow students only through the asynchronous forum were disengaged and reluctant to communicate more than minimally. Studies of social interaction using asynchronous modes of communication suggest that a sense of shared purpose is essential to successful online interaction (Westberry & Franken 2013). However, students who only communicate asynchronously with their teachers and fellow students may miss out on "collaborative learning activities, which are a cornerstone of contemporary social constructivist pedagogical approaches" (Bower, Kenney, Dalgarno, Lee & Kennedy 2013, p. 92). Bower et al. also point out that because of this lack of interaction, and reliance on asynchronous written communication, online studies are sometimes, e.g. in Australia, not seen as equivalent to face-to-face learning.

Clearly the conditions of technology-mediated communication as well as the individual situations of students who choose to study online complicate the need for well designed courses that offer flexible options for interaction between students and with the teacher. For those students who attend real-time classes, whether on campus or online, a social context is provided. For students who cannot join the real-time classes, other options need to be offered.

The aim of this study was to investigate possible ways to reduce the isolation of online students and to extend to them something of the social and educational advantages experienced by campus students who are able to interact with the teacher and with each other in real time. The online students were offered the opportunity to virtually sit in on campus classes in real time. The learning experiences of both online and campus students were assessed, and the intervention was refined accordingly and then reassessed.

Method

To facilitate interaction between participants in the course at the focus of this study, the six online students were invited to participate in real time in a scheduled campus class with the twelve campus students via Skype on iPads in a blended-synchronous model. The purpose of this invitation was to allow engagement in what White, Ramirez, Smith and Plonowski (2010, p. 35) termed "a similar manner to on-campus students". This was in order to create the basis for a social constructivist learning environment. After initial hesitation, due to time constraints, work commitments or the high cost of broadband connectivity, four online students engaged in the online synchronous participation option. The means of communicating synchronously with the online students during the campus class was introduced, evaluated and refined in an iterative approach.

The experiences of the campus and online students were elicited twice, firstly informally in class and by inviting e-mail comments, and secondly by inviting them to participate in an anonymous written evaluation of the teaching set-up via Google Forms. Observations, spontaneous comments and elicited responses were considered with respect to the community of inquiry constituted by the course, in particular as regards the social presence of the online participants from the perspective of the campus participants. In addition, the course was analysed as partly overlapping activity systems following aspects of activity theory as characterized by Nardi (1996).

Results

First Cycle

In the first attempt to solve the problem of the disengaged online learners, four iPads were brought into the classroom (each with a different Skype account so they could host simultaneous individual Skype video calls), one for each of the four online students who had expressed willingness to participate in the real-time class with some twelve campus students. The iPads were placed around the table, between campus students such that nearby campus students were asked to turn an iPad as required. This set up was used for the first half of the course, six seminars. During the seminars, problems (such as dropped calls, or online students sitting in noisy environments) and effects arising (such as students experiencing difficulty hearing the online students when the classroom became noisy during small group discussion) were noted. In the sixth seminar of the course, all the participants were asked openly for their thoughts on a) how they thought the course was going in general and b) their thoughts and suggestions about the blended synchronous model with the iPads, and they were invited to mail the lecturer with any further points that they were not comfortable sharing openly.

Observations and spontaneous comments suggested that the model in which online students were each represented in the physical space of the classroom as a face on a tablet device led to them being seen as real people by the campus students. Campus students looked at the faces on the iPads as though they were classmates and would glance in their direction when referring to a point made by a online participant. This can be termed perceived social presence (Kim 2011; Hostetter & Busch 2013). Social presence has been defined as the "degree to which a person is perceived as a 'real person' in mediated communication" (Gunawardena & Zittle, 1997, p.9).

The discourse in the focus classroom evolved so that campus students began to refer to the online participants in a way reminiscent of the way disabled campus students might be referred to, that is, when a campus student was asked to help a named online student to turn to see the board, rather than being asked to turn the tablet. However, it also became apparent that the two groups of students, the virtual and the physical, were having partially different classroom experiences (c.f. Westberry & Franken 2013). Some campus students were reluctant to take responsibility for facilitating for a online student by taking them along to another table for a small group discussion or turning the iPad to face the speaker in whole class teaching or discussion.

One of the constraints of Skype on an iPad using the built-in speakers was that it was not full duplex, meaning that the sound was not transmitted simultaneously in both directions, so that in noisy environments the sound would not be received well. In the classroom, this meant that while whole class teaching and discussion where one campus or online participant at a time was talking went well, as soon as small group or pair discussions started, the online participants had difficulty hearing, and the ambient noise meant that the campus students had difficulty hearing the online students. Campus and online students raised their voices to attempt to be heard, which made things more difficult. The volume of the iPads was raised to max, which meant that the online students' voices were perceived as penetrating and somewhat abrasive. These sound problems led to some irritation in both groups.

The positive experiences of this set-up, with the online students present on iPads, were that they were able to ask questions during class, that they could join in whole class and small group discussion and that they got to know the campus students and each other a little. The negative experiences included the sound problems with the students' voice quality and their difficulty hearing what was going on when the room became noisy, that not all online students were able to or chose to join the campus class, and that the forum activity was much less than before, as the most active students were the ones who had accepted the invitation to participate in real time.

Second Cycle

In an attempt to solve the problems experienced in the first half of the course, namely a reluctance by some campus students to be responsible for facilitating for their remote peers, and the specific sound problems caused by the set up, a new set-up was implemented. The first adjustment was to set-up a Skype account that allowed multiple participants on video calls. This meant that the online students participated in a group video call on a laptop rather than on multiple individual Skype calls on iPads. The second adjustment was that the lecturer took on the responsibility of facilitation for the online students, turning the computer so the webcam captured the person speaking at any time. The third adjustment was in the way small group discussion was treated. The participating online students (by now only three or sometimes two) were treated as a single group for small group discussions, and the computer microphone and speakers were disabled during the group discussions, meaning that the online students could neither hear what was going on in the classroom, or be heard by anyone in the classroom during the small group breakouts.

The remainder of the course proceeded in this way. The new order of the reduced physical presence of the two or three online students, now on a single laptop rather than each occupying an iPad worked with fewer sound problems. On one occasion, one of the online students had children in the room and did not know how to disable the computer microphone. This meant that the computer speakers had to be temporarily disabled, leaving the other online students unable to participate orally, although they could still use the text chat function. When one of the students lost the connection with the call, the lesson paused while the teacher reconnected the call.

A teaching assistant who could deal with technical hiccups would have made things a lot easier for the teacher and caused fewer delays for the other students. This is in line with the findings of White et al. (2010), who also point out that a second teacher in the room would make using technology a lot easier, although in their study they did not elicit feedback from campus students. Bower et al. (2013) reported case studies where teachers claimed that having a teaching assistant was highly advantageous in helping to deal with the increased cognitive load required to manage blended synchronous learning classes. They also identified capturing and managing audio discussions as a major challenge of the blended synchronous teaching (p. 100). In fact, most of the case studies reported by Bower et al. did not allow online students access to the microphone, which is a clear disempowering of these students, but a concession to the constraints of blended synchronous learning, as managed by a single teacher.

Elicited Feedback from Online and Campus Students

Towards the end of the course, the online and campus students were asked to anonymously evaluate the experience of having physical and virtual participants sharing a physical space and to relate this experience to the asynchronous channels previously available to the participants (cf. Garrison & Cleveland-Innes, 2005). This evaluation was separate from the regular student course evaluation, and focused entirely on the mode of teaching. Using Google forms, students were asked to respond to the following prompts:

- What, in your opinion, has been positive about mixing campus and online students?
- Have you studied online in other courses? If so, was there any real time communication? Please explain.
- What is your experience of studying in this course?
- What, in your opinion has been negative about mixing campus and online students?
- We changed from using several iPads with one online student per iPad to having a single Skype conversation on the laptop. Did this make a difference to you? Please explain.
- Please give any other comments and advice about including online students in class for next time I run this course.

Table 1

Summary of Students' Experiences of Blended Synchronous Learning

Positive	Negative
Online students	
Input from more people Building relationships	Feeling unwelcome
Campus students	
Input from more people Accessibility	Time fixing technology Online students prioritised by teacher Sound problems Social cues Facilitating for the online students

Eleven students chose to respond, eight campus students, two online students, and one student who reported having taken part in both campus and online modes. A number of students did this, both online students who found themselves on campus at class time, and campus students who had to stay at home for personal reasons. The responses were carefully considered and a number of themes emerged. These are presented in Table 1. See the Appendix for full survey responses.

While the online students appreciated being part of the class and hearing the teacher and taking part in discussions, they did not quite feel welcomed by the campus students. Some of the comments from campus students suggest that this feeling was well-grounded, as there seemed to be some resentment of the time and effort taken to satisfy the technical needs of online students, and a lack of understanding of the affordances of their mode of participation regarding their perception of social cues.

The students in both groups were also asked to comment on the move from using several iPads with one online student per iPad to having a single Skype conversation on the laptop. Their responses are summarised in Table 2, again with full responses in the Appendix.

Table 2

Summary of Students' Experiences of Laptop Versus Multiple Ipads

Campus students	Online students
Sound quality Online students own group an advantage No difference	Sound quality Online students own group a disadvantage.

The isolation of the online students for small-group discussion was seen as a disadvantage by the online students but as a relief by most campus students who mentioned it. Both groups (online and campus students) reported seeing the other group as quite separate from themselves. This is similar to the othering described by Palfreyman (2005), with both groups talking about *us* and *them*, with little realisation that they were in fact very similar to each other; the online students expressed feeling excluded from the campus students' social community. This was interesting since there was actually some movement of students from campus to online and viceversa. There also seemed to be a monitoring of teacher time and attention dedicated to the other group on the part of some participants in both groups.

Presence in Online Learning Situations

The tensions between online and campus students in this study appear to be partly due to the perceived reality of the online students, and their status as full members of the class community. The aim of the study was to afford the online students greater access to the class community with a view to enhancing their socio-constructivist learning experience. The idea that learners as a community of inquiry can together discover more than each individual alone is capable of was developed by a series of scholars including Peirce, Wells, Lipman and Sexias (Pardales & Girod, 2006). Lipman (2003 pp. 95-100) lists some features of communities of inquiry including inclusiveness, participation, shared cognition, face-to-face relationships and feelings of social solidarity. Some of these features are noteably lacking in the blended group at the focus of this study. Of face-to-face relationships Lipman writes "these relationships may not be essential to communities of inquiry, but they can be very advantageous. Faces are repositories of complex textures of meaning that we constantly try to read and interpret" (p. 95) The computer-mediated communication of the blended synchronous classroom, especially when several faces appear as small images on a single screen, is not conducive to this kind of interpretation of meaning.

Garrison and Anderson (2003) reported their application of the community of inquiry model to online learning, where the components of cognitive presence, social presence and teaching presence interacted. They had earlier defined social presence as "the ability of participants in a community of inquiry to project themselves socially and emotionally, as real people (i.e., their full personality), through the medium of communication being used."(Garrison, Anderson & Archer 1999, p. 94). Social presence is clearly highly relevant to the experience of the participants in the course described in this study. If the online students are perceived as real people by the campus students, even if they are not able to move independently and have limited vision and hearing, they are worthy of all the consideration due to disabled classmates. Garrison offered a new, farther-reaching, definition of social presence as "the ability of participants to identify with the group or course of study, communicate purposefully in a trusting environment, and develop personal and affective relationships progressively by way of projecting their individual personalities" (2011, p. 34). The campus students achieved this in the course studied in this paper; the online students less so, though considerably more so than when they only interacted through asynchronous text-based forums.

However, Gunawardena and Zittle (1997) found that social presence alone may be a very strong predictor of satisfaction in online learning, and they cite earlier work by Short, Williams and Christie (1976) ranking text-based computer-mediated communication (devoid of nonverbal codes that are generally rich in relational information), audio only communication and video (or television as it was in the 1976 study) in increasing order of social presence. Gunawardena and Zittle (1997, p. 9) conclude that "the capacity of the medium to transmit information about facial expression, direction of gaze, posture, dress, and nonverbal cues all contribute to the degree of social presence of a communications medium". Increased connectivity and technological development have led to richer media being available for educational communications, and the affordances of the communication tools now used facilitate considerable social presence.

The role of technological development in the tools available for online education is also mirrored by pedagogical development, as noted by Garrison (2012), responding to a article by Annand (2011) which questioned the importance of social presence. Garrison pointed to a generational shift from distance education, which was, he claimed, concerned with information transmission, to online learning in a collaborative constructivist approach with "collaborative discourse in purposeful communities of inquiry" (2012, p. 251). The course discussed here is designed so that the co-construction of knowledge by collaborative discourse is at its centre. Without interaction, the learning in a course of this kind will be essentially different and fail to be enriched by the collective professional experiences of the group. Any online students who do not engage with their classmates will miss out on large parts of the intended learning. The interaction needed for this kind of learning requires students to experience their own and their peers' social presence in the community.

Other components of online presence may also have a bearing on the perception of students. Cleveland-Innes and Campbell (2012, p. 283) considered emotional presence to exist alongside social presence, and define it as "the outward expression of emotion, affect and feeling by individuals and among individuals in a community of inquiry as they relate to and interact with the learning technology, course content, students and the instructor". The responses elicited from the participants in the course in this study, where online students sometimes felt that their comments were not picked up by campus students, suggest that the need for recognition and appreciation from the teacher and fellow students experienced by some students is a hinder to their interaction, and must be addressed.

Similarly, the learning experiences of the students will vary according to the way they engage with the material and the other participants. Akyol and Garrison (2011) discussed the role of cognitive presence, and cited early work on deep and surface learning approaches by Marton and Säljö (1976) as relevant to the context of online learning. Akyol and Garrison reported different levels of social, cognitive and teaching presences in online and blended courses and concluded that “cognitive presence in a community of inquiry is strongly associated with high levels of perceived learning” (2011). They noted that students in a blended course had higher perceptions of learning, satisfaction, cognitive presence, teaching presence and social presence than those in an online course. This was attributed to the blended students having weekly discussions in face-to-face meetings. The affordances of the tools used in the current study were such that all students, campus and online, were able to participate in intergroup and intragroup discussions.

Activity Systems

Activity theory as developed by Engeström from Leont’ev’s earlier work, and described by Nardi (1996) offers a set of conceptual tools for describing a technology-mediated activity. Nardi noted that “technology use is not a mechanical input-output relation between a person and a machine; a much richer depiction of the user's situation is needed for design and evaluation” (p. 4). Nardi described activity theory as "...a powerful and clarifying descriptive tool rather than a strongly predictive theory” (p. 6) and this is how it has been used here, to clarify the tensions between the different groups of students. Activity theory allows activities to be described as systems with specific roles for the subject and object, considering rules, instruments or mediating artefacts, division of labour and community.

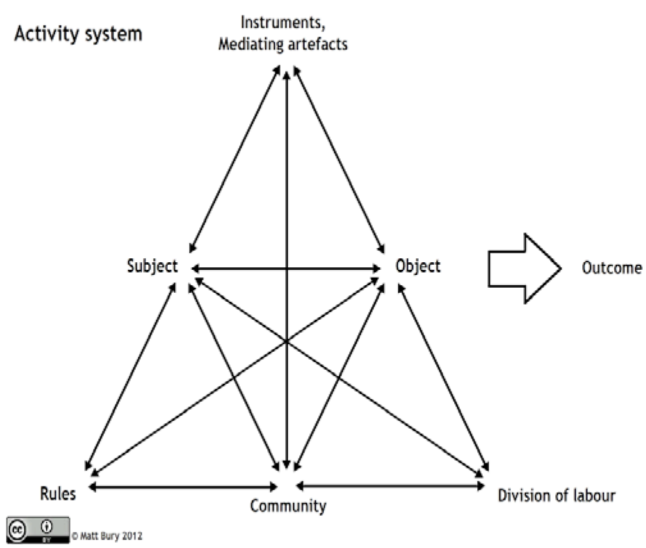

Figure 1. Activity system from Bury (2012).

Previous studies have applied activity theory to higher education settings (Barab, Evans & Baek 2004; Brine & Franken 2006) and have found the model helpful in describing the dynamics of classes, looking at aspects of the seminars as activities with subjects and objects and rules for each group. It appears that student beliefs and student expectations lead to hidden benefits and hidden challenges associated with mixing these groups of students (Westberry & Franken 2013).

Recent work applying activity theory to technology-mediated higher education (e.g., Murphy & Rodríguez-Manzanares, 2014) suggests that this approach can give insight into the tensions that arise when activity systems overlap. Applying the lens of activity theory to the study at hand, the comments of both groups of course participants were interpreted to inform the description of each group's activity system. Consider Figure 1 and Table 3 where the activity systems of online students and campus students are explored separately.

From this analysis it can be seen that campus and online students are working towards the same outcome, discussion and learning in order to complete the course successfully, but they are not operating in the same community or according to the same rules.

Table 3

The Activity Systems of Online and Campus Students

	Online students	Campus students
Subject	Online students	Campus students
Instruments	Skype, laptop or iPad, forum	Classroom meetings
Object	Achieving the learning outcomes and passing the course	Achieving the learning outcomes and passing the course
Rules	As afforded by Skype.	Face-to-face communication. Interpreting gaze and other social cues
Community	All students and teacher	Campus students and teacher
Division of labour	Campus students and teacher need to facilitate. Campus students should be willing to help and to welcome online students	Teacher teaches and campus students participate actively and independently

The tension arises because the online students believe they are part of the campus students' community, and the campus students expect them to behave like physically present campus students and conform to the same norms, even though their instruments are different and have different affordances. Both groups expressed resentment of the other group; this arises from the two groups not realizing the differences between their situations with each expecting the other group to behave more like themselves. Clearly, things would have progressed more harmoniously if all the students were aware of the needs of both groups, and if clear rules for classroom discourse had been co-constructed with the students at the beginning of the course.

Conclusion

One of the fundamental differences between campus and online students is that campus students occupy a physical space in the classroom. They are each assigned a seat and a few decimeters of table space. They are represented in the classroom by their bodies in full size, with all that means in terms of being able to use facial expression, gesture and body language to add to anything they might actually say in class, either to the class as a whole, to the teacher or to the person sitting next to them. Online students, on the other hand, do not have their physical body in the classroom. Like Morbius, they are disembodied. They do not have access to these same linguistic, paralinguistic and extralinguistic means of expression. Depending on the way the course is set up, on courses that also have a campus occurance, online students may be able to view recordings of campus classes or to view them in real time (like a fly on the wall). In the latter case they may be able to interact with the teacher, the other online students and/or with the campus students. This interaction is often accomplished using text chat rather than voice communication.

The blended synchronous set-up including online students in the classroom via Skype on individual tablets described in this study was an attempt to address the limitations of this kind of fly-on-the-wall experience. However, even in the most empowering set-up described in this study, the online students could be silenced or rendered deaf or blind at the flick of a switch, and they could not move themselves independently to turn to see who was speaking or to the board.

The justification of this study was to move some way to compensating the online students for these limitations. By allowing each online student to participate in the class via an individual Skype connection on a tablet, they were each represented in the physical space of the campus classroom by the moving image of their head on the screen of the tablet. While they were still not physically present in the classroom, they were represented in physical space, embodied in the tablet, in a way that was lost when the move was made to having several online students communicating via a single Skype channel on a laptop. While their moving heads could still be seen in the second set up, they had lost their position around the table, each as an individual student, taking a place among the other students.

If online learners can be said to be disembodied, giving them a physical presence increases their social presence as perceived by campus students. Synchronicity of interactions between online and campus students can increase the sense of community and perceived by online students.

An important insight gained from this study was that, given their reduced ability to pick up on the social cues of the campus students (raised hands, gaze, impatient fidgeting, etc.), it was difficult to afford online students in a blended synchronous classroom free access to speaking rights. Instead, they could be asked to indicate when they want to say something (in text, or by raising their hands, literally or otherwise), or even be limited to written participation if there are more than a few of them.

Moving on from the course described in this study, the decision was made in a subsequent blended synchronous course to use Adobe Connect for live streaming from the campus class. Online students could participate in real time, and could, if they chose, activate their webcams and microphones. Preliminary findings from this course suggest that online students who had never experienced having a voice in the campus classroom did not miss it, and threw themselves enthusiastically into real-time text chat communication with each other, the teacher and the campus students, actually being reluctant to switch on a microphone when asked to do so for a discussion, and choosing not to activate their webcams. There was also an increased degree of movement from campus to synchronous online participation in this class, as students choose to stay at home and sit in on the campus class from the comfort of home. Also, as the Adobe Connect sessions were recorded, and the recordings were made available to all students, some students preferred to view after the event, mailing any questions that arose as they viewed the classes to the teacher.

This drift of some students from campus to the digitally mediated synchronous classes led to a decision by the teacher to move new courses away from campus altogether, being set up as online only, combining the advantages of non-transient pre-recorded lectures, live webinars and online tutorials (Q&A sessions) which are recorded for later (re)viewing and asynchronous forums. This kind of course is quite different than the blended synchronous course that is described in this study, but the flexibility it offers is greatly enhanced. The physical classroom experience is sacrificed, but the online experience will be better, and there will no longer be a distinction between campus and online students, though the distinction between the students who participate in live webinars and tutorials and those who view only recorded material may become more prominent. More research is needed to examine the student experience in this kind of course, and to see if students miss the classroom.

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Appendix

Table 1

Summary of Students' Experiences of Blended Synchronous Learning

Positive	Negative
Online students	
Input from more people • I really benefit from hearing the ideas of other students and also hearing the lecturer's discussion with them. Building relationships • A platform for me to build professional learning relationships between both lecturer and other online students	Feeling unwelcome • They weren't very welcoming...I felt at times like a fly on the wall watching! • The campus students appear to have no interest in interacting with the online students! • It's a shame that the campus students didn't feel confident to join in with the on line students discussion times. • When there are whole classroom discussions, they rarely have any feedback about what we are saying. Yet it seems like they are more likely to comment on things that are said by peers in the classroom.
Campus students	
Input from more people • Because it's a small group it's nice to have other people's experiences shared. • Being able to hear more opinions. • Allows them to take part in discussion and add their viewpoint. • They also provided additional diverse ideas at times. • The various opinions from online students can be brought into classrooms. • It has expanded the range of ideas and input for the on-campus students. Accessibility • Having that option if unable to attend class on campus. • like the accessibility of it for all.	Time fixing technology • Some time was spent at the beginning and during each session connecting. • Waiting around when technical hitches occur Online students prioritised by teacher • Screens can become the focal point, possibly excluding campus students at times • Unequal amount of speaking • Just getting their own queries answered which should not take place in group lecture time Sound problems • Classes become noisy, hard to hear what is said. • The technical difficulties - volume etc - the online students have sometimes experienced. • It was also challenging to be part of a small discussion group with a skype person This seemed to improve once

• Good to include online students and make them feel part of the course. • It's great to have the online students as real faces not just a photo on Learn. • It enables the online students to be a part of the class. • It has been good for us to hear from and share viewpoints with the online students in 'real time'. • mainly, and hugely, advantageous for the online students - to feel more a part of the class and also have access to other student input. • It is great for the online students that they are able to access the seminars.	they were on one device. • The background noise of the online students. Difficulties in using devices to speak to and include the online students due to noise and volume. • Sound problems (background noise) • I switched out from the online people at times. Social cues • Online students do not get the visual cues for turn taking or when someone else wants to speak. • On-line students demanding immediate attention, cutting in, not being there to read others body language eg. someone about to speak. • Lack of turn taking • Using iPad/laptops prevents social cues from being recognised. Makes communication a bit difficult. Facilitating for the online students • we sometimes forget to turn the viewing screen around, so that the online students are sometimes left hearing our speakers, but facing nothing.

Table 2

Summary of Students' Experiences of Laptop Vs Multiple Ipads

Campus students	Online students
Sound quality • Better - easier to hear and have small group discussions. • Much better. Easier to focus, sound direction better. • Acoustically it seemed better when the online students were on a single conversation. Online students own group • Better too that the online students were then their own group so everyone wasn't competing to be heard. • Yes this worked much better as laptop	Sound quality • The benefit of putting the online students together on one iPad is that the sound quality was better and in general, the lecturer attempted to turn it towards whoever was speaking. • Yes it helped with sound. Online students own group • It was nice to get to know the other online student but we often missed out on other discussions • For small group discussions, I didn't like being shut off from the rest of the

positioned centrally so all online students seeing the same thing, and also better sound for all to hear from both sides. It seemed that then the online student could talk together on the breaks which I think was possibly valuable for them.

No difference

- No much difference for me as long as on-line students can be organised into the class.
- Not really. Found all the annoying issues as above still relevant
- It was better with [a single] skype. Everyone was in the same conversation, easier to hear and follow what was happening

campus students.

- I think that for small group discussions, one of the campus students should have been grouped with us with a headset and microphone.
- Why didn't the campus students join on line students in the discussions? All they needed to do was take the iPad put on some head phones and join in.
- The multiple ipad scenario would have worked better if each online student could have been paired up with one person in the campus class to "look after them". The downside to this would be if the campus student doesn't feel like they want to be responsible for the distant learner.

THE INTERNATIONAL
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Identity and the Itinerant Online Learner

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Abstract

This paper outlines a preliminary study of the kinds of strategies that master students draw upon for interpreting and enacting their identities in online learning environments. Based primarily on the seminal works of Goffman (1959) and Foucault (1988), the Web of Identity Model (Koole, 2009; Koole and Parchoma, 2012) is used as an underlying theoretical framework for this research study. The WoI model suggests that there are five major categories of “dramaturgical” strategies: technical, political, structural, cultural, and personal-agential. In the data collection, five online master of education students participated in semi-structured, online interviews. Phenomenography guided the data collection and analysis resulting in an outcome space for each strategy of the WoI model. The study results indicate that online learners actively employ a variety of strategies in interpreting and enacting their identities. The outcome spaces provide insights into ways in which online learners can manage their identity performances and strategies for ontological re-alignment (reconceptualization of oneself). Further study has the potential to elucidate how learning designers and online instructors might facilitate such identity-work in order to shape productive online environments.

Keywords: Digital identity; relational learning; online interaction

Introduction

Learners today navigate through physical and virtual environments with apparent ease. These environments offer a variety of social networking opportunities through which participants can accumulate, exchange, create, and integrate new information into their personal narratives. Yet, learners still report feeling isolated and disconnected in these environments (McInnery & Roberts, 2004). How can today's itinerant learners develop a sense of identity and affiliation within such communities? To answer this question, the researcher draws upon her previous work on the Web of Identity (WoI) model (Koole, 2009) which outlines strategic techniques for interpreting and enacting identities. The goal of this phenomenographic-style study is to explore the extent to which these strategies are experienced in a given online learning community, and how strategy enactment contributes to the development of self and affiliation. It is intended that the outcome of this short study will form a basis upon which to structure a larger study of identity positioning and relational dialogue in online learning.

Literature Review

This paper is grounded in a social constructionist perspective which holds that individuals socially create and negotiate an understanding of who they are with relation to shared knowledge, beliefs, and behaviours (Berger and Luckmann, 1966; Burr, 2003; Hacking, 2000). To help orient the reader to constructionism (with an « n »), it can be contrasted with constructivism (with a « v »). Social constructivism emphasizes mental processes in which an individual constructs his/her understanding of « reality ». These mental processes are influenced by internalized understanding of « societal conventions, history and interaction with signifcant others » (Talja, Tuominen and Savola, 2005, p. 81). Constructionism, however, emphasizes discourse as the primary mechanism through which an individual actively and contingently constructs and positions him/herself in relation to the world; that is, how one continually shapes his/her identity. Within this philosophical position, dialogic interaction is a significant focus of this research and the WoI model. Talja, Tuominen and Savola (2005) describe this dialogic theory well: « Constructionism sees language as constitutive for the construction of selves and the formation of meanings » (p. 89).

The social constructionist perspective is of great importance because it highlights the perspective taken on identity itself: that identity is not a characteristic inherent within the individual alone; rather identity is a fluid process shaped by the individual, the world, and the people with whom s/he interacts. Many other theories of identity are heavily focused on internal mental/psychological processes (such as Erikson's [1968] stages of development, Marcia's [1966] identity status theory [see Schwartz, Luyckx, and Vignoles, 2011]). Rather than taking an internal, psychological perspective, social constructionism asks us to consider how the learner and the community within which s/he interacts co-construct identities.

Macfayden (2008) suggests that "establishment of learner identities allows the development of a learning community" (p. 560). Goodyear and Zenios (2007) also recognize the relationship between identity, community, and learning:

> A strong element of this socio-cultural view of learning is that participation in authentic knowledge-creation activities, coupled with a growing sense of oneself as a legitimate and valued member of a knowledge-building community, is essential to the development of an effective knowledge-worker. Action and identity are key. (p. 355-356)

Many definitions of community strongly support the notion that members should have a shared sense of history, purpose, norms, hierarchy, ritual, sense of belonging, and continuity (Lapadat, 2007; Schwier, 2007; Rovai, 2002). In other words, in order to more easily exchange and build upon ideas, it is helpful if learners share a common language, culture, and intellectual heritage. Online and offline, the social constructionist perspective suggests that it is through interaction, particularly "relational dialogue," that learners express their dispositions, commonalities, and difference—their identities and affiliations (Ferreday, Hodgson & Jones, 2006, p. 224). This sense of selfhood and community, as noted by Ricoeur (1992), involves the sense of both self (idem—temporal continuity) and selfhood (ipse—differentiation of an individual from others in a given community).

Some researchers have posited that online interaction reduces social inequalities. It can, however, be difficult to mask some personal and cultural characteristics (such as gender) through sustained interaction because of unconscious habits and interaction styles (Ferreday, et. al., 2006; Chayko, 2009). Such habits might include writing styles, turns of phrase, metaphors frequently used, common typos, and spelling errors—to name a few. Walther's (1996) research into asynchronous, text-based online conferencing led him to conclude that online interactions can, indeed, provide in-depth impressions of identities (hyper-personal), but requires more time and different techniques to decipher. Therefore, we can theorize that, online or offline, dialogic interaction between people takes place, but is guided by and transformed through the affordances, the "range of possible activities" (Norman, 1999, p. 41) of the available tools.

Theoretical Framework

Based on Goffman's (1959) impressions management perspectives and Foucault's (1988) technologies of the self, the Web of Identity model (WoI) is a heuristic for exploring different aspects of identity performance in both physical and virtual settings. The outer ring (light grey) in Figure 1 shows five perspectives through which participants view performances. The inner ring (dark grey) represents the observable enactments of the perspectives—that is, the dramaturgical strategies (terminology from

Goffman's [1959] « dramaturgical theory » in which he saw interaction as similar to a theatrical performance). Such strategies may be viewed as epistemic games, the socially negotiated ways of expressing the perspectives (Collins, 1993). The centre of the model, cognitive resonance (CR), is the point at which an actor interprets behaviours of others, adjusts strategies, and makes sense of the world.

The mechanism underlying the individual's move towards CR is based upon Festinger's (1966) theory of cognitive dissonance. To explain this theory, one must first understand how he defines « cognition ». His use of the term cognition refers to « any knowledge, opinion, or belief about the environment, about oneself, or about one's behavior » (p. 3). He then introduces the notion of dissonance: « the existence of nonfitting relations among cognitions » (p. 3). This is a significant factor in the WoI model: when individuals move from consonance to dissonance, they will seek to re-establish consonance. The process of re-establishment has been labelled « resolution ». Individuals may resolve dissonance through a variety of strategies such as altering how they act, changing their opinions, declining or avoiding interaction; these strategies shape identity.

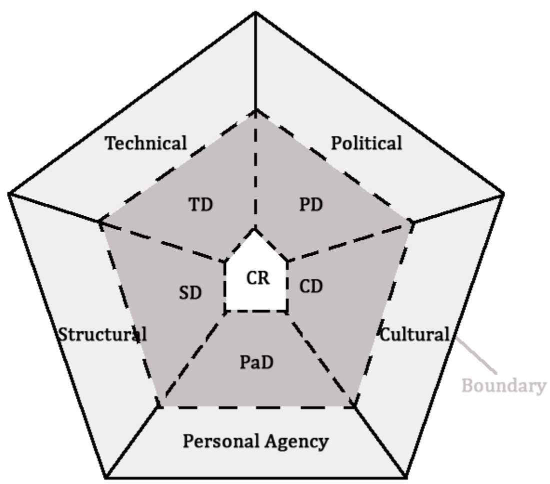

Figure 1. The web of identity: TD = technical-dramaturgical, PD = political-dramaturgical, SD = structural-dramaturgical, CD = cultural-dramaturgical, PaD = personal agency-dramaturgical, and CR = cognitive resonance (Koole, 2009).

Figure 1 is a graphical representation of the WoI process. In adjusting CR, the individual formulates reactions that are then expressed (pushed back) through the dramaturgical strategies (dark grey) and which may, in turn, influence the perspectives (light grey). (The dotted lines in the model symbolize the permeability. It is a complex, iterative, and continual process involving dialogic and symbolic exchange [Koole & Parchoma, 2012]). Table 1 describes the strategies of impressions management corresponding to the middle ring (dark grey) in Figure 1. The terminology has been derived primarily from that of Goffman (1959). Foucault's (1988) terminology is indicated in parentheses.

Table 1

WoI Model (Koole, 2009)

Strategy	Definitions & descriptions
Technical-dramaturgical (TD)	Display of quality, competency, and standards through tools enabling communication, production, transformation, or manipulation of objects, situations, events, and ideas of self or others. The technology learners use may enable and/or constrain how they express and portray themselves. The identity cues are different over different media such as text, audio, and video. (Foucault : technologies of production.)
Political-dramaturgical (PD)	Display of persuasion, manipulation, authority, threat, punishment, coercion, and control over others. Power differences between interlocutors may enable and/or constrain how they express and portray themselves. Consider the power differences between teachers and students that guide behaviour. Learners may fear reduction of grades or access to resoruces. (Foucault : technologies of power.)
Structural-dramaturgical (SD)	Display of status, level of formality, maintenance of social distance, symbolic importance, game rules, and social hierarchy of self or others. In the academic world, the manner of referencing experts is a structural requirement. In conversations, turn-taking and sharing of interaction space is structurally guided. (Foucault : no cognate).
Cultural-dramaturgical (CD)	Display and maintenance of moral standards, cultural values, and signs and symbols of the community. Etiquette online as well as tone and language use (i.e., formality, cursing) are related to moral expectations and values. Behaviour that falls outside such norms may be met with ostraticm or punishment. (Foucault : technologies of sign systems.)
Personal-Agency-Dramaturgical (PaD)	Display of individual needs, motivations, and idiosyncratic abilities, dispositions, tendencies, and one's own personal history. Individuals often have unique abilities and proclivities of which they may or may not be aware. They may break rules or ignore other strategies in favour of their personal preferences and abilities. (Foucault : technologies of the self.)

Several strategies may be used in a given situation and expression of any one strategy may trigger the use of another. Enactment of strategies and reactions to enactments are constantly transformed and interpreted through the model.

In this process, individuals constantly evaluate their “personal epistemology” (one’s beliefs about the world) against the apparent epistemology of others (Goodyear & Zenios, 2007, p. 363). In other words, individuals compare what they believe about the world and what they expect of the world with what they observe others doing and saying. Expression of WoI techniques shapes the coordination of activity, emotional states, and views of self and group history. The constant adjustment of epistemology in the centre of the model (CR) may be related to an individual’s epistemic fluency—that is, the agility with which an individual can adopt and/or adapt behaviours and, possibly, beliefs about new conditions within a given social context (Goodyear & Zenios, 2007). When an individual and members of his/her community share an understanding of their collective and individual identities, the individual approaches a more harmonious level of resonance (Chayko, 2008). In contrast, individuals may reach points at which their concept of self or belonging are in conflict with the strategies enacted. Such conflict may result in rejection and/or ontological adjustment of concepts of self or community (Koole & Parchoma, 2012). This space of liminality (a position between dissonance and resolution) can be thought to be somewhat similar to Land, Cousin and Meyer’s (2005) conception of a [concept] threshold point—a point at which dissonance becomes so great that the individual must readjust. In identity terms, we might call this a self-concept threshold.

Support for the premises of the WoI model may be found in the relational self theory (Chen, Boucher, and Tapias, 2006) which describes how individuals develop representational models of others, internalize them and develop a repertoire of selves that they can enact when interacting with different people. These selves provide « positive and negative self-evaluations, affect, goals, self-regulatory strategies, and behaviours » (Chen, Boucher, and Kraus, 2011, p. 154). Chen et al. suggest that additional research needs to be done to identify « moderators of transference », that is, « modering variables that make transference and other phenomena associated with the activation of significant-other representations more or less likely to occur » (p. 168). What the WoI model provides is a breakdown of the strategies, moderating variables, that individuals can use to model their identities and decipher the identities of others.

Methods

Research Questions

The main questions the author seeks to answer in this study include: How do learners experience each WoI strategy? Do learners adjust these strategies to attain cognitive resonance? An additional underlying goal is to ascertain the value of the theoretical model: does the WoI provide a lens through which researchers can gain deeper understanding of how learners shape and reshape their online identities?

Methodological Approach

To explore the ways in which learners experience cognitive resonance and the WoI strategies, the researcher chose to use phenomenographically-inspired methodology. Marton and Pong (2005) define phenomenography as an investigation of "the qualitatively different ways in which people understand a particular phenomenon or an aspect of the world around them" (p. 335). Phenomenography appears commensurate with the investigation of WoI actions from the point of view that phenomenographers regard experience as a result of interaction between the individual experiencing and the phenomenon experienced (Åkerlind , 2005); in the WoI model, identity develops from the interaction between the individual experiencing strategies and their expression of strategies in response. Phenomenography allows the researcher to explore participants' descriptions (from a second-order perspective), how individuals experience strategies, express strategies, and the resulting adjustments, though ephemeral, in cognitive resonance-seeking.

Research Instruments

In keeping with phenomenography's emphasis on context in shaping experience (Marton & Pong, 2005; Svensson, 1997), the interview questions focused on eliciting narrations and viewpoints of online interactions such as conflict, support, and sharing, and how those interactions might affect perceptions of identity.

Data Collection

Once research ethics permission was acquired, the researcher solicited volunteers amongst students in a Master of Education course taught entirely by distance. The researcher recorded the interviews using a synchronous tool, Elluminate®. The researcher then transcribed the recordings. The transcripts were redacted, removing any names or other comments that might identify any individuals. The participants were given an opportunity to review the transcripts and encouraged to add any additional thoughts and corrections to the transcripts.

Data Analysis

According to Åkerlind (2005), the steps in phenomenographic data analysis include: 1) reading and re-reading transcripts, 2) searching for variation of experience, and 3) searching for structural relationships between variations of experience. Analysis is highly iterative and involves constant comparison yielding categories with a complete set of possible ways of experiencing the target phenomenon. This was the procedure followed in this study.

Limitations and Delimitations

Because the researcher was an employee of the master's program from which the participants were sampled, the participants may have felt the need to soften their accounts of conflict and performance of others in the program. No deception was used; the learners were apprised of the fact that this was a pilot project and that their identities would remain confidential. The study was fully approved by the institutional research ethics board.

Whilst the goal of phenomenographic research is to achieve a complete picture of variation, the results can never be completely representative of all the different ways of conceptualizing or experiencing a phenomenon (Åkerlind, 2005). Because of the scope of this initial research project, the variation represented in the results is limited in accordance with the number of participants. Generally, it is recommended that phenomenographic studies involve 15 to 20 participants (Trigwell, 2000). This preliminary study involved only five. Additional studies should be done in order to more fully examine the variation of experience. Finally, the results may not necessarily be generalized to other programs or institutions as the participants are all members of the same master's program, which may, itself, be idiosyncratic.

Results

Five participants were interviewed, four female and one male: P2, P4, P5, P6, and P7. They described themselves as a teacher, consultant, full-time parent, and two as instructional designers. All were enrolled in the same Master of Education program. They reported to have taken at least two online courses and had some experience with the social networking environment. Most of the interactions with classmates were restricted to the class discussion boards. Four participants indicated having developed a closer relationship with one or two fellow students, leading to email, Skype, or face-to-face contact. The results below outline the main categories of experience for each strategy and CR, accompanied by examples of the variety of ways in which they were experienced.

Technical-Dramaturgical (TD) Strategies

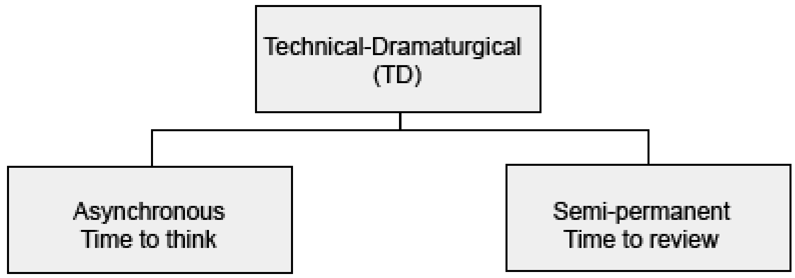

Figure 2. Technical-dramaturgical categories.

Figure 2 illustrates the main TD categories expressed by the participants. Although the technologies enable rapid responses, all participants felt that the asynchronous environment allows them to carefully consider the messages of others as well as script, edit, and reedit their own responses, cautiously avoiding "knee-jerk reactions" and inappropriate tone. P5 indicated having an online identity that is "extremely scripted," carefully stripped of "spontaneous expressions of . . . thoughts or feelings". For both P4 and P5, the semi-permanent nature of the online environment necessitated such scripting. P5 commented, "I'm very cognizant of the fact that once it's there, it's there. So, I'm careful in that respect."

The semi-permanence of online interactions also meant that past interactions could be re-examined. When discussions or values did not resonate, P2, P4, and P7 tried to glean additional information from the messages and profiles of the other learners. P4 reflected, "Even if it's not a picture of the person, um, if they've chosen something else, that kind of shows you what they value."

Political-Dramaturgical (PD) Strategies

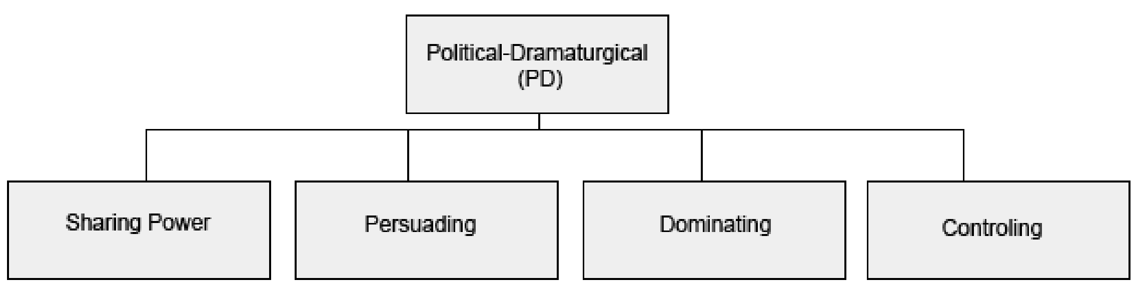

Figure 3. Political-dramaturgical categories.

The PD strategies fit on a continuum starting with encouragement (sharing power) and extending through persuasion, dominance, and control. All participants indicated that they both gave and received encouragement. P6 noted, “Throughout discussions, I have had people comment that they’ve appreciated the discussion and I take that as encouragement, regardless of their views.” Sharing of power also took the form of information sharing—especially when a fellow student did not appear to understand something. P6 reported “filling in the person, so they have a little better context.”

P6 was “cynical” about the effectiveness of persuasion and took a cautious approach in discussions,

> “I certainly try to persuade others. I am careful to ensure that my comments are phrased in such a way that it is clear that I am criticizing ideas rather than people . . . to maintain not only my dignity, but the dignity of [others].”

This approach was reflected by P4 who said, “I’ve actually never felt that people tried to persuade me. They’ve always sort of shown a different viewpoint, and then leave it up to you to draw your own conclusions.” P5 noted that professors and students attempted to persuade each other. P7 commented, “Yeah, I think they’ve persuaded me to [consider] their viewpoints—whether I’ve adopted them, maybe not.” According to these accounts, persuasion was often enacted through respectful sharing of ideas.

Dominance, itself, was seen as aggressiveness in tone and argument, forcing viewpoints, “always” posting messages first, posting large numbers of messages, and asking “all the questions.” P5 recounted a story of how another student’s work was “torn apart” by another. The student who levied the critique justified her actions by positing her authority in the subject. Reactions to such aggression varied from non-responsiveness (P7: “I just become silent”) to the use of backchannel communications such as private emails to the aggressor, the professor, or the other students in an attempt to control behaviour. P7 reported, “I did privately say in an email that it was not appropriate and that the tone needed to be changed.” Digressions in class discussions, unmanageable numbers of messages, and personal attacks—albeit rare—were expected to be controlled by a moderator or instructor in a power role.

Structural-Dramaturgical (SD) Strategies

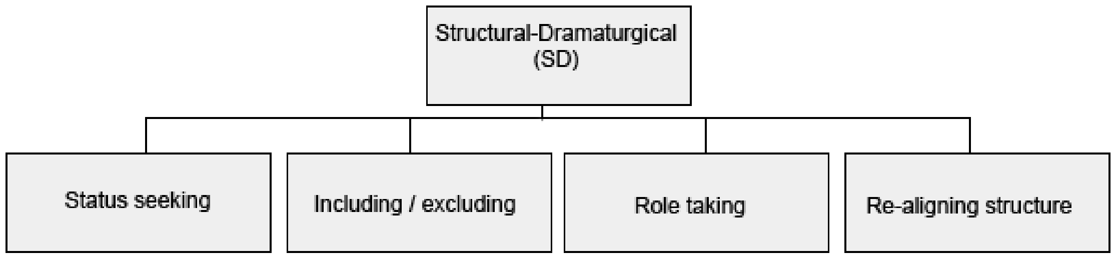

Figure 4. Structural-dramaturgical categories.

Clearly the quest for and maintenance of status is the most significant characteristic of the SD strategy. When asked about the most important or influential person in a discussion, participants referred to those with knowledge and expertise, those who seemed “articulate” and “well-read,” and those with “better ideas.” Receiving numerous responses and acknowledgement from the instructor was also an indicator of importance—popularity superseding quality of ideas. Lack of responses tended to be interpreted as lack of worthiness. P4 suggested, “You feel like you’re getting picked last for gym.” Those deemed least influential were described as those who lacked presence, posting rarely or late in the discussions.

For some participants, signs of familiarity amongst others gave them a sense of being excluded, and hence, of lesser status. P2 pondered, “Sometimes, I wonder whether they’ve had a previous relationship . . . with the prof . . . because sometimes some profs, when they respond to postings, will use people’s [first] names.” P5 admitted to having unintentionally excluded others: “A specific example of that is my friend and I, who take courses together, I think sometimes inadvertently, uh, create a conversation that is only two-ways between she and I, that other people may feel excluded.”

A great variety of roles were recognized including the leader, follower, bully, facilitator, organiser, editor, nurturer, know-it-all, and devil’s advocate. P7 recounted how a participant tried to assume a role:

> “He will argue [with] everything you say . . . He wants to be a leader, but he’s also devil’s advocate. And, I don’t even think [laughs] he’s devil’s advocate, um, with reason and thought behind it . . . and, usually I just ignore comments from him.”

This may suggest that successful role-enacting requires adequate status or recognized legitimacy.

To re-establish or mend structure, participants observed the use of “back-peddling” (rescinding statements) and apologies: “most people will understand when you say, ‘I’m sorry. Can we move on? And, in some ways, it strengthens relationships.”

Cultural-Dramaturgical (CD) Strategies

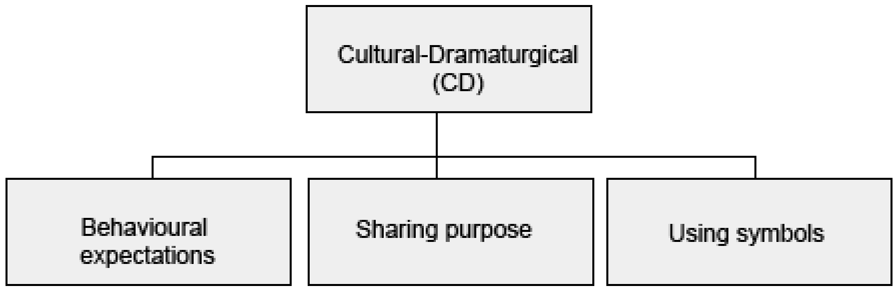

Figure 5. Cultural-dramaturgical categories.

The common perception of this master of education culture is one of civility. Most described their classmates as polite, sincere, appreciative, respectful, and encouraging. As students in a Master of Education course, they felt that most classmates were working towards the same purpose—that of being student-centred professionals. However, P4 remarked that the underlying cultural expectations may subconsciously silence the voices of those with opposing views: “I think that as much as we think it’s welcoming, there’s some really subtle and not-so-subtle cues that if [you held a different viewpoint], you might be really reluctant to come forward with it.” Although memorable, personal attacks of classmates’ work or personal integrity was viewed by all participants as unusual and unacceptable. P5 even related a story in which she apologized to a victim of another student’s attack.

Cultural-online symbols such as the use of emoticons, text-messaging codes, and jargon, while mentioned, seemed less salient in the interviews. Identifiable real-life cues as to nationality or other cultural values seemed similarly muted.

Personal-Agency-Dramaturgical (PaD) Strategies

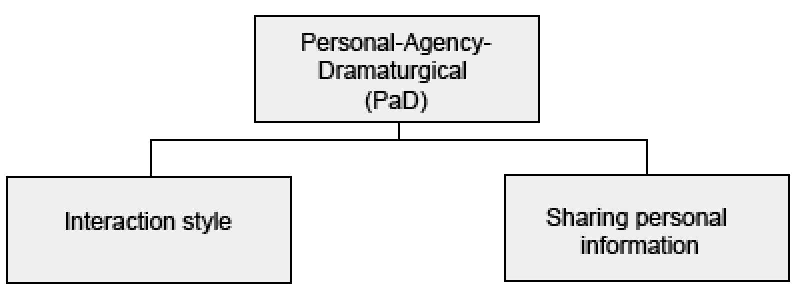

Figure 6. Personal agency-dramaturgical categories.

The participants revealed a range of interaction preferences. P2 and P5 indicated having regular social interactions with classmates whilst P7 and P4 preferred less interaction, leaning towards online-introversion. Meanwhile, P6 showed signs of online extroversion having few qualms about contacting others and breaking into discussions.

P5 and P4, in particular, described their preference for taking the time to carefully reflect on and shape dialogue. P4 said she only disclosed personal information that was relevant to the discussion adding that she did not actively conceal personal information, but simply chose not to reveal much. The participants acknowledged some students as "more memorable" such as those deemed boastful or who displayed rare behaviours such as personal attacks. P4 simply accepted not being a memorable, high-status participant (in her perception). Meanwhile, P2 said it did not matter what others thought of her saying, "I am who I am. And, I am that person 24 hours a day [in any context]."

The participants' work and family backgrounds influenced the content of their messages and affected availability for interaction as well as the type of interactions experienced during crises such as illness and death in the family (i.e., expression of sympathy and support).

Cognitive Resonance (CR)

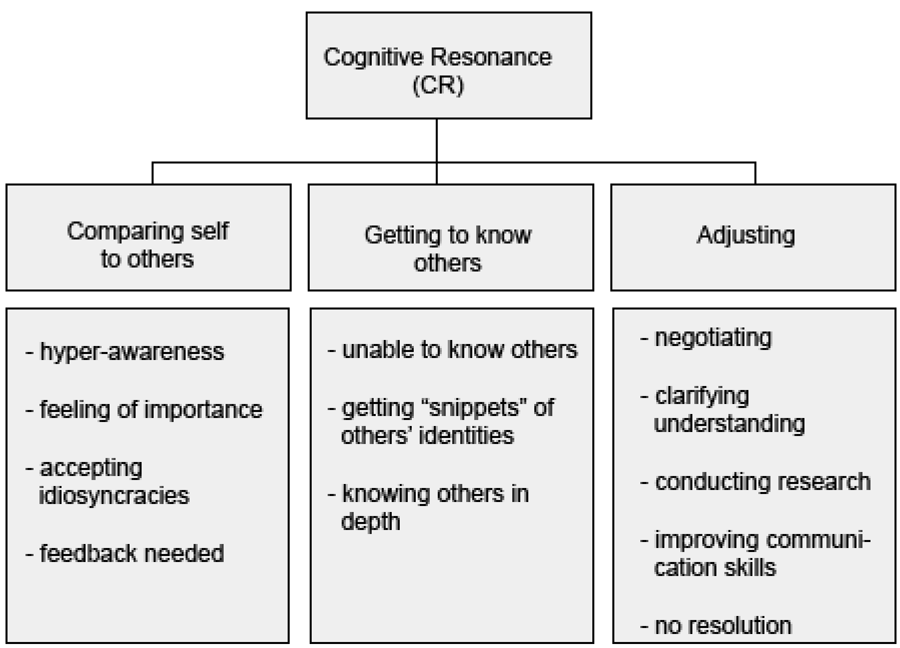

Figure 7. Cognitive resonance categories.

Responses to messages were used as a comparative or evaluative tool. For example, P4 noted that she was "hyper-aware" of her online interactions when she first started taking courses in the program. In particular, she constantly evaluated uncomfortable interactions reflecting, “We all need to feel important and go about it in different ways.” P7, P6, and P2 commented on the need to accept others as they are along with their idiosyncrasies. P5 felt that lack of response to forum messages was “like falling into a dead zone” and that it was “intensely uncomfortable.” P5 added, “You have to have feedback to get that sense of where you stand and a sense of grounding.”

Three participants felt that an individual’s online identity is different from one’s real-life identity—attributing lack of body language and non-verbal cues as possible causes. P5 felt:

> “I’m not sure that people can really get to know each other very well in the sense of knowing the real you—unless you also have developed . . . an online friendship where you have an opportunity to talk socially outside of class and on your own time.”

Yet, they could piece together some information about the other students: P7 stated, “I think I know their goals. And, I think we’re working towards the same purpose—the same end . . . a group purpose.” P6 added, “I’ll say it’s difficult to really get to know somebody. But, you certainly get snippets, and sometimes in-depth snippets of people’s views.” And, as the number of interactions increased, P6 also noted, “it’s hard not to pick up little snippets of who they are.” At the other extreme, P6 indicated, “I, personally, find that I am able to interact on a deeper level through discussion boards.” The frequency of interaction was recognized as a significant factor online for both present and future affiliations: “The sense of community is heightened by each contact,” P5 noted. P7 also considered the possibility of future interdependency. One participant commented: “We may be colleagues down the road . . . we may need to draw upon each other for experience and advice.”

At times, the participants felt that others did not have an accurate idea of their identities or viewpoints. P2, P4 (rarely), P5, P6, and P7 resorted to private conversations to clarify interactions. P6, who claimed to openly express strong viewpoints, usually tried to provide adequate context to help clarify opinions. P6 noted that debate, “generally spurs [him/her] to go to the Internet to do a little bit more research.” P5, whose viewpoint on an issue was aggressively “shot down” by her classmates, resolved to write a research paper on the issue. There were also times when the participants could not resolve observations: “To this day, I’m still flabbergasted. And, I’m surprised often by the behaviour that occurs in group work” (P5).

The CR process stimulated the honing of strategies in accordance with cultural values and expression of power. Notably, P4 commented on how an experience in group work helped in the development of conflict-handling strategies (PD) such as negotiation: “In this last group project, we just had a really honest conversation about what our expectations were.” P4 noted becoming “more aware of preventing conflict . . . in a way that's supportive of other people." P4 described learning how to provide positive and constructive critiques of others' papers. Able to reflect on feedback and previous experience, P4 altered her strategies.

Discussion and Findings

All participants were able to recount narratives demonstrating variations in the enactment of the WoI strategy categories. The participants showed differences in the extent to which they attributed importance to the others' behaviours—particularly with regard to the quantity and origin (status of the person responding) of responses to their own performances. Especially significant was lack of presence and lack of response to messages, which could be interpreted as social insignificance or exclusion.

The participants appeared to be unsure of their identities within their online learning environments, yet demonstrated attempts to identify themselves amongst others. In fact, the primary effect of interacting through the asynchronous, text-based medium of a learning management system (LMS) and social networking system was the allowance for reflecting on others' performances and for careful scripting of their own. Whenever confronted with information that upset their concept of self or belonging, individuals would strive to regain CR. As per Walther's (1996) research, they employed new techniques—online techniques—to re-establish epistemic fluency when self-concept thresholds were threatened. By referring to user-profiles, pictures, and previous discussion postings, they could acquire some information needed to decide whether to accept new information, clarify meaning, conduct additional research, or disregard performances.

Multiple strategies were employed in any given situation. For example, encouragement, a means of sharing one's power (PD), may be used in consideration with cultural values (CD) or structural goals (SD). Encouraging others to persevere in the program under difficult circumstances can serve to maintain the community, elevate the status of the person encouraging, and create social alliances. Encouragement can also reflect cultural values such as mutual benefit and the creation of "safe learning environments." Whilst aggressive message posting in terms of frequency, timing, and length may be an expression of dominance (PD), it can also be used in hopes of elevating status (SD) and being perceived as influential.

Interestingly, some dramaturgical techniques may have unintended effects. Informality of names and dialogue (SD), seemingly intended to breakdown hierarchy, can actually reinforce structure. Linguistically, formality of name use can connote various meanings (Pinker, 2007). In this study, informality conveyed intimacy suggesting previous relationships among some and excluding less intimate others. The lack of salience of national and cultural characteristics supports some of the literature suggesting that online interaction can reduce bias (Ferreday et al., 2006; Chayko, 2009); however, as we can see, other strategies may create new hierarchies.

Conclusion

The participants' narrations showed variations in how the WoI strategies could be experienced (technical, power, structural, cultural, and personal agency). One's sense of self and belonging was clearly an ongoing process involving continuous evaluation of one's own performances contrasted to those of others. The interview data showed clear signs of conscious interpretation and strategy readjustment. This is encouraging in that it suggests that the WoI model can offer a novel lens through which to better understand *how* online learners use strategies to portray themselves and *how* they decipher the identities of others with whom they interact. Further application, testing, and refinement of the WoI model is recommended.

The WoI model may also inform the development of online learning systems. Although many social networking and learning systems provide tools for managing identities (such as profile, discussion forums, editing tools, content sharing), learners still seem to struggle to understand how others perceive them and how to understand others. As noted by one respondent, the sense of community is heightened through increased frequency of interaction. Therefore, increased opportunities for interaction may provide more opportunities for performance management and ontological re-alignment. In the words of Goodyear and Zenios (2007), "Action and identity are key" (p. 355-356).

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THE INTERNATIONAL REVIEW OF RESEARCH IN OPEN AND DISTANCE LEARNING

Developing Open Education Literacies with Practicing K-12 Teachers

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Abstract

This study seeks to understand how to use formal learning activities to effectively support the development of open education literacies among K-12 teachers. Considering pre- and post-surveys from K-12 teachers (n = 80) who participated in a three-day institute, this study considers whether participants entered institutes with false confidence or misconceptions related to open education, whether participant knowledge grew as a result of participation, whether takeaways matched expectations, whether time teaching (i.e., teacher veterancy) impacted participant data, and what specific evaluation items influenced participants' overall evaluations of the institutes. Results indicated that 1) participants entered the institutes with misconceptions or false confidence in several areas (e.g., copyright, fair use), 2) the institute was effective for helping to improve participant knowledge in open education areas, 3) takeaways did not match expectations, 4) time teaching did not influence participant evaluations, expectations, or knowledge, and 5) three specific evaluation items significantly influenced overall evaluations of the institute: learning activities, instructor, and website / online resources. Researchers conclude that this type of approach is valuable for improving K-12 teacher open education literacies, that various misconceptions must be overcome to support large-scale development of open education literacies in K-12, and that open education advocates should recognize that all teachers, irrespective of time teaching, want to innovate, utilize open resources, and share in an open manner.

Keywords: Open education; K-12; literacies; professional development

Introduction

Despite decades of work in the area and hundreds of initiatives and research studies focused on utilizing technology to improve classroom teaching and learning, effective technology integration remains a “wicked problem,” complicated by diverse learning contexts, emerging technologies, and social trends that make formalized approaches to technology integration and theory development difficult (Kimmons, in press; Mishra & Koehler, 2007). Within this space, those intent upon improving K-12 teaching and learning with technology have had difficulty agreeing upon what constitutes effective integration, what the purposes of integration might be, and how such integration might help to solve some of the persistent problems plaguing educational institutions without falling prey to technocentric approaches to change (Papert, 1987).

In response to technocentrism, open education has arisen as an approach for integrating technology into the learning process with a vision for “building a future in which research and education in every part of the world are ... more free to flourish” (Budapest Open Access Initiative, 2002, para. 8) and increasing “our capacity to be generous with one another” (Wiley, 2010, para. 39). That is, technology in open education is seen merely as a tool for encouraging and empowering openness. As such, open education encompasses a variety of movements and initiatives, including open textbooks (Baker, Thierstein, & Fletcher, 2009; Hilton & Laman, 2012; Petrides, Jimes, Middleton-Detzner, Walling, & Weiss, 2011) and other open educational resources (Atkins, Brown, & Hammond, 2007; OECD, 2007; Wiley, 2003), open scholarship (Garnett & Ecclesfield, 2012; Getz, 2005; Veletsianos & Kimmons, 2012), open access publishing (Furlough, 2010; Houghton & Sheehan, 2006; Laakso, 2011; Wiley & Green, 2012), and open courses (Fini, 2009; Kop & Fournier, 2010; UNESCO, 2002).

Most proponents of open education focus exclusively upon higher education, despite much excitement among teachers for expanding open practices to K-12 and preliminary evidence that open education can help to address persistent K-12 problems. Reasons for lack of spill-over into K-12 vary, but it is likely that this difference stems in part from the fact that change in K-12 must either occur at the highly bureaucratic state level or at the hidden local level, whereas higher education institutions and their professors have more flexibility to try innovative approaches and also enjoy greater visibility for sharing results. Nonetheless, advances are being made in bringing open practices to K-12 through both practice and research.

Perhaps the most well-known study in this regard was completed by Wiley, Hilton, Ellington, and Hall (2012), wherein they conducted a preliminary cost impact analysis on K-12 school use of open science textbooks and found that these resources may be a cost-effective alternative for schools if certain conditions are met (e.g., high volume). Beyond driving down costs, however, others have suggested that open education can help support the emergence of “open participatory learning ecosystems” (Brown & Adler, 2008, p. 31), can counterbalance the deskilling of teachers that occurs through the purchasing of commercial curricula (Gur & Wiley, 2007), and can provide a good basis for creating system-wide collaborations in teaching and learning (Carey & Haney, 2007). These potentials represent promising aims for K-12 and have even led to the development of open high schools intent upon democratizing education and treating access to educational materials as a fundamental human right (Tonks, Weston, Wiley, & Barbour, 2013).

However, it is also recognized that the shift to open is problematic for a number of reasons (Baraniuk, 2007; Walker, 2007), not least of which is the fact that K-12 teachers must develop new information literacies to become effective open educators (Tonks, Weston, Wiley, & Barbour, 2013), and little work has been done to study how to best support these professionals in developing literacies and practices necessary to embrace openness or to utilize and create their own open educational resources (cf. Jenkins, Clinton, Purushotma, Robinson, & Weigel, 2006; Rheingold, 2010; Veletsianos & Kimmons, 2012). If advocates of open education seek to diffuse open educational practices, then a lack of understanding in how to support literacy development among K-12 teachers is a clear problem. To combat this, this study seeks to move forward the state of the literature and practice on how to effectively train teachers in developing open education literacies.

As personnel in a center for innovation and learning at a public university in the United States, the researchers have taken on the challenge of improving K-12 teaching and learning in their state through effective technology integration and believe that open education may be a way forward for enacting real, scalable change in public K-12 schools. They also believe that open education can serve as an empowering vision that schools may use to move ahead with meaningful technology integration initiatives. However, open education is a new concept to most K-12 teachers and administrators, and knowledge and skills necessary for effectively utilizing and creating open educational resources are not standard topics of teacher education courses or professional development trainings.

As a result, the researchers have sought to push forward a new, grassroots initiative in their state focused upon helping K-12 personnel to develop the knowledge, skills, and attitudes necessary for becoming effective open educators. The first wave of this initiative consisted of conducting a series of Technology and Open Education Summer Institutes for K-12 teachers in the target state, wherein over one hundred teachers participated in a 3-day collaborative learning experience focused on learning about issues related to open education (e.g., copyright, copyleft, Creative Commons) and creating and remixing their own open educational resources.

As we conducted these institutes, we faced a number of challenges and uncertainties due to lack of previous work in this area. Some of these included wondering 1) whether participants entered the institutes with an accurate understanding of open education concepts, 2) whether such an institute setting could be effective for increasing teacher knowledge in this area, 3) whether participant takeaways would match their expectations, 4) whether time teaching or teacher veterancy had any impact on participant perceptions of the learning experience, and 5) what factors might influence an overall evaluation of the institute as a valuable learning experience.

In this study, we explored five research questions emerging from these concerns which will help to inform on-going efforts to promote open education practices in K-12. These questions included the following:

RQ1. Did participants enter the institute with false confidence or misconceptions related to open education concepts (e.g., copyright)?
RQ2. Did participant self-assessments of open education knowledge grow as a result of the institute?
RQ3. Did participant takeaways match initial expectations or change as a result of the institute?
RQ4. Did time teaching (i.e., teacher veterancy) have an effect on participants' expectations, knowledge, or evaluation metrics?
RQ5. What specific evaluation items influenced participants' overall evaluations of the institute?

Background

As part of our mission to improve K-12 teaching and learning with technology, our research team conducted a series of three-day Technology and Open Education Summer Institutes with K-12 teachers in our state. Each institute involved up to 30 participants and was organized according to grade level, with two institutes focusing on elementary and two focusing on secondary education.

In total, over one hundred K-12 teachers from all over the target state participated in the summer institutes, representing all grade levels, a variety of subject areas, and all of the state's educational regions (cf. Idaho State Department of Education, 2007). To our knowledge, there has never been any professional development experience quite like this attempted anywhere, in terms of subject, scale, scope, and diversity of participants, and this study extends prior work in this area by introducing and evaluating an approach to supporting K-12 teacher open education literacy development that is not bounded by a single school or subject area. The overarching institute vision was to help educators across the state to develop open education literacies that they could then take back to their schools for enacting change and supporting innovation in open educational practices. Such a grassroots, broad-spectrum approach to open education is unique and untested, and our goal was to yield research outcomes that could help us move forward with ongoing innovation in this area.

When applying to attend the institutes, potential participants identified subject areas and grade levels that were of most interest to them. If accepted, participants were then assigned to a professional learning community or PLC (DuFour, 2004) within their institutes that was focused on their subject area and/or specific grade level. This meant that though each institute was either focused on elementary or secondary education, each participant had a focused experience in one of five PLCs. PLC focus areas varied by institute but typically included subject area specialization (e.g., science, mathematics).

The actual structure of learning activities at each institute was also atypical as compared to most K-12 professional development experiences. Each institute consisted of roughly 3 phases or days. Day One was more traditional in the sense that it was largely instructor-centered and focused on presentations, provocative videos, and class-wide discussions. During Day One, a small portion of the time was also devoted to helping participants to get to know their PLCs and to begin making plans for how they would work together through the institute. Day Two was completely different. At the start, participants immediately took a few minutes for a planning session with their PLCs to set goals and to gather thoughts from the day before and then began a series of development sprints where each PLC worked together to create open educational resources that would be valuable to their members' schools and classrooms. During Day Two, the instructor interjected occasionally to provide guidance and support, but all learning and activities were driven by the goals established by each PLC autonomously. During Day Three, the PLCs were given time to wrap up their projects, the instructor provided final guidance on sharing, and each PLC presented their products to the larger group and also made their resources available to the public on the web.

Throughout this process, technology was heavily used to support collaboration and communication. The open course website was made available to participants and the public before the institute began and remains open and available indefinitely (Kimmons, 2014). This decision was surprising to participants, who were accustomed to professional development experiences where information was initially provided but severed upon completion. Making information and resources perpetually available to participants gave them more freedom to focus on working on their own products and critically evaluating learning experiences as opposed to spending time laboriously taking notes in preparation for the time when access to information resources would cease.

Within the lab space utilized for the institutes, each PLC was assigned to a horseshoe-shaped table with a display switching matrix and large-screen interactive display along with personal computing devices to connect into their tables. This allowed each participant to wirelessly access information resources and work on institute materials individually but also to work within the context of a group setting where they could autonomously and effectively collaborate, share, and present their information to other group participants. Throughout this process, collaborative document creation software (i.e., Google Drive) was used so that participants could work on the same documents simultaneously and share resources in a common, cloud-based folder.

Before these institutes, many participants had never experienced using these types of software and hardware tools before, and most had never used them in a synchronous, collaborative setting. Furthermore, the lab also provided access to a variety of other cutting-edge technologies like an interactive table, wearable devices, a telepresence videoconferencing robot, and kinesthetic learning games, which participants were given opportunities to try out and consider their applications for local school use during Technology Exploration sessions.

Though a variety of technologies were provided, technology was not the focus of the institutes but was rather a tool that was used to inspire participants to think creatively and to collaborate in open ways. Because it was anticipated that most teachers would have had little exposure to open education, technology was also used as a marketing tool for the institute, because though most teachers may not have had initial interest in the unknown topic of open education, it was expected that access to new technologies would be a motivator for eliciting interest in the institutes.

Methods

This study employed a longitudinal survey design methodology (Creswell, 2008) to collect and analyze data from institute participants before and after the institute. This method was deemed to be appropriate, because research questions lent themselves to quantitative analysis of trends among institute participants over the course of the three-day experience.

Sample

Survey respondents included eighty (*n* = 80) participants in the targeted Technology and Open Education summer institutes. In total, over one hundred K-12 educators participated in the institutes, but not all elected to participate in the study. Participants were predominantly female, reflecting an uneven gender distribution of the K-12 labor force in the target state, came from all geographic regions of the target state, and were generally veteran teachers (72% having taught for five or more years). More detailed participant demographic information was not collected, because it was deemed unnecessary to answer the research questions.

Data Collection

Throughout the institutes, both quantitative and qualitative feedback was elicited from participants, but this report deals primarily with quantitative results. Data sets for this study included two online surveys: one conducted immediately before the institute and one conducted immediately after the institute.

Survey Instruments

Both surveys were delivered online, and participants completed them by following a link on their personal or provided laptops or mobile devices while at the institute. Surveys consisted of a number of questions that may be categorized as eliciting one of the following:

- fact (e.g., years teaching);
- expectation (e.g., personal learning goal);
- knowledge (e.g., self-assessment);
- evaluation (e.g., instructor evaluation);
- open response (e.g., general feedback).

Pre-survey.

The pre-survey consisted of the following two factual questions, knowledge question, and expectation question:

1. How long have you been teaching? [Fact]
2. Did you do the preliminary work for this institute, including watching the videos, creating a Google account, and reading the articles? [Fact]
3. How well do you understand each of the following concepts or movements (explained below)? [Knowledge]
4. What do you hope to gain from this institute (explained below)? [Expectation]

The knowledge question consisted of six separate items and yielded a reliable Cronbach's alpha of .74.

Post-survey.

The post-survey consisted of two knowledge questions, five evaluation questions, one expectation question, and three open response questions:

1. How well did you understand each of the following concepts or movements before the institute (explained below)? [Knowledge]
2. How well do you understand each of the following concepts or movements now (explained below)? [Knowledge]
3. Compared to other professional development sessions, this institute was: (Leave blank if this is your first professional development session.) [Evaluation]
4. How would you rate this institute (explained below)? [Evaluation]
5. The institute was a good use of my time. [Evaluation]
6. The institute was of practical value to me in the classroom. [Evaluation]
7. This institute helped me to think critically about how I incorporate technology into my teaching. [Evaluation]
8. What was the most valuable knowledge or skills that you gained from this institute (explained below)? [Expectation]
9. What was most valuable about this institute? [Open response]
10. What would you change about this institute? [Open response]
11. Please provide any feedback or suggestions to help us understand how to make future institutes meaningful and valuable for teachers. [Open response]

Knowledge questions each consisted of six separate evaluations and yielded a reliable Cronbach's alpha of .86. Evaluation questions consisted of fifteen total items and yielded a reliable Cronbach's alpha of .85.

Response rate.

A complete response was determined by the presence of both a pre-survey and post-survey for each participant. Since all study participants were encouraged to complete surveys on-site, the response rate was high (80%), and missing surveys likely reflected improper entry of unique identification numbers or accidental failure to complete one survey.

Analysis

Data from the pre-survey and post-survey were merged using a unique identifier provided by participants in each survey. Participant data that did not include both surveys were considered incomplete and were excluded from analysis. If multiple responses existed for participants, timestamps were used to select the earliest submission for the pre-survey (to avoid post-surveys mistakenly taken as pre-surveys) and the latest submission for the post-survey (to avoid pre-surveys mistakenly taken as post-surveys). All other submissions were discarded. Several tests were run on the data to answer pertinent research questions, and an explanation of each research question and its accompanying test(s) is now explained.

RQ1: False confidence and misconceptions.

H_0: There was no difference between self-evaluations of prior knowledge collected before the institute and after the institute.

H_1: Self-assessments of prior knowledge collected before the institute were different than self-assessments of prior knowledge collected after the institute.

In the pre-survey, participants were asked "How well do you understand each of the following concepts or movements?" and then were expected to self-evaluate their understanding of six open or general education knowledge domains ("Common Core", "open education," "copyright," "fair use," "copyleft," and "public domain") according to a 5-point Likert scale. It was believed that participants might initially rate themselves one way on these knowledge areas but that upon completion of the institute, they might come to realize that their initial self-assessments were incorrect. For this reason, the post-survey included the same question, which was reworded as follows: "How well did you understand each of the following concepts or movements *before the institute*?" These data were analyzed using paired samples T-tests on each knowledge domain to determine if there was a significant difference between pre-survey assessments of prior knowledge and post-survey assessments of prior knowledge with the expectation that a negative change would reflect a realization on the part of participants that their initial self-assessments had been overstated or based upon a misconception of what the knowledge domain entailed. When completing the post-survey, participants were not given access to their pre-survey assessments, which required them to self-evaluate without reference to their former assessments. In this analysis, the phrase "false confidence and misconceptions" is used to inclusively address all possibilities wherein a participant's pre-survey assessment of prior knowledge does not match her post-survey assessment of prior knowledge and would include instances where participants might have forgotten the complexity of a topic.

RQ2: Knowledge growth.

H_0: Participants reported no knowledge growth as a result of the institute.

H_1: Participants reported knowledge growth as a result of the institute.

In the post-survey, participants were also asked to self-assess their final knowledge with the question "How well do you understand each of the following concepts or movements *now*?" in connection with the six open education knowledge domains mentioned above and were provided with the same 5-point Likert scale. Two sets of paired samples T-tests were run: one comparing pre-survey prior knowledge with post-survey final knowledge and the other comparing post-survey prior knowledge with post-survey final knowledge. It was anticipated that if knowledge growth occurred, both of these sets of tests would reveal significant differences.

RQ3: Expectations and takeaways.

H_0: Valued takeaways from the institute matched initial expectations.

H_1: Valued takeaways from the institute did not match initial expectations.

In the pre-survey, participants were asked "What do you hope to gain from this institute (please rank with the most valuable at the top)?" and were provided with the following four items:

1. Open content creation literacy (e.g., how to create open content)
2. Relationships with other educators (e.g., building a professional learning community)
3. Technology integration strategies (e.g., how to integrate technology *x*)
4. Technical skills (e.g., how to use technology *x*)

All of these were topics addressed in the institute. In the post-survey, participants were again asked to rank these same four items in accordance with this question: "What was the most valuable knowledge or skills that you gained from this institute (please rank from most valuable to least)?" Paired samples T-tests were then run on each item with the expectation that a change in average ranking of an item would reflect a difference between participants' initial expectations of the institute and actual takeaways.

RQ4: Time teaching.

H_0: Time teaching has no effect on expectation, knowledge, or evaluation metrics.

H_1: Time teaching has an effect on expectation, knowledge, or evaluation metrics.

In the pre-survey, participants were asked “How long have you been teaching?” and were provided with the following three options: “1 year or less,” “2-5 years,” or “more than 5 years.” A one-way ANOVA with Bonferroni post hoc test was then run with *time teaching* as the factor and each expectation, knowledge, and evaluation item from the pre-survey and post-survey as a dependent variable. It was expected that this test would reveal any cases where time teaching had an effect on survey outcomes.

RQ5: Influences on overall evaluation.

H_0: There is no linear correlation between participants’ overall evaluations and specific evaluation items.

H_1: There is a linear correlation between participants’ overall evaluations and specific evaluation items.

In the post-survey, participants were asked “How would you rate this institute?” and were then expected to evaluate the institute overall and in ten specific evaluation items according to a 5-point Likert scale. Categories included: *instructor*, *support staff*, *schedule / organization*, *learning activities*, *your PLC*, *tech explorations*, *website / online resources*, *lab / venue*, *food / refreshments*, and *lodging*. A stepwise linear regression model was then used with *overall evaluation* as the dependent variable and all ten specific evaluation items as the independent variables to determine whether linear correlations existed between specific evaluation items and the overall score, thereby revealing which specific evaluation items informed the overall rating.

Findings

Descriptive statistics revealed that participants believed their institutes to be highly valuable and effective. The average participant overall rating for the institute was 4.86 on a 5-point Likert scale, and 44% of participants believed their institute was the best professional development experience they had ever experienced, and another 44% believed that it was much better than most other professional development experiences that they had experienced in the past. In their evaluations, participants rated all aspects of the institute highly, and participants strongly agreed that the institutes were a good use of their time, that they were of practical value to their classroom practice, and that the institutes encouraged them to think critically about technology integration (cf. Table 1). Findings emerging from statistical analysis related to each research question now follow.

Table 1

Descriptive Statistics of General Evaluation Items

	n	Mean	*SD*
Overall rating	80	4.86	.35
Practical value	79	4.73	.44
Good use of time	78	4.77	.42
Encouraged critical thinking	80	4.59	.61
Comparative value [a]	76	4.49	.57

[A] This item was formulated on a 7-point Likert scale (M = 6.29, SD = .8), but results were converted to a 5-point scale to allow for uniformity in reporting.

RQ1: False Confidence and Misconceptions

The comparison of pre-survey *prior knowledge* with post-survey *prior knowledge* yielded a number of significant differences between how participants initially evaluated their knowledge on topics related to open education and how they later came to assess their prior knowledge. In the cases of *open education*, *copyright*, *fair use*, and *public domain*, participants' self-assessments went down in the post-survey, so we must reject the null hypothesis and conclude that self-assessments differed significantly before and after the institute for these cases (cf. Table 2). This finding suggests that initial participant self-assessments might have been based on false confidence or misconceptions about what the terms meant, but that as participants became more familiar with terms through the institutes, they came to recognize how little they actually knew before entering the institute. Differences on *Common Core* and *copyleft* were not significant, suggesting that the institute did not change participant understanding of what these terms meant (as is likely the case with Common Core) or that participants had no prior knowledge of the term (as is likely the case with copyleft).

Table 2

Comparison of Pre-Survey and Post-Survey Prior Knowledge Ratings

	Prior knowledge				
	Pre-survey	Post-survey	Mean difference	T	Df
Copyright	2.76	2.31	-.45 ***	-5.07	79
Fair use	2.24	1.8	-.44 ***	-5.39	79
Public domain	2.45	2.03	-.43 ***	-4.11	79
Open education	2.25	1.91	-.34 ***	-4.36	79
Common Core	3.8	3.83	.03	.41	79
Copyleft	1.38	1.34	-.04	-.56	79

*** Denotes significance at the $p < .001$ level.

RQ2: Knowledge Growth

The comparison of pre-survey prior knowledge with post-survey final knowledge and also the comparison of post-survey prior knowledge with post-survey final knowledge yielded significance in every case (cf. Table 3 and Table 4). Thus, we must reject the null hypothesis and conclude that participants reported knowledge growth as a result of the institute in every domain.

Table 3

Comparison of Pre-Survey Prior Knowledge and Post-Survey Final Knowledge

	Pre-survey prior knowledge	Post-survey final knowledge	Mean difference	T	Df
Copyleft	1.38	3.89	2.5 ***	26.1	79
Open education	2.25	4.18	1.93 ***	19.2	79
Public domain	2.45	4.26	1.81 ***	13.85	79
Fair use	2.24	3.94	1.7 ***	17.93	79
Copyright	2.76	4.03	1.26 ***	12.22	79
Common Core	3.8	4.1	.3 ***	4.16	79

*** Denotes significance at the $p < .001$ level.

Table 4

Comparison of Post-Survey Prior Knowledge and Post-Survey Final Knowledge

	Post-survey prior knowledge	Post-survey final knowledge	Mean difference	T	Df
Copyleft	1.34	3.88	2.54 ***	27.48	79
Open education	1.91	4.18	2.26 ***	24.59	79
Public domain	2.03	4.26	2.24 ***	18.7	79
Fair use	1.8	3.94	2.14 ***	22.03	79
Copyright	2.31	4.03	1.71 ***	17.24	79
Common Core	3.83	4.1	.28 ***	4.67	79

*** Denotes significance at the $p < .001$ level.

RQ3: Expectations and Takeaways

The comparison of pre-survey *expectations* with post-survey *outcomes* yielded significant results in every case (cf. Table 5). Thus, we must reject the null hypothesis and conclude that valued takeaways did not match initial participant expectations.

Table 5

Comparison of Pre-Survey Expectations and Post-Survey Outcomes

	Pre-survey expectations	Post-survey outcomes	Mean difference	T	Df
Plc	3.3	2.45	-.86 ***	-5.82	5
Open education	2.39	2	-.39 *	-2.3	55
Technology skills	2.71	3.04	.32 *	2.07	55
Technology integration	1.59	2.5	.93 ***	6.1	55

Note: Since these are ranked items, a lower number indicates a higher score (1 meaning first, 2 meaning second, etc.).
* Denotes significance at the $p < .05$ level.
*** Denotes significance at the $p < .001$ level.

To clarify this finding further, if we were to list *expectations* and *outcomes* in accordance with their rankings, we would see that the largest changes occurred in the cases of *technology integration*, wherein participants expected to learn about technology integration but did not count it as a valuable outcome, and PLCs, wherein participants did not expect their PLCs to be valuable but then evaluated them highly as an outcome (cf. Table 6).

Table 6

Expectations and Outcomes in Ranked Order

Expectations from pre-survey	Outcomes from post-survey
1 Technology integration	1 Open education
2 Open education	2 Professional learning community
3 Technology skills	3 Technology integration
4 Professional learning community	4 Technology skills

RQ4: Time Teaching

ANOVA tests on knowledge items generally did not reveal differences between participants when grouped according to *time teaching* or teacher veterancy. The only significant main effects between groups were found on the *Common Core* and *fair use* items in the pre-survey and on the *Common Core* item in the post-survey (cf. Table 7). Bonferonni post hoc tests revealed that this difference can be attributed to the least experienced teaching group, which self-assessed lower than more experienced groups in all three metrics, with an average difference ranging between .71 and 1.14 points on the 5-point scale (cf. Table 8).

Table 7

Main Effect of Time Teaching on Knowledge Items

	SS	df	Mean Square	F
Pre-survey Common Core	6.96	2	3.48	5.89 *
Pre-survey fair use	6.12	2	3.06	3.71 *
Post-survey Common Core	3.68	2	1.84	3.22 *

* Denotes significance at the p < .05 level.

Table 8

Main Effect Comparison of Less and More Experienced Teachers on Knowledge Items

	Comparison of *1 Year or Less* Group to			
	2-5 Years Group		*5+ Year* Group	
	Mean difference	Standard error	Mean difference	Standard error
Pre-survey Common Core	+1.14 *	.36	+1 *	.31
Pre-survey fair use	+1.14 *	.42	+.8	.36
Post-survey Common Core	+.71	.35	+.77 *	.3

* Denotes significance at the p < .05 level.

RQ5: Influences on Overall Evaluation

Participants rated sessions highly across all ten specific evaluation items, but the stepwise linear regression revealed that three specific evaluation items (activities, instructor, and website) significantly predicted *overall* ratings (cf. Table 9). The regression model for all three of these predictors also explained a significant proportion of variance in overall ratings, $R^2 = .649$, $F(3, 68) = 41.94$, $p < .001$. Of these factors, activities and instructor had a positive linear correlation with overall ratings, while website had a negative linear correlation. All other factors were excluded from the regression model due to lack of significance.

Table 9

Regression Model of Activities, Instructor, and Website Prediction upon Overall Evaluation

	Unstandardized coefficients			
Model	B	Std. Error	Beta	T
(Constant)	1.43	.4		3.54 ***
Activities	.43	.06	.65	7.08 ***
Instructor	.54	.09	.49	6.03 ***
Website	-.27	.07	-.34	-.38 ***

*** Denotes significance at the $p < .001$ level.

Implications

A variety of implications arise from these findings. First, it may be concluded that the institutes were considered to be a valuable learning experience for participants and that utilizing this type of approach for developing open education literacies in practicing teachers can yield positive results and help to address this need (cf. Tonks, Weston, Wiley, & Barbour, 2013). This finding was corroborated in the knowledge growth analysis, which found that participants' self-evaluations on specific knowledge items increased significantly both when comparing pre-survey prior knowledge with post-survey final knowledge and when comparing post-survey prior knowledge with post-survey final knowledge. Making both of these comparisons allowed us to determine more surely that participants' knowledge grew than would have been possible by simply asking participants to reflect on their learning.

Second, it seems that part of the challenge with open education revolves around misconceptions and false confidence related to key components. It is telling that participants changed their initial ratings of themselves on knowledge of copyright, fair use, public domain, and open education between the pre-survey and the post-survey and rated themselves lower on prior knowledge after having experienced the institute. This corroborates our anecdotal findings that teachers tend to believe that they understand what these concepts mean and what they entail, but that upon examination and the completion of focused learning activities, participants come to recognize that they did not understand the concepts very well to begin with. This is problematic for open education, because it is difficult to appeal to a need when teachers do not recognize that a need exists. If teachers already believe that they understand copyright and fair use, for instance, then they have no impetus to learn about these concepts and may consider themselves to be open educators when in fact they have very little understanding of what this entails and what it means to share in open ways utilizing copyleft or Creative Commons licensing. Further research in this area would be valuable for gaining a more nuanced understanding of misconceptions and false confidence via qualitative analysis, but such analyses were beyond the scope of the current study and were not essential for answering the research questions.

Third, we found it noteworthy that perceived importance of both open education and professional learning communities increased through the course of the institutes, while importance of technology integration and skills decreased. This suggests that if we truly seek to create open participatory learning ecosystems (Brown & Adler, 2008, p. 31), teachers need experiences like these institutes that allow them to experience collaborations with other teachers in an open manner. It seems dubious that system-wide collaborations (Carey & Haney, 2007) can occur otherwise, because open education requires teachers to rethink fundamental aspects of how they operate as educators, to reevaluate basic collaborative practices, and to share in ways that may be new and uncomfortable. In addition, as teachers recognize collaborative potentials with one another across traditional school and district boundaries and recognize that they have value to contribute to the profession through sharing, this may help to counteract deskilling influences upon teachers, wherein they are relegated to serving as technicians rather than professionals (Gur & Wiley, 2007).

Fourth, though there is no theoretical basis for assuming that innovation adoption is correlated with age factors (cf. Rogers, 2003), it has been our experience that many advocates for innovation and technology integration resort to a narrative of innovation which considers younger teachers to be more willing to innovate than their more experienced peers. Our findings, however, reveal that time teaching had no impact on participants' expectations of the institutes or their evaluations of the experience, which means that veteran teachers responded just as positively to the learning activities as did their less experienced counterparts. The only significant differences we found related to two knowledge items: Common Core (pre-survey and post-survey) and fair use (pre-survey only). In the case of Common Core, it makes sense that more veteran teachers would self-assess higher than less experienced teachers, because they have had more experience teaching and adapting to new standards or ways of teaching and also work in districts that have devoted a sizable amount of training to Common Core, while the less experienced teachers would have just recently completed their teacher education programs and likely would not have completed many district or school level trainings.

The difference with fair use, on the other hand, reveals that veteran teachers entered the institute with greater perceived knowledge of fair use than did their novice counterparts but that this difference disappeared by the end of the institute. This means that either veteran teachers truly began the institute with a greater knowledge of fair use than their novice counterparts or they had more false confidence in this regard. Given the fact that training on issues of copyright and fair use are uncommon for teachers, we believe that the latter interpretation is likely more accurate and that as teachers spend time in the classroom and use copyrighted works, they develop a false sense of confidence related to fair use. This interpretation is corroborated by the fact that when novice teachers and veteran teachers self-assessed their prior knowledge on the post-survey, differences between groups disappeared, meaning that after participants had focused training related to fair use, they self-evaluated themselves equally low on initial knowledge. This is problematic, because it suggests that as teachers gain experience in the classroom, they also develop a false sense of confidence related to fair use and therefore likely begin utilizing copyrighted materials in ways that may not be permissible. This also means that although the development of open education literacies is essential for ongoing diffusion (Tonks, Weston, Wiley, & Barbour, 2013), teachers may not recognize the need to learn more about open education, because they assume that they already sufficiently understand these topics.

And fifth, if open education leaders seek to help K-12 teachers develop literacies necessary to utilize open educational resources in their classrooms and to share their own creations through open practices, then we need to understand what factors influence these teachers' ratings of learning experiences toward this end. From our results, we find that the learning activities themselves, which involved collaborative group work with other professional educators, and the instructor, who modeled open educational practices and facilitated collaborative learning, were the most important factors for creating a positive open education experience.

Interestingly, though participants provided anecdotal feedback that the website and online resources were valuable, their ratings in this regard are negatively correlated with overall satisfaction with the institutes. The reason for this is unknown, but it may be that those teachers who valued the ability to peruse resources on their own and to learn at their own pace via provided online resources found the face-to-face institute to be less valuable, whereas those who found the online resources to be less useful needed to rely more heavily on the institute and valued the experience more as a result. This may mean that some educators might be more effectively introduced to open education via online, asynchronous learning experiences, while others may be more effectively reached through face-to-face, synchronous experiences.

Conclusion

Given these findings and implications, we conclude that this type of open education institute can be valuable for practicing teachers if coupled with effective and collaborative learning activities and a strong instructor to model open education practices and collaborative learning for participants. We also conclude that there may be a number of misconceptions related to open education that make it difficult for practicing teachers to recognize the need for this type of work but that as they participate in learning activities increasing their knowledge of concepts like copyright, fair use, public domain, and copyleft, teachers come to recognize the value of these subjects and to value learning experiences devoted to them. And finally, advocates of open educational practices should eschew narratives of innovative change that categorize educators based upon veterancy factors and recognize that all teachers want to innovate and share; teachers merely need learning experiences that empower them to overcome false confidence and misconceptions in a manner that is positive and that treats them as competent professionals.

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THE INTERNATIONAL REVIEW OF RESEARCH IN OPEN AND DISTANCE LEARNING

The Influence of Personality and Chronotype on Distance Learning Willingness and Anxiety among Vocational High School Students in Turkey



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Abstract

There are many studies related to distance learning. Willingness and anxiety are important variables for distance learning. Recent research has shown that anxiety and willingness towards distance learning are moderated by personality. This study sought to investigate whether distance learning willingness and distance learning anxiety are associated with age, gender, occupation, chronotype and personality in a Turkish vocational high school students sample. Two measures of individual differences were implemented: chronotype (morningness/eveningness preference) and BIG-5 dimensions (agreeableness, conscientiousness, extraversion, neuroticism, and openness). Seven hundred and sixty-nine vocational high school students from Turkey filled out a self-administered questionnaire. Evening types, older, and female students had higher distance learning willingness scores than morning types, younger, and male students. No significant difference was found between chronotype groups with respect to distance learning anxiety. Furthermore, extraverted students reported a lower distance learning anxiety. Openness to experience was associated with high distance learning willingness. We conclude that evening types may benefit from distance learning more than other types.

Keywords: Personality; morningness-eveningness; distance learning; willingness; anxiety

Introduction

One of today's most common learning applications is distance learning and it is continuing to become widespread. Distance learning (DL) is a learning application where students learn by using learning material and communication technology when instructors and students are separated by time and/or location (Moore & Kearsley, 2005). For these reasons, DL students may have more self-directed, self-oriented, and independent learning habits and a higher level of information technology skills. In this respect most of the DL students are university students and they are older than face-to-face students (Hunt, 2010; Mupinga, 2005; Tucker, 2003). So DL for adults is not a new application but DL in high schools has been growing in recent years (Rice, 2006). In the United States, approximately 700,000 elementary and secondary education students (1.1 % of all K-12 students) were enrolled in DL in 2007 (Picciano & Seaman, 2009). Open high school in Turkey was implemented in 1992 (Demiray & Sağlık, 2003). Open high school programs or open education systems have the ability to offer quality education to a large number of students (Latchem, Özkul, Aydin, & Mutlu, 2006). Open high school programs have become widespread over time and 1,548,158 K-12 students were enrolled in open high school and open vocational technical high school programs in Turkey in the 2011/12 year; 63,080 students were enrolled in open vocational technical high school programs from the Aegean and Marmara region of Turkey and a total of 235,257 students were enrolled in all regions of Turkey in the 2011/12 year (Ministry of National Education Turkey, 2012).

K-12 Distance Learning

There are different terminologies in the literature related to K-12 level DL. Some of them are K-12 DL, "virtual schools" and "cyber schools". We chose to use the K-12 DL concept in the study because of its widespread use. Many studies are addressing DL in adults, but there are limited studies of theK-12 level (Barbour & Reeves, 2009; Cavanaugh, Barbour, & Clark, 2009). With K-12 level application, DL began to cater for all age groups (adolescents and adults; Rice, 2006). At the K-12 level, although there are a limited number of articles, DL hasbeen studied mostly in the United States and Canada (Barbour & Mulcahy, 2008; Picciano & Seaman, 2009; Rice, 2006; Sheppard, 2009). Also especially the United States and Canada, K-12 level DL is increasing and spreading every day (Allen & Seaman, 2013; Barbour, 2013; Demiray & Sağlık, 2003; Smith, 2009). In developed countries such as USA and Canada, K-12 DL is used to provide the opportunity for students with learning disabilities. Other reasons in developing countries are students learning in different places and at different times, overcrowded classrooms, lack of quality teachers and school infrastructure (Barbour, 2013; Barbour & Mulcahy, 2006; Cavanaugh & Clark, 2007). In developing countries, such as Turkey, K-12 DL is used for economic, cultural, and social development (Moore & Kearsley, 2005). Another reason for the increase and spread of K-12 DL may be that students are more successful in DL than in face-to-face learning (Cavanaugh, 2001; Cavanaugh, Gillan, Hess & Blomey, 2004; Rice, 2006).

K-12 DL students are typically working adults and mostly women (Moore & Kearsley, 2005), students with disabilities, and students from rural areas (Berman & Tinker, 1997). In K-12 DL and other DL applications, the number of participants from rural areas is higher than from urban areas (Picciano & Seaman, 2009). One of the reasons may be the more difficult access to schools and qualified personnel in rural areas. In addition, some studies stated that DL students from rural areas are at least equal or even more successful than those in the city center (Barbour & Mulcahy, 2006, 2008; Sheppard, 2009). In this aspect, achievement is another reason why DL could be chosen by participants from rural areas.

DL (especially asynchronous DL) offers participants learning with their preferred speed, time and style (Roblyn, 1999). In this aspect, DL is developing critical and creative thinking, time management, problem solving skills, and independent learning habits (Barker & Wendel, 2001). Despite these benefits, DL is not the most effective choice in all situations, especially not in novice students (Cavanaugh, Gillan, Kromrey, Hess, & Blomeyer, 2005) and digital immigrants (Prenksy, 2001). When compared to face-to-face learning, many students are not familiar with DL. These students, who faced DL for the first time, were defined as novices (see Cornacchione, Lawanto, Githens, & Johnson, 2012; Moore & Kearsley, 2005). Conrad (2002) found that novice students express fear and anxiety when they start DL. Higher dropout rates may result from anxiety and may affect distance learning willingness (DLW; Cavanaugh, Barbour, & Clark, 2009). Hara (2000) found that technical and communication skills and DL experience are important factors for a DL student's anxiety. Williams (2007) found that DL students prefer traditional face-to-face learning more than DL. On the contrary, Wang (2007) found that DL students were pleased with DL and willing to continue. For successful DL, a student's distance learning anxiety (DLA) and DLW are important variables (Horzum & Çakır, 2012; Jegede & Kirkwood, 1994) and may vary according to students' characteristics.

Although descriptive and media comparison studies have usually been done in DL literature (Bernard, Abrami, Lou, & Borokhovski, 2004; Demiray & Sağlık, 2003; McIsaac & Gunawardena, 1996), students' individual differences have become a main topic of recent studies (Dillon & Greene, 2003; Zawacki-Richter, 2009; Zawacki-Richter, Bäcker, & Vogt, 2009).

Chronotype or morningness-eveningness preference is one of these individual differences. Morningness-eveningness is an individual preference for a specific time of day for mental and physical performance (Adan, Archer, Hidalgo, Di Milia, Natale, & Randler, 2012). There are small but significant gender differences with women scoring higher on morningness (Díaz-Morales & Randler, 2008; Randler, 2007). Also, age effects can be found with young children being more morning oriented at the kindergarten age (Randler, Fontius, & Vollmer, 2012) and a strong tendency towards eveningness during adolescence (Carskadon, Vieira, & Acebo, 1993; Collado, Díaz-Morales, Escribano, Delgado, & Randler, 2012). At the end of adolescence, a turn back to morningness occurs (Roenneberg, Kuehnle, Pramstaller, Ricken, Havel, Guth, & Merrow, 2004) and people become progressively more morning oriented towards their later years of life (Randler & Bausback, 2010). Despite these common general patterns, significant inter-individual differences in chronotype remain throughout the lifespan.

One advantage of DL is the independent time management so students can learn at their optimal time of day. This is in strong contrast to the usual early morning schedules at school (Hurd, 2007). Evening type students with regularly scheduled school learning have more problems (emotional problems, timing of sleep, learning success, etc.; Gau, Shang, Merikangas, Chiu, Soong, & Cheng, 2007). Recent research showed that chronotype had a significant influence on school and university achievement (Beşoluk, 2011; Fabbri, Antonietti, Giorgetti, Tonetti, & Natale, 2007; Randler & Frech 2006, 2009) with earlier chronotypes being at an advantage. Thus eveningness should be related to DLW.

Chronotype is also related to personality factors as measured by different inventories (for an overview see Tsaousis, 2010 and Adan et al., 2012). In the current literature on DL, two of the most widely recognized and applied personality models are the Myers-Briggs (MBTI) and the Big Five personality model (BIG-5). MBTI profiles are known to have strong implications on learning style, and BIG-5 represents the dominant conceptualization of personality in the current literature (Kim, 2011; Kim &Schniederjans, 2004). Research on personality and chronotype indicated that eveningness is related to extraversion, impulsivity, novelty seeking, depressive symptomatology as well as openness and, to smaller extent, psychoticism (psychopathology) while morningness is related to conscientiousness, agreeableness, persistence, and emotional stability (see Adan et al., 2012; Tsaousis, 2010).

There is only limited research onchronotype and other personality dimensions in DL. Individual differences in personality influence outcomes and experiences of DL. For example, students with lower conscientiousness failed their courses more often (Santo, 2001) and high emotional stability was related to persistence (Kemp, 2002). High introversion was related to preference and participation in DL (Moore & Kearsley, 2005). Anxiety scores of the DL students are relatively moderate or higher and anxiety levels didn’t change significantly overtime (Bolliger & Halupa, 2012; MacGregor, 2002).

Önder, Horzum, and Beşoluk (2012) worked with face-to-face and blended learning students. They noticed the importance of the synchronicity between learning time and circadian preference. In their research it was found that students’ performance was enhanced when teaching was performed in sync with students’ chronotype. Evening types in face-to-face learning students expressed a higher DLW and they chose DL lessons more often than morning types (Jovanovski & Bassili, 2007). Horzum, Önder, and Beşoluk (2014) found no difference in online learning students’ achievement according to chronotype. Furthermore, Luo, Pan, Choi, Mellish, and Strobel (2011) found that students’ chronotype affected their individual daily time schedules for DL.

Studies on cognitive abilities and performance showed evidence for a synchrony effect, that is, evening types should prefer and perform better in later lessons and morning types should prefer and perform better in earlier lessons (Goldstein, Hahn, Hasher, Wiprzycka, & Zelazo, 2007).

Previous research did not investigate the influence of personality and individual differences (chronotype and BIG-5) on DLA and DLW. The aim of this research is to investigate differences of the students' DLA and DLW according to age, gender, occupation, and personality (chronotype and BIG-5). We hypothesize that eveningness is associated with higher DLW.

Method

The research was based on quantitative paper-and-pencil survey methodology. Students filled out self-administered questionnaires. Data were collected by hand.

Participants

Participants voluntarily completed a questionnaire in the 2012 academic cycle. These participants were purposively sampled from Vocational Open High Schools (VOHS). The reason for the selection of students in the VOHS is that it is the most widely spread and most preferred application in the K-12 level DL in Turkey (Horzum, 2007). Seven hundred and sixty-nine VOHS students participated, 408 (53.1%) were females. Age ranged from 14 to 44 years, 580 (75.4%) students were between 14-18 years old, and 189 (24.6%) students were between 19 and 44 years; the mean age was 17.78 (±2.29) years. Two hundred and seventy-nine (36.3%) were employed (part time students) and 490 (63.7%) were unemployed (full time students). Two hundred and forty-two (31.5%) were from the Aegean and 527 (68.5%) from the Marmara region of Turkey. These two regions of Turkey are comparable for the rise of the sun and sunlight proportion.These two regions were selected because they share a similar longitude and similar development level.

VOHS System in Turkey

The VOHS education system lasts at least fouracademic years and eightsemesters (an academic year consists of two semesters). If one of the student's mean year-end reaches45 points and higher, theypassthe course successfully. Students who have successfully completed their course acquire credits.

There is no age restriction in VOHS. People of all ages who graduated from elementary school or dropped out from high school can apply to VOHS. In these programs, common (general cultural) field and elective courses are included. Students in the VOHS take mandatory (field) courses with face-to-face, common (general cultural) and elective courses with DL (for detailed information see http://maol.meb.gov.tr/).

Field courses consisting of 130 credits are presented by face-to-face learning. In addition, common (general cultural) and elective courses consisting of 110 credits are presented withDL. Students who completed the total 240 credits will graduate. Common and elective courses are placed in the first year of the VOHS system. Field, common and elective courses are placed in the second, third and fourth year of the VOHS system. In this respect, DL takes place in the first year of the system. From the second year, while field courses occur with face-to-face training, common and elective courses still have to be taken with DL.

VOHS students must take courses that are determined by the Ministry of Education in order to graduate from school. These students are required to take the exam with all common (general cultural) and field courses. Also they are required to complete the credits for graduation. If they fail, they have to repeat the course. If a student fails an elective course, he/she may repeat that course or choose another elective course (see http://maol.meb.gov.tr/html_files/derslisteleri.html).

VOHS course timetables and syllabuses can't be changed and students can't take courses prior to the related term. Books and lecture notes of DL courses are available free of charge. Students can access and use those books and notes in electronic format on the internet whenever they need to (see http://maol.meb.gov.tr/html_files/derskitaplari.html and http://hbogm.meb.gov.tr/www/acik-ogretim-lisesi-ders-notlari/icerik/56). There are also internet TV and radio broadcasts on the website to serve as supportive course materials (http://internettv.meb.gov.tr/index.asp).

Instruments

Composite Scale of Morningness (CSM)

Students' morningness-eveningness preferences were measured with the Composite Scale of Morningness (CSM) which was developed by Smith, Reilly, and Midkiff (1989). The CSM is composed of 13Likert scale items and the total score varies from a minimum of 13 to a maximum of 55 with high scores reflecting high morningness. The scale is used in many different countries and shows good psychometric properties and convergent validity with psychometric measures (Caci, Deschaux, Adan, & Natale, 2009; Randler, 2009). The scale was adapted into Turkish by Önder, Beşoluk, and Horzum (2013). Cronbach's alpha coefficients of the CSM were reported as .73 in a high school sample. The internal consistency coefficient of the scale was .64 in this study.

Big Five Inventory (BIG-5)

Students' personality was measured using the BIG-5. In this study the BIG-5 is used in its 10-item short version. Short questionnaires can be good measurements when time is constrained (Burisch, 1998). The scale contains 10 items on a five-point Likert scale. It was developed by Gosling, Rentfrow, and Swann (2003) and adapted into Turkish by Günel (2010). The scale consists of five dimensions (agreeableness, conscientiousness, extraversion, neuroticism [the opposite of emotional stability], and openness) with two items for each dimension. The internal consistency (Cronbach's alpha) of the dimensions ranged from .70 to .89.

Distance Learning Willingness Scale (DLW)

The DLW instrument was developed by Horzum and Çakır (2012). The DLW consists of two factors and 10 items and it is in the form of a five-point Likert type scale. The total score varies from a minimum of 10 to a maximum of 50, indicating high DLW. Cronbach's alpha coefficients of the CSM were reported as .90. The internal consistency of the present study was .86.

Distance Learning Anxiety Scale (DLA)

Students' anxiety related to DL was measured using the DLA scale, developed by Horzum and Çakır (2012). The DLA consists of six items and it is in the form of a five-point Likert scale. The total score varies from a minimum of 6 to a maximum of 30, indicating high DLA. The internal consistency coefficient of the scale was .90. The internal consistency coefficient of the scale was .87 in this study.

Procedure

Permission for the conduct was obtained from the National Education Directorships. Participation was anonymous and voluntary, and there was a guarantee of confidentiality. For the statistical analyses, Pearson correlation coefficients and MANOVA (generalized linear model, GLM) were utilized to determine the relationships and differences between variables. These analyses were performed via SPSS 20.

Results

Participants' DLW scores ranged from 6 to 30 ($\overline{X}$ ± SD; 29.42 ± 9.20), DLA scores ranged from 6 to 30 ($\overline{X}$ ± SD; 15.81 ± 6.14), and morningness-eveningness scores ranged from 15 to 50 ($\overline{X}$ ± SD; 35.75 ± 5.54). Concerning BIG-5 factors mean scores (±SD) were 3.27 (±1.06) for extraversion, 3.84 (±0.89) for agreeableness, 3.77 (±0.96) for conscientiousness, 2.89 (±0.92) for neuroticism and, finally, 3.23 (±0.91) for openness to experience. In our participants, neuroticism scored lowest and agreeableness highest.

Female VOHS students reported a lower willingness ($\overline{X}$ ± SE 2.84± .048) than male students (3.03 ± .049). Later chronotypes reported a higher willingness (r = -.110, p = .002). This result showed that evening type students have higher willingness to DL. Older VOHS students showed a higher willingness to DL (r =.096, p = .008) and a lower anxiety (r = -.065, p = .074), extraverted students reported a lower anxiety (r = -.153, p < .001; Table 1).

Table 1

Correlations between Study Variables

	2	3	4	5	6	7	8	9
1 DLW	-.038	**.096	**-.110	.060	-.039	.020	-.028	**.101
2 DLA		.065	-.059	**-.153	*-.090	**-.095	*.072	-.057
3 Age			.051	.000	**-.106	-.012	-.044	.062
4 CSM				-.022	**.155	**.102	*-.088	-.063
5 Extraversion					.043	**.256	**-.114	**.173
6 Agreeableness						**.305	-.032	-.010
7 Conscientiousness							-.059	**.097
8Emotional Stability								.017
9 Openness to Experiences								-

Asterisks indicate significant correlations: * p< .050, ** p< .010; 1, DLW = Distance learning willingness; 2, DLA = Distance learning anxiety; 4, CSM = Composite Scale of Morningness: 13 = extreme eveningness to 55 = extreme morningness; 5 to 9, Big-Five dimensions.

We found significant main effects in the multivariate GLM (MANOVA) of gender [λ = .989, F(2, 758) = 4.068, p = .017, η^2 = .011], CSM score [λ = .988, F(2, 758) = 4.471, p = .012, η^2 = .012], age [λ = .987, F(2, 758) = 4.869, p = .008, η^2 = .013] and extraversion [λ = .982, F(2, 758) = 6.760, p = .050, η^2 = .018] on willingness and anxiety, but not of occupation (yes/no) [λ = .998, F(2, 758) = .636, p = .530], agreeableness [λ = .995, F(2, 758) = 1.737, p = .177], conscientiousness [λ = .999, F(2, 758) = .513, p = .599] and emotional stability [λ = .997, F(2, 758) = 1.154, p = .316]. Openness tended to have a significant influence [λ = .992, F(2, 758) = 2.906, p = .055].

Gender was a significant predictor of willingness but not of anxiety, CSM was associated with willingness. Age showed an effect on willingness and a trend on anxiety, extraversion was associated with anxiety, and openness was associated with willingness (Table 2).

Table 2

General Linear Model, Univariate Statistic Results

	Dependent Variable	F	p	η^2
Gender (male/female)	DLW	8.138	.004	.011
	DLA	.000	.984	.000
Age	DLW	6.201	.013	.008
	DLA	3.807	.051	.005
Occupation (yes/no)	DLW	.847	.358	.001
	DLA	.460	.498	.001
Chronotype (CSM)	DLW	7.526	.006	.010
	DLA	1.255	.263	.002
BIG-5 Extraversion	DLW	.984	.321	.001
	DLA	12.736	<.001	.017
BIG-5 Agreeableness	DLW	.007	.935	.000
	DLA	3.461	.063	.005
BIG-5 Conscientiousness	DLW	.536	.464	.001
	DLA	.520	.471	.001
BIG-5 Emotional Stability	DLW	.630	.428	.001
	DLA	1.736	.188	.002
BIG-5 Openness	DLW	5.157	.023	.007
	DLA	.766	.382	.001

CSM = Composite Scale of Morningness; DLW = Distance learning willingness; DLA = Distance learning anxiety.

Discussion

Until recently, research on DL mostly focused on achievement, attitude, and satisfaction (Moore & Kearsley, 2005; Zawacki-Richter, Bäcker, & Vogt, 2009). However, there is limited research on DLW and DLA (Hara, 2000; Horzum & Çakır, 2012; Hurd, 2007; Jegede & Kirkwood, 1994). Moreover, studies on individual differences (especially chronotype and BIG-5) in DL also have just begun to rise.

Evening orientation was related to a higher DLW, which remained significant after controlling for personality in the linear model. Similarly, evening type students had higher DLW, a finding that has been previously proposed by Jovanovski and Bassili (2007). These findings indicated that a DL program can present learning environments that are better suited to individual differences (Moore & Kearsley, 2005), especially of the late chronotype. So, for evening type students, DL is perceived as the better option. Asynchronous DL is carried out in VOHS. One explanation of these results may lie in the nature of asynchronous DL. In DL programs, all students may set the schedule themselves, yet are able to access learning material and lessons from anywhere and anytime and learn at their own pace. Moreover, it was found that students' chronotype affected the choice of learning time in DL (Luo et al., 2011). Evening type students, who have more problems (emotional problems, timing of sleep, learning success, etc.) with regular scheduled school learning (Gau et al., 2007) because of early school schedules

(Beşoluk, 2011), may prefer DL environments. An interesting question might be to compare individual learning processes in DL and in scheduled school programs.

DLA was unrelated to morningness-eveningness. As anxiety was unrelated to chronotype, DL should benefit all chronotypes equally with the advantage of working/performing at one's own best time. Therefore we encourage educational institutions to implement DL programs.

Moreover, extraverted students reported lower DLA. Extraverted students have a tendency to be sociable, talkative, active, and ambitious (Kim, 2011), so they reported lower anxiety. Open-minded students reported a higher DLW. This finding is consistent with the literature: Santo (2001) found that students with higher scores on openness to experience also express positive opinions of DL and they learn effectively when taking DL (Kim & Schniederjans, 2004).

Furthermore, this study showed that age has an effect on DLW. Older students may prefer DL because most of the older students are married and work while studying. Because they work or take care of children, it is difficult to participate in face-to-face lessons, and DL might be the better opportunity to study. Therefore, their DLW is higher. Consistent with the results of our study, Hurd (2007) found that older students prefer DL since they are learning within the context of family and work, and they need to fit learning into their time schedule and therefore prefer to study at their own pace. However, it was found that age was also associated with anxiety. This finding is consistent with Conrad (2002). Most of the older people haven't enough information technology skills (Prenksy, 2001) to benefit from DL. In DL, students have to handle some technological devices for learning. In conclusion, this anxiety may result from older students' lack of technological skills.

In this study we found that DLA of students did not differ with respect to gender. Consistent with the results of this study, Jegede and Kirkwood (1994) found no significant differences in students' DLA according to gender. However, it was found that women have lower DLW than men. Women who successfully perform in a face-to-face learning environment (Beşoluk, 2011) want to remain in this familiar environment and not turn towards DL.

Our study has several limitations. One of them is that participants were VOHS students. In order to obtain a more generalized result for all high school students, similar studies are needed from open high school or open secondary school students. 720 students participated in the study. For more generalized results further research should be done with more participants. Another limitation is related to the data collection process. We used only quantitative instruments. One of the problems in findings related to DL is the use of quantitative methods (Bernard, Abrami, Lou, & Borokhovski, 2004). In addition, to increase the validity of the data, some other measures (qualitative methods) should be obtained, such as observation, interview, document analysis, and so on.

Furthermore, since participation was voluntary, the sample suffers from self-selection. Asynchronous DL is carried out in VOHS. Also similar studies can be done on synchronous DL applications or comparable studies can be done on synchronous and asynchronous applications.

In conclusion, our study contributes to the knowledge about differences in DLW and DLA according to circadian types and personality. Future work should further investigate acceptance of DL applications in relation to circadian type and personality.

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Online Instruction, E-Learning, and Student Satisfaction: A Three Year Study

  

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Abstract

This article presents the results of a three-year study of graduate and undergraduate students' level of satisfaction with online instruction at one university. The study expands on earlier research into student satisfaction with e-learning. Researchers conducted a series of surveys over eight academic terms. Five hundred and fifty-three students participated in the study. Responses were consistent throughout, although there were some differences noted in the level of student satisfaction with their experience. There were no statistically significant differences in the level of satisfaction based on gender, age, or level of study. Overall, students rated their online instruction as moderately satisfactory, with hybrid or partially online courses rated as somewhat more satisfactory than fully online courses. "Convenience" was the most cited reason for satisfaction. "Lack of interaction" was the most cited reason for dissatisfaction. Preferences for hybrid courses surfaced in the responses to an open-ended question asking what made the experience with online or partially online courses satisfactory or unsatisfactory. This study's findings support the literature to date and reinforce the significance of student satisfaction to student retention.

Keywords: E-learning; instructional design; online education; student retention; student satisfaction

Introduction

In their ten-year study of the nature and extent of online education in the United States, Allen and Seaman (2013) found that interest on the part of universities and colleges in online education shows no sign of abating. Online education continues to expand at a rate faster than traditional campus-based programs. The authors reported the number of students enrolled in at least one online course to be at an all-time high of 32% of all enrollments in participating institutions, representing an increase of 570,000 students from the previous year. Allen and Seaman also found that 77% of university leaders responding to the survey rated learning outcomes to be the same, if not better, with online education when compared with face-to-face learning. Their results support the *no significant difference phenomenon* that Russell (1999) found in his comparative study of student learning in the online and traditional classroom environments. Acknowledging that learning outcomes are equivalent, the question of how satisfied students are with their experiences with e-learning persists. This is important from the stand point of student retention which is, of course, relevant to enrollment and maintaining institutional revenue streams. Also, analysis of student satisfaction may point to improvements in e-learning practices which in turn could improve outcomes.

Literature Review

The Allen and Seaman (2013) report looked at online education, including the growing presence of massive open online courses (MOOCs), from the institutional perspective, not from the student's. In their report, the authors noted that the remaining barriers to widespread acceptance of online education were lack of faculty and employer acceptance, lack of student discipline and low retention rates. Of these, student retention in online programs is particularly relevant to the discussion of student satisfaction with their online experience. Reinforcing the instructor's role in designing satisfying online curricula, Kransow (2013) posited that if students were satisfied with their online experiences, they would be more likely to remain in the program.

Kransow (2013) poses a critical question for instructors working in the online environment. How can online courses be designed to maximize student satisfaction as well as student motivation, performance and persistence? Drawing on the literature, Kransow emphasizes the importance of building a sense of community in the online environment. Yet, building an online community that fosters student satisfaction involves strategies that go beyond facilitating interaction with course components. Building community also requires, among other elements, interaction with each other, that is, between student and instructor and among students in the course. Sher (2009), in his study of the role such interactions play in student learning in a Web-based environment, found interaction between student and instructor and among students to be significant factors in student satisfaction and learning.

Interaction—between the student and the instructor, among students, and with course content and technology—was the focus of Strachota's (2003) study of student satisfaction with distance education. In her study, learner-content interaction ranked first as a determinant of student satisfaction, followed by learner-instructor and learner-technology interaction. Interaction between and among students was not found to be significantly correlated with satisfaction. Bollinger (2004) found three constructs to be important in measuring student satisfaction with online courses: interactivity, instructor variables and issues with technology.

Palmer and Holt (2009) found that a student's comfort level with technology was critical to satisfaction with online courses. Secondary factors included clarity of expectations and the student's self-assessment of how well they were doing in the online environment. Drennan, Kennedy, and Pisarski (2005) also found positive perceptions of technology to be one of two key attributes of student satisfaction. The second was autonomous and innovative learning styles. Richardson and Swan (2003) focused on the relationship of social presence in online learning to satisfaction with the instructor. They found a positive correlation between students' perceptions of social presence and their perceptions of learning and satisfaction. For Sahin (2007), the strongest predictor of student satisfaction was personal relevance (linkage of course content with personal experience), followed by instructor support, active learning and, lastly, authentic learning (real-life problem-solving).

Kleinman (2005) looked at improving instructional design to maximize active learning and interaction in online courses. Over a period of ten years, Kleinman studied online communities of learning, concluding that an online environment which fosters active, engaged learning and which provides the interactive support necessary to help students understand what is expected, leads to a satisfied learning community. Swan (2001), too, found that interactivity was essential to designing online courses that positively affect student satisfaction. Wang (2003) argued that to truly measure student satisfaction researchers must first assess the effectiveness of online education.

Online education represents a major shift in how people learn and in turn, how learners are taught. The argument is made that, therefore, there is an increasing need to understand what contributes to student satisfaction with online learning (Sinclaire, 2011). Student satisfaction is one of several variables influencing the success of online learning programs, along with the institutional factors that Abel (2005) listed in his article on best practices (leadership, faculty commitment, student support, and technology). Sener and Humbert (2003) maintained that satisfaction is a vital element in creating a successful online program.

There have been a number of studies of student satisfaction with e-learning (Swan, 2001; Shelley, Swartz, & Cole, 2008, 2007), fully online as well as with blended learning models (Lim, Morris, & Kupritz, 2007). There have also been a number of studies by Arbaugh and associates on the predictors of student satisfaction with online learning (Arbaugh, 2000; Arbaugh, & Benbunan-Fich, 2006; Arbaugh, et al., 2009; Arbaugh, & Rau, 2007). Results from this study both support and expand on earlier work.

Discussion about the role that MOOCs are destined to play in higher education (Deneen, 2013; Shirky, 2013) serves to heighten educators' interest in providing quality online courses that maximize student satisfaction. The controversy over granting credit for MOOC courses (Huckabee, 2013; Jacobs, 2013; Kolowich, 2013a; Kolowich, 2013b; Kolowich, 2013c; Lewin, 2013; Pappano, 2012) reinforces the relevance of student satisfaction to successful online education.

This study reports on research into student satisfaction with online education conducted over three years. The research has focused largely on business students at one university in Southwestern Pennsylvania. The emphasis on student satisfaction with e-learning and online instruction is increasingly relevant for curriculum development which in turn is relevant for student retention. Understanding what makes online instruction and e-learning satisfactory helps to inform instructional design.

This study is an extension of previous research on student satisfaction with online education (Cole, Shelley, & Swartz, 2013, Swartz, Cole, & Shelley, 2010, Shelley, Swartz, & Cole, 2008, 2007). Researchers used a multi-item survey instrument to assess how well student expectations were met in selected online courses. Graduate and undergraduate students were asked first whether they were satisfied with their experience with e-learning. Following that, they were asked to explain what made the experience satisfactory or unsatisfactory. Student satisfaction is defined as "the learner's perceived value of their educational experiences in an educational setting" (Bollinger & Erichsen, 2013, p. 5).

Research Questions

This study focused on two survey questions:

1. Please rate your level of satisfaction with the online and/or partially online courses you have taken.

2. What made your experience with the online course/s satisfactory or unsatisfactory?

Both survey questions were broken into two separate questions for purposes of analysis, resulting in four research questions:

1. How satisfied were students with their fully online courses?

2. How satisfied were students with their partially online courses?

3. What factors contributed to students' satisfaction with e-learning?

4. What factors contributed to students' dissatisfaction with e-learning?

This paper presents the results of that analysis.

Method

Researchers used a Web-based survey created in Vovici, an online survey software program. Following a pilot study in spring, 2010, surveys were sent to students in graduate and undergraduate business courses over a period of three years. Researchers used a mixed-method analysis to evaluate responses to the selected questions. Descriptive statistics were used to summarize demographic data and survey responses. Results were transferred from Vovici to, and combined in, SPSS to analyze the first two research questions. Independent samples t-tests were conducted on the scaled items. Keyword analysis was used for the third and fourth research questions. The survey was anonymous.

Students in each of the business classes were offered extra credit for taking the survey. Credit was given based on notification to the instructor by the student. The same instructor taught each of the 19 courses in the second and third study samples as well as the business courses included in the initial study.

The initial survey instrument was approved by the University's Institutional Review Board in 2010. Subsequent modifications to the survey were minor and did not require separate approvals in 2011/2012 or 2012/2013. The same script was used seeking participation in each of the surveys. Participation was solicited via an e-mail from the instructor. Each e-mail included the link to the Web-based survey developed in Vovici.

Data from the completed surveys were transferred from Vovici into SPSS. Independent samples t-tests were conducted on the questions asking students to rate their level of satisfaction with online learning. Responses from males and females, "Generation X" and "Generation Y," and from graduate and undergraduate students were compared to determine if there were any statistically significant differences in the level of satisfaction with online and partially online courses. Responses to the question asking what contributed to the respondents' satisfaction or dissatisfaction with online learning were tabulated in Vovici. To analyze these responses, researchers grouped keywords under themes to form categories. The categories were: convenience, interaction, structure, learning style, and platform. "Interaction" included "communication." "Structure" included "clarity" and "instructor's role." "Other" was included to capture responses that did not fall into any of the stated categories.

Sample and Participant Selection

The sample from the pilot study in spring, 2010 included graduate students from the MS in Instructional Technology and the MS in Nonprofit Management programs, undergraduate business majors, and Masters of Business Administration (MBA) students. No changes to the survey design were indicated as a result of the pilot study. The second study was conducted over three terms, summer, 2010, fall, 2010, and spring, 2011. This sample was composed of undergraduate students enrolled in Legal Environment of Business (BLAW 1050), taught in the fall 2010 term, and graduate students enrolled in Legal Issues of Executive Management (MBAD 6063), which was taught in the summer 2010 and spring 2011 terms. The third study was conducted over four terms, fall, 2011, spring, 2012, fall, 2012, and spring, 2013. This sample was composed of undergraduates in BLAW 1050 taught in the fall 2011, fall 2012, and spring 2013 terms and graduate students in MBAD 6063, taught in the spring 2012 and spring 2013 terms. Both the graduate and undergraduate business courses chosen for the study were taught by the same instructor.

Thirty-three students participated in the spring 2010 survey, a response rate of 58%. One hundred and sixty-four students participated in the second study, a response rate of 92%. Three hundred and fifty-six students participated in the third study, a response rate of 97%. Combined, the total number of participants was 553 of 603 enrolled students, for a response rate of 92%.

Twelve males and 21 females participated in the first survey. One hundred and three males and 61 females responded to the survey in the second study group. Two hundred and seventeen males and 135 females responded to the survey in the third study group for a total of 332 males (60.5%) and 217 females (39.5%) who participated in the surveys. Not all participants in the third sample responded to the question on gender.

Participants were asked to identify themselves as belonging to one of the following age groups:

- Traditional Workers (born before 1946)
- Baby Boomers (born between 1946 and 1960),
- Generation X (born between 1961 and 1979) and,
- Generation Y (born after 1979) (Recursos Humanos, 2010).

Eight participants identified themselves as belonging to the Baby Boomer or the Traditional Worker categories. Nine people checked “Other.” Three participants did not respond to the question on age. The remaining respondents self-identified as belonging to “Generation X” or “Generation Y.” Due to the limited sample sizes for “Baby Boomers” and “Traditional Workers,” only responses from participants in the Generation X and Generation Y categories were compared for this study.

In the first survey, 22 respondents self-identified as members of “Generation Y.” Eleven respondents classified themselves as members of “Generation X.” In the second study group, 136 respondents self-identified as “Generation Y.” Twenty-two respondents self-identified as “Generation X.” In the third study group, 303 respondents self-identified as “Generation Y.” Thirty-nine respondents self-identified as “Generation X.” The total number of respondents who self-identified as belonging to “Generation Y” was 461. Seventy-two respondents self-identified as “Generation X.” The total number of respondents belonging to either “Generation X” or “Generation Y” was 533.

Two hundred and sixty graduate students participated in the surveys. Two hundred and eighty-one undergraduate students participated, for a total of 541. Some respondents did not identify themselves clearly as being either graduate or undergraduate students. Table 1 presents the respondents' demographic information.

Table 1

*Respondent Sample Demographics**

Study	N/Response %	Male	Female	Gen X	Gen Y	Grad	UG
I	33 – 58%	12	21	11	22	33	0
II	164 -92%	103	61	22	136	89	73
III	365-97%	217	135	39	303	138	208
Total	553-92%	332	217	72	461	260	281

* Not all respondents answered each question on gender, age, or level of study

Procedure

Responses to the two questions on student satisfaction from three surveys, Designing Online Courses, Students' Perceptions of Academic Integrity and Enhancing Online Learning with Technology, provided the data for the analysis. Although survey instruments used in the second and third studies were modified slightly to gather data for the studies on academic integrity and use of technology, each survey asked:

1. Please rate your level of satisfaction with the online and/or partially online courses you have taken.
2. What made your experience with the online course/s satisfactory or unsatisfactory?

Researchers used a 5 point Likert scale for the first survey question, asking students to rate their level of satisfaction with fully online and/or partially online courses. Zero was equal to "very satisfied;" four was equal to "very dissatisfied." The second survey question was designed as a follow-up query, asking what contributed to the student's satisfaction or dissatisfaction with online learning.

To help inform the analysis of responses to the research questions, researchers asked students how many online or partially online courses they had taken. To enable comparisons by gender, age group, and level of study, demographic questions were included in each of the surveys.

Designing Online Courses was administered in the spring 2010 term. The survey was composed of 12 questions. Students' Perceptions of Academic Integrity was conducted in the summer 2010, fall 2010, and spring 2011 terms. This survey was composed of 13 questions. The third survey, Enhancing Online Learning with Technology, was composed of 12 questions. This survey was administered in the fall 2011, spring 2012, fall 2012, and spring 2013 terms.

Results

The first survey question sought to capture respondents' level of experience with e-learning. In the first two studies, students were asked if they had taken or were taking one or more fully online graduate courses, partially online graduate courses, fully online undergraduate courses, and/or partially online undergraduate courses. Responses from both studies were combined for analysis. There were 198 student responses. Since the response categories were not mutually exclusive, a student could select more than one response. Some students had taken both graduate and undergraduate-level fully online and/or partially online courses. As a result, the total number of responses to the question (255) exceeds the number of respondents (198). Table 2 presents the results.

Table 2

Level of Experience with E-Learning – Studies I & II

Response	Count N=255	% Student responses N=198
As a graduate student in fully online courses	65	32.8
As an under graduate student in fully online courses	28	14.1
As a graduate student in partially online courses	73	36.8
As an undergraduate student in partially online courses	50	25.2
As a student taking courses outside of a degree program	5	2.5
None	24	12.1
Other	10	5.0

Elaboration on "other" included four instances of some experience with online courses that did not fit the categories in the question, and two references to having had online assignments. Four were unresponsive to the question.

The question asking for the respondent's level of experience with online or partially online was phrased differently in the third study. In the final surveys (from fall, 2011, spring, 2012, fall, 2012, and spring, 2013), researchers asked how many fully or partially online courses the student had taken. There were 391 responses. Students could choose only one response. Table 3 illustrates the results.

Table 3

Level of Experience with E-Learning – Study III

Responses	Count N= 391	%of Responses
1 course	89	22.7
2-4 courses	154	39.3
5-10 courses	56	14.3
More than 10 courses	20	5.1
None	35	8.9
Oher	37	9.4

RQ1 How satisfied were students with their fully online courses?

In a two part survey question, students were asked to rate their level of satisfaction with fully online courses taken and with partially online courses taken. Students could respond to either part of the question or to both. To the first part, level of satisfaction with fully online courses, there were 472 responses, 85% of the total 553 participants. A 5 point Likert scale was used to measure responses ranging from 0 (*very satisfied*) to 4 (*very dissatisfied*). One hundred and six students or 22.5% of the total responding said that they were “very satisfied.” One hundred and seventy-one (36.2%) said that they were “satisfied.” One hundred and twenty-six (26.7%) were “neutral.” Fifty–one (10.8%) said that they were “dissatisfied.” Eighteen (3.8%) respondents were “very dissatisfied” with their experience with fully online courses.

Independent samples t-tests were conducted on this question to determine if there were any significant differences in the levels of satisfaction based on gender, age, or level of study with regard to satisfaction with fully online learning. There were no statistically significant differences between males and females, between members of “Generation X” and “Generation Y,” or between graduate and undergraduate students on the question. Females, members of Generation X, and upper-level undergraduate students were more likely than males, members of Generation Y, and graduate students to rate their experiences with fully online courses as satisfactory. The mean score for females was 1.31; the mean score for males was 1.41. The mean score for members of Generation X was 1.24; the mean score for members of Generation Y was 1.40. The mean score for upper-level undergraduate students was 1.19; the mean score for graduate students was 1.23. Table 4 presents the results.

Table 4

Student Satisfaction with Fully Online Courses

Variable	*n*	*M*	t	Sig.(2-tailed)
Female	177	1.31	-1.052	.293
Male	294	1.41		
Generation X	63	1.24	-.989	.326
Generation Y	396	1.40		
Undergraduates	26	1.19	-.146	.884
Grad. Students	105	1.23		

RQ2 How satisfied were students with their partially online courses?

There were 420 responses, 76% of the total 553 participants, to the second part of the question asking students to rate their level of satisfaction with partially online courses. The same 5 point Likert scale was used to measure both parts. Ninety-nine students or 23.6% of the total responding said that they were “very satisfied.” One hundred and thirty-six (32.4%) said that they were “satisfied.” One hundred and thirty-seven (32.6%) were “neutral.” Forty-three (10.2%) said that they were “dissatisfied.” Five students (1.2%) said that they were “very dissatisfied” with their experience with partially online courses.

Independent samples t-tests were conducted on this question to determine if there were any significant differences in the levels of satisfaction based on gender, age, or level of study with regard to satisfaction with partially online learning. As with the first research question, there were no statistically significant differences between males and females, between members of “Generation X” and “Generation Y,” or between graduate and undergraduate students with regard to satisfaction with partially online courses. However, unlike satisfaction with fully online courses taken, males were somewhat more satisfied than females, and graduate students were more satisfied than upper-level undergraduates with partially online courses taken. The mean score for males was 1.32; for females, the mean was 1.34. The mean for graduate students was 1.11; for upper-level undergraduates, the mean was 1.35. As was the case with fully online courses, older students, members of Generation X, were more satisfied with their partially online courses than were members of Generation Y. The mean score for “Generation X” was 1.09; for “Generation Y,” the mean was 1.37. Table 5 presents the results.

Table 5

Student Satisfaction with Partially Online Courses

Variable	*n*	*M*	t	Sig.(2-tailed)
Female	163	1.34	.262	.794
Male	255	1.32		
Generation X	53	1.09	-1.933	.054
Generation Y	355	1.37		
Undergraduates	26	1.35	-.146	-1.010
Grad. Students	93	1.11		

When samples were combined, students rated their level of satisfaction with partially online courses higher than they did with fully online courses they had taken. Because students could rate both types of e-learning, the variables were treated as continuous as opposed to categorical variables. The mean score for level of satisfaction with partially online courses was 1.33; for fully online courses, the mean was 1.37 on a 5 point Likert scale ranging from 0 (*very satisfied*) to 4 (*very dissatisfied*).

RQ3 What factors contributed to students' satisfaction with e-learning?

RQ4 What factors contributed to students' dissatisfaction with e-learning?

The third and fourth research questions were posed in a single open-ended survey question, "What made your experience with the online course/s satisfactory or unsatisfactory?" The survey question did not distinguish partially online courses from fully online courses.

Ninety-one percent of the survey participants (504 of 553) chose to respond to the question asking what factors contributed to their satisfaction or dissatisfaction with online learning. Responses to the question from each of the three surveys were combined for analysis. Keywords were identified and grouped by theme to form five categories: interaction (including communication), convenience, structure (including clarity and instructor's facility with online instruction), learning style, and platform. "Other" was included to capture comments not easily grouped under one of the above.

Five hundred and sixty-six responses were included in the analysis. Of these, 280 (49.5%) comments expressed reasons for the respondents' satisfaction with their online experience. Two hundred and eighty-six (50.5%) comments expressed reasons for the respondents' dissatisfaction with online learning. One answer could include both satisfaction and dissatisfaction responses. These were tabulated separately. Students who participated in the first two studies, graduate and undergraduate business students and masters students in instructional technology and nonprofit management, expressed more dissatisfaction than satisfaction with their online courses than did participants in the third study who were graduate and undergraduate business students. In the first study, 30.9% of the respondents expressed reasons for satisfaction with their experience; 69% expressed reasons for dissatisfaction. In the second study, 43.9% expressed reasons for satisfaction; 56% expressed reasons for dissatisfaction. In the third study, 54% expressed reasons for satisfaction while 46% expressed reasons for dissatisfaction.

Why were students satisfied with their online courses? Convenience ranked highest, followed by online course structure and learning style. For those who were dissatisfied, the most common reason given was lack of interaction, with the instructor as well as with other students. Those who were dissatisfied also listed online course structure and learning style. The online learning platform did figure in the reasons for satisfaction or dissatisfaction, but to a lesser degree.

Convenience was the greatest factor influencing students' satisfaction with online course, representing 40% of the total 280 comments expressing satisfaction. Course structure, including clarity, represented 36.4% of the comments. The instructor's facility with online instruction accounted for another 3.6%. Positive interaction and communication, primarily with the instructor represented 8.2%. Compatibility with the student's learning style represented 6.4% and satisfaction with the platform (Blackboard) accounted for 1.4% of the comments. The remaining remarks were classified as "Other," representing 3.9%. "Other" included satisfaction with course content and with available resources. "Other" also included responses indicating equal satisfaction with onground courses.

Lack of interaction, including lack of communication with the instructor and classmates, was the main source of dissatisfaction with online courses, accounting for 33.2% of the total 286 comments expressing dissatisfaction. Dissatisfaction with the online course structure, including clarity, represented 27.6% of the comments. Dissatisfaction with the instructor's facility with online instruction accounted for another 8%. Incompatibility with the student's learning style represented almost 14% of the total reasons for students' dissatisfaction. Dissatisfaction with the platform (Blackboard) accounted for 6.3% of the comments. The remaining remarks were classified as "Other," representing 9.8%. "Other" included dissatisfaction with course content, with the online fees, the work load and with technical support. Table 6 illustrates the results.

Table 6

Factors Influencing Satisfaction/Dissatisfaction with Online Learning

Factor	S N=280	%	D N=286	%
Convenience	112	40.0	3	1.0
Interaction	9	3.2	58	20.3
Communication	14	5.0	37	12.9
Structure	98	35.0	73	25.5
Clarity	4	1.4	6	2.1
Instructor	10	3.6	23	8.0
Learning Style	18	6.4	40	13.9
Platform	4	1.4	18	6.3
Other	11	3.9	28	9.8

Discussion

In several areas, results were consistent with other studies (Sher, 2009; Kuo, Walker, Belland, & Schroder, 2013). Student-instructor interaction and learner-content interaction were among the predictors of student satisfaction that Kuo, Walker, Belland and Schroder identified in their study of student satisfaction with online programs. In this study, student-instructor interaction and learner-content interaction were also important. But there were some differences of degree with regard to issues of instructor's communication and interaction with students. Jackson, Jones, and Rodriguez (2010) found that timeliness in responding to students, accessibility, clearly stated expectations, and instructor enthusiasm played a significant role in student satisfaction. In this study, issues of timeliness and instructor's accessibility were also raised but to a lesser extent than clarity and instructor's ability to effectively use technology in online courses.

As noted earlier, satisfaction with online learning as expressed in the open-ended question, "What made your experience with the online course/s satisfactory or unsatisfactory?" was stronger in the third sample than in the first two. Although the initial sample included non-business students, the second and third samples were composed of business students taught by the same instructor. Possibly, the positive change in the level of satisfaction could be attributed to the students' and/or the instructor's greater experience with online course delivery.

Based on responses to the open-ended question in this study, one might conclude that if going to class or taking courses onground were as convenient as taking courses online, the majority of students would choose that mode of learning. Interestingly, in a comparison of students in traditional, classroom environments and students in online courses, Callaway (2012) found that students in the classroom setting were satisfied with both quality and convenience of the traditional instruction, while students in the online learning environment were satisfied with the quality of the courses, but not with the convenience of the online instruction.

In this study, it was clear that students felt the lack of interaction with the instructor and with their classmates in the online environment. Onground instruction affords the student the opportunity to have questions answered and for the instructor to elaborate on points to be made at the time the student is experiencing difficulty. Interaction with other students contributes to the sense that there is a community of learning and provides additional support for the student to expand his or her understanding of the material. The following comments from the three studies are illustrative.

Study I

1. "It is difficult to engage the student in online courses. I think interacting with other students and the professor is crucial to developing persepective [sic] about the subject material as well as real world applications."

3. " ... I have gained so much from face-to-face interactions with professors and fellow students. There is so much learning from observing how a professor does various things and from getting to know classmates and learning from what they have to share. While I absolutely love online courses due to the convenience ..., I do not think any student's sole method of taking courses should be online... I would have to say the mix of online and on-ground found in the hybrid class is perfect for me."

Study II

17. "I like the partially online format because it provides students with the opportunity to put a face to a name with their professor and ask questions..."

27. "With a heavy schedule at times, I enjoyed the convenience of the online class. I would have liked to have engaged in face to face conversation about certain topics throughout the course."

Study III

6. "I do not like how you can't directly ask a teacher something. However, it is great that you have your own time to get projects done throughout an online course. Overall I was satisfied with my online course and would do it again when I have the chance."

312. "I feel it can be good and bad. I think that it can be helpful for people that have busy hectic schedules that can't be at class at the same time every week. But, it is hard, for me atleast [sic] to learn when you are not sitting face-to-face with the professor."

Although not the focus of this study, comments from students did reinforce the notion that an answer to convenience and interaction could be hybrid or partially online courses. Bollinger and Erichsen (2013) explored the comparison of hybrid with fully online courses in their study of student satisfaction, finding differences based on learning style. While the reliance on “learning styles” as a basis for more effective instructional design, does have its critics (see, Pashler, McDaniel, Rohrer, & Bjork, 2008), others have found it to be helpful in understanding what contributes to student satisfaction. Learning style also figured in this study as one of the five most cited factors affecting student satisfaction or dissatisfaction with their online and partially online learning experience. Yet in a comparison of online and traditional management information systems courses, Sinclaire (2012) found no relationship between learning style and satisfaction for students in the online courses. She did find a relationship between learning style and satisfaction in the traditional courses.

Also evaluating the two formats, hybrid and fully online, Estelami (2012) found student satisfaction in both to be affected by course content, student-instructor communication, the instructor’s role in the course and the use of effective learning tools. In this study, results supported Estelami’s findings more closely with regard to course content and instructor-student interaction. Comments on the instructor’s facility with technology might be grouped in Estelami’s third and fourth constructs, instructor’s role in the course and use of effective learning tools.

Pinto and Anderson (2013) found that the more the student felt a part of the class, and the more interaction there was between students, the more satisfied the student reported to be with the hybrid format. As in this study, communication was important to the student’s reporting satisfaction with e-learning.

As retention is key to the success of online programs in higher education, the relationship between students’ satisfaction with their e-learning experiences and student retention is clear (Lorenzo, 2012). It is this role that makes ongoing studies of satisfaction with online education important.

Limitations

Notwithstanding the broad time span of the studies, the sample was small. As noted earlier, the authors’ studies of student satisfaction in the online learning environment to date have focused largely on undergraduate and graduate level business students at one private nonprofit university in Southwestern Pennsylvania. While growing, the university’s experience with online instruction is relatively recent. The first fully online courses were initiated in 1999. Since that time, the university has added more than 250 online and partially online courses. Current offerings include eight undergraduate and twelve graduate degree programs online, and ten online certificate programs.

With regard to the strong response rate for each of the surveys, that could be attributed in part to having offered "extra credit" for taking the survey. The "extra credit" incentive applied to the graduate and undergraduate business courses.

It needs to be noted as well that people are more likely to take the time to articulate dissatisfaction than they are to voice satisfaction. That tendency may be reflected in the responses to the open-ended question and may explain why the overall mean scores on the Likert scale indicated moderate satisfaction with both fully online and partially online courses.

Conclusion

Many institutions and their faculties are immersed in the debate over "how much is too much" online course delivery. Why? Is it because online education appears to have acquired an unstoppable momentum? MOOCs may be a case in point (Allen & Seaman, 2013). Or, perhaps is it that as universities here and abroad are searching for ways to open access to the millions who cannot physically attend college, the affordability and ease of working in the online environment seems to provide a promising solution? In spite of skepticism that online learning has proven to be effective and at the same time, saves money (Bowen, 2013), online education appears to be here to stay.

To date, there have been numerous studies of student satisfaction and student learning. There appears to be consensus that both online and onground instruction is effective (Wagner, Garippo, & Lovaas, 2011). There may be instances where the students' ability to understand course material is improved in a setting that provides immediate in-person contact with the instructor. But there also may be instances where the student is more comfortable participating in an online course. The argument is that both modes are effective given the right fit between student and course. As Wyatt (2005) noted in his comparison of students' perceptions of online and traditional classroom learning, some students thrive in the online environment while others languish.

Discussing the disconnect between convenience and quality in the traditional versus the online environment, Callaway (2012) concluded the discovering with "the right mix" of traditional instruction and online delivery could address the disparity. With regard to satisfaction with e-learning, one might argue that "the right mix" would include the elements inherent in a hybrid model. As researchers found in this study, positive interaction, with the instructor and with fellow students seems to go hand-in-hand with student satisfaction. Hybrid instruction is one way to foster interaction while providing the element of convenience and the ability to learn at one's own pace. Additional research, such as Pinto and Anderson's (2013) study of student expectations and satisfaction with hybrid learning, would further this discussion.

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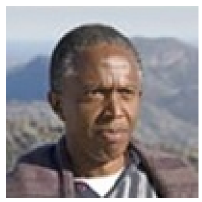
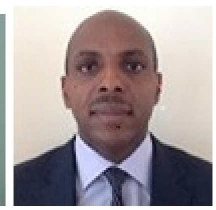
Students'Perceived Challenges in an Online Collaborative Learning Environment: A Case of Higher Learning Institutions in Nairobi, Kenya

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Abstract

Earlier forms of distance education were characterized by minimal social interaction like correspondence, television, video and radio. However, the World Wide Web (WWW) and online learning introduced the opportunity for much more social interaction, particularly among learners, and this has been further made possible through social media in Web 2.0. The increased availability of collaborative tools in Web 2.0 has made it possible to have online collaborative learning realized in Higher Learning Institutions (HLIs). However, learners can perceive the online collaborative learning process as challenging and they fail to utilize these collaborative tools effectively. Although a number of challenges have been mentioned in the literature, considerable diversity exists among countries due to diversity in infrastructure support for e-learning and learners' background. This motivated this study to investigate components of online collaborative learning perceived as challenging by learners in HLIs in Kenya. Using a questionnaire, a survey was conducted in two public universities and two private universities to identify students' perceived challenges in an online collaborative learning environment. Through purposive sampling the questionnaire was distributed to 210 students using e-mail and 183 students responded. Based on descriptive analysis the following five major challenges were rated as high: lack of feedback from instructors, lack of feedback from peers, lack of time to participate, slow internet connectivity, and low or no participation of other group members. There was also a relationship between the university type (private or public) with the perceived challenges which included: lack of feedback from the instructor ($\boldsymbol{p}$=0.046) and work load not shared equally among group members ($\boldsymbol{p}$=0.000). Apart from slow internet connectivity the rest of the challenges were in line with the observed challenges in the literature.These key challenges identified in this study should provide insight to educators on the areas of collaborative learning that should be improved in order to provide access to quality education that supports effective online collaborative learning in HLIs in Kenya.

Keywords: Social interaction; Web 2.0; online collaborative learning; perceived challenges; collaborative tools; HLIs in Kenya

Introduction

With the increased demand of higher education in Kenya, e-learning in Kenya has gained popularity. To meet the growing demand most of the Kenyan universities have set up an e-learning portal to tap the many students who do not have time to attend physical classes but have time to study online. For example to address the increased demand for e-learning programs in Kenya, recently Kenyatta University (KU) launched a digital school. According to KU website, the digital school offers over 100 courses through blended learning. The students taking these courses can access notes and assignments on the e-learning portal and later they attend four hour face-to-face tutorials for every course before they sit for the final exam. Consequently, other universities in Kenya have followed the same suite and now have e-learning portals for blended learning.

With the recent installation of fiber optic cables in Kenya, the cost for internet has dropped. For example in Nairobi, one can access fiber optic speed of about 100mbps at US $12 per month. According to Karshoda and Waema (2014), about 52% of the students in Kenyan universities own smartphones and 53% own laptops. This shows increased ownership, which coupled with decreased internet access cost means that universities have a good opportunity to offer distance education as well as blended e-learning through technology enhanced pedagogies. This recent e-readiness survey which was carried out in 17 Kenyan universities indicated that student population doubled within a period of five years, as shown in Table 1. Therefore, universities should increase their internet bandwidth expenditures from the current 0.5% to 1.5 % of their total annual expenditure by the year 2016 (Karshoda et al., 2014). This was good recommendation in terms of network access, however for distance learners to benefit from this bandwidth e-pedagogy challenges must also be addressed with concrete data within the Kenyan context. This research comes at a time when Kenyan universities are now aware of their e-readiness status in terms of: network access, networked campus, networked learning, networked society, and institutional ICT strategy as defined by Karshoda et al. (2014), and the same time they are being faced with the increased demand in higher education. Therefore, technology enhanced teaching and learning approaches is no longer an option but a requirement to meet this increased demand. Consequently, the government of Kenya has recommended the establishment of

National Open University of Kenya by December 2014, in an effort to expand enrolment through distance and e-learning. With all this information at hand, there is need to explore other elements in e-learning like collaborative learning which has pedagogical advantages such as development of critical thinking skills, co-creation of knowledge and meaning, reflection and transformative learning (Palloff & Pratt, 2005).

Table 1

Demographic Data and Internet Availability for 17 Universities in Kenya From 2008-2013

Year of survey	Total students	Total PCs owned by students	Total bandwidth (Mb/s)	Bandwidth per 1,000 students	PCs per 100 students	% of students with PC access at home
2008	162,319	8,907	70.8	0.436	5.5	27
2013	339,418	13,815	1,431.5	4.22	4.07	30.4

Source: KENET e-readiness data in 2008 and 2013

Some universities in Kenya have embraced the use of technology in teaching and they have established institutes like Open, Distance and e-Learning (ODeL) which co-ordinate distance learning programmes, develop e-content and build capacity in e-learning through training staff on e-learning pedagogies and establishing centers which have computer labs where distance learners can access learning materials and the same time they can do collaborative learning online. The government of Kenya has also established policies to guide ODeL in HLIs which recommends the establishment of an open university as contained in Sessional Paper No. 1 of 2005 (Republic of Kenya, 2005). This is further indication of the government initiative to support ODeL programs to meet the increased educational demand in HLIs in Kenya. Despite this support, previous research in two Kenyan universities (University of Nairobi [UoN] and KU) has identified some key challenges in delivery of ODeL like lack of e-learning resources, higher level of students' dissatisfaction (90.8%) and lecturers' dissatisfaction (85.6%) with the programme organization and delivery (Nyerere, Gravenir & Mse, 2012). Given these two universities are pioneers in ODeL, these challenges could also be hindering effective implementation of ODeL programs in other HLIs in Kenya. However, this research did not address the use of collaborative tools in e-learning platforms and the related challenges which should go in line with the effective implementation of ODeL programs to realize the full potential of e-learning.

Although there are many e-learning platforms in Kenya the most popular ones are Moodle and Blackboard which do provide both synchronous and asynchronous collaborative tools. Using these e-learning platforms, learners are able to follow lectures online, interact with lecturers, start online discussions through various collaborative tools, submit assignments and check on their academic progress online. Despite the potential benefits of collaborative learning, like development of critical thinking skills, co-creation of knowledge and meaning, reflection and transformative learning, these collaborative tools are yet to be put into full utilization as according to Nyerere et al. (2012), most of the instructors use the e-learning platforms to communicate to their students, for instance posting course notes or sending them assignments. However some private universities in Kenya such as Strathmore University and Australian University Study Institute (AUSI) have adopted the use of e-learning in more than 80% of their courses through the Moodle platform while public universities such as KU has only managed to offer about 25% of their courses through the Moodle platform. This information is found on the universities' websites. This information shows that private universities have been utilizing e-learning platforms more than public universities. Therefore there is need to consider both public and private universities when investigating the key challenges associated with online collaborative learning in order to get concrete data which can be useful in both cases.

Previously, research has been carried out to investigate the learners' satisfaction (Singh, 2005), perceived usefulness and challenges (Song, Singleton, Hill & Koh, 2004; Kim, Liu & Bonk, 2005), and factors leading to unsuccessful group collaboration (Roberts & McInnerney, 2007; Liu, Joy, & Griffiths, 2010) in a collaborative online learning environment. However, results have shown that perceived challenges are likely to vary depending on type of e-learning technology used, infrastructure availability (internet and computers) and the use of different learner activity management systems (LAMSs) in HLIs. Furthermore, in Kenya no empirical evidence has been gathered to establish the perceived challenges in an online collaborative learning environment. The purpose of this study is to investigate students' satisfaction and perceived challenges in an online collaborative learning environment with specific attention to those LAMSs being utilized by HLIs in Kenya and more specifically in Nairobi, where e-learning infrastructure is more established in terms of network access due to fiber optic network and education demand being higher as compared with other regions in Kenya.

This study was conducted to investigate the components of online collaborative learning which learners perceive as challenging, hence hindering the effective collaboration process in their online group activities. These three primary questions guided this research design:

1. To what extent do students collaborate online while doing group work in HLIs in Kenya?
2. What are the components of online collaborative learning which learners perceive as challenging in HLIs in Kenya?

3. Is there any significance relationship between university type (public or private) and the perceived challenges in using an online collaborative learning environment?

Literature Review

Like any other educational idea collaborative learning is an overloaded term with different meanings being given by different scholars. In our research study we adopt Dillenbourg's (1999) definition where collaborative learning is defined as a situation in which two or more people learn or attempt to learn something together. The situation is termed *collaborative* if peers are more or less at the same level, can perform the same actions, have a common goal and work together. In the pedagogy of teaching, teachers are encouraged to assign group work that gives students the freedom to learn from one another. The idea of group work in learning finds its root in work from the Russian psychologist Vygotsky (1978) who explored the causal relationships that exists between social interaction and individual learning providing a foundation of the social constructivist theory of learning.

Constructivist psychologists advocate the use of collaborative tools such as discussion forums in e-learning as they support the argument that cognitive development is a result of social interaction (Vygotsky, 1978; Siemens, 2005). Other researchers have also explored how constructivism and connectivism learning theories can be adequately used in education technology for the digital age (Mattar, 2010). A commonly used collaborative learning technique is the use of group work to learn a task and researchers have demonstrated that learning is more effective if peers collaborate and share ideas when solving a task as a group rather than as individuals (Johnson and Johnson, 1989). They also demonstrated that construction and synthesis of knowledge through group work outperforms individual learning (Brindley, Blaschke & Walti, 2009; Moller, 1998). In their book, Harasim, Hiltz, Teles, and Turoff (1995) have fully demonstrated the potential of collaborative learning in distance education through learning networks which are used to create learning communities at a distance in which learners construct knowledge through active participation with peers and from experts wherever they are located. Learning in groups in an online context gives the students the opportunity to express their own ideas, negotiate meaning, and develop key professional skills like listening, presenting ideas, persuasion, self-direction, self-monitoring and team working (Jaques & Salmon, 2007).

This constructivism theory of learning has been adopted in HLIs in Kenya where students are engaged in discussions by tutorial fellows. These tutorials give the learners a chance to collaborate face to face, critique one another, share knowledge and compare new concepts with one another. Similarly, by introducing e-discussion forums in an online learning environment it is possible to have social affective and cognitive benefits realized in face-to-face tutorials. Effective strategies must be laid down to ensure students are not passive but they actively enter into the online classroom and post their thoughts and ideas to the online discussion (Palloff & Pratt, 2007). Moreover, constructivism theory of learning can be supported in ODeL through a variety of technologies which support constructive learning like computer-mediated communication, computer supported collaborative work, case-based learning environments and computer-based cognitive tools (Jonassen, Davidson, Collins, Campbell & Hagg, 1995). However, social interaction experienced in an online learning environment lacks the aspect of face-to-face interaction experienced in a classroom environment and there do exist notable differences like communication limitations due to lack of interaction support tools in real time, and absence of *challenge and explain* cycles of interaction that characterize face-to-face tutorials (Curtis & Lawson, 2001). This gives online learning a major disadvantage even though its demand continues to rise. Consequently online collaborative learning becomes more challenging than face to face prompting the need to carry out more empirical research to identify the key challenges and provide mechanisms to address them in order to realize the same benefits as in face to face collaborative learning.

The Kim et al. (2005) study on an MBA online course reveals that even when students had positive attitudes towards online learning because of its benefits (flexibility, more learning experience through social interaction and enhancement of virtual teaming skills) they are faced with some challenges such as difficulty in communication with peers, lack of sense of community and absence of real-time feedback. Existence of these challenges is an indication that learners in this course could not realize the benefits of collaborative learning. In their study, Roberts and McInnerney (2007) identified seven common problems in an online learning environment: student antipathy towards group work, selection of the groups, lack of essential group-work skills, free-rider, possible inequalities of students' abilities, withdrawal of group members and assessment of individuals within the groups. Zorko (2009) investigated factors which inhibit collaboration in wikis and the study provided recommendations on how to increase collaborative behaviors in the wiki in problem based English language learning. Studies have also shown that online learners get frustrated with collaborative learning due to commitment imbalance on the task and lack of common learning goals among students hence requiring the instructor to equip online learners with social and group skills necessary for effective collaboration (Capdeferro & Romero, 2012). Table 2 summarizes some of these perceived challenges within three categories: poor motivation, lack of individual accountability and negative interdependence (Liu et al., 2010). This summary review provides the background for conceptual elements which needed to be examined as challenging from students' perspectives.

Table 2

Perceived Challenges in Online Collaborative Learning Environment

Category	Description	Source
Poor Motivation	• Posting irrelevant posts to the learning scenario • Misunderstanding the topic • Posts containing grammatical/spelling errors • Difficulty in communication with peers • Absence of real-time feedback • Disagreement among members • Withdrawal of group members • Assignments of students to group membership • Student antipathy towards group work • Lack of common learning goals among students	(Liu et al., 2010; Hassanien, 2007; Black, 2005; Capdeferro et al., 2012)
Lack of Individual Accountability	• Not contributing much • Lack of time • Too lazy to work and not meeting deadline • Free-rider • Lack of individuals assessment within the groups	(Kim et al. 2005; Liu et al., 2010; Singh, 2005)
Negative Interdependence	• Lack of essential group-work skills • Lack of sense of community • Possible inequalities of students' abilities • Single student dominating the group scenario • Unwillingness to criticize • Little feedback on each other's work • Commitment imbalance on the task • Poor group management	(Liu et al., 2010; Roberts et al., 2007; Capdeferro et al., 2012; Zorko, 2009)

Although most of these challenges are common across the studies, there could be diversity in some cases due to infrastructure availability (like network access, computer-mediated communication tools and instructor support) and student background in different HLIs. To bridge this diversity gap there is need to carry out more surveys on the perceived challenges in those countries where these studies are yet to be done. Therefore, there is a need to empirically investigate the students' perceived challenges in an online collaborative learning environment in HLIs in Kenya. This will provide further insights to online instructors in HLIs in Kenya who would like to include constructivist pedagogy in e-learning on the status in the use of computer-mediated communication tools for collaborative learning and the same time inform them of the existing challenges. This also provides an opportunity to researchers to find relevant solutions to these challenges when paying particular attention to Kenya. This study comes at a time when HLIs in Kenya have witnessed increased enrollment within constrained physical resources; consequently, they have adopted blended e-learning through ODeL programs to complement the scarce physical resources (Nyerere et al., 2012). Status on collaborative learning in HLIs in Kenya is yet to be established definitely; this research provides an opportunity to inform instructors and learners with concrete data on the status and the associated key challenges in an online collaborative learning environment in HLIs in Kenya.

Methodology

Research Design

A cross-sectional study using descriptive survey was used to investigate students' collaboration level in group work and identify students' perceived challenges in an online collaborative learning environment. A descriptive survey was adopted as it could examine the situation the way it is and provide quantitative information that was summarized through statistical analyses, thus providing the basis to answer our research questions (Engelhart, 1972). This survey was conducted by administering questionnaires using a web-based tool (Lime survey). This approach was preferred because it enabled a faster collection of responses and the ease of exporting the data to our Statistical Package for Social Sciences (SPSS) for analysis.

Sample and Sampling Procedures

Purposive sampling was adopted to select two public universities namely KU and Jomo Kenyatta University of Science and Technology (JKUAT), and two private universities namely United State International University (USIU) and AUSI, which have adopted the use of online collaborative learning tools in their e-learning modules and they are within Nairobi. Purposive sampling was also used to select students who were engaged in group activities online. With the help of instructors a total of two hundred and ten students were identified within the four universities. These were students who were undertaking at least one course or a module online on an e-learning platform. The sampled students were informed by their instructors of the purpose of the study, and responding to the questionnaire items was voluntary.

Research Instruments

Data was collected through a questionnaire that consisted of thirty items. The literature review provided the conceptual elements which were used to develop the set of items in the questionnaire. Twenty nine items in the questionnaire were close ended while one item was open ended. Table 3 summarizes the different categories for the questionnaire items. To ensure validity, content related evidence was used and two experts in e-learning were requested to review the content and the format of the instrument. From their comments some items were rephrased, some content in group orientation added and reformatting done as recommended. Content-related evidence was adopted to ensure the instrument contained an adequate sample of the key challenges related to online collaborative learning (Fraenkel, Wallen & Hyun, 2012).

Table 3

Summary of the Questionnaire Items

Item Number	Type	Information gathered
Items 1-7	Multiple choice	Demographic information
Item 8	Multiple choice	Gadgets used by students to access online materials
Item 9	Likert Scale	How often a collaborative tool is used to do collaborative work
Items 10-11	Multiple choice	To filter students who had participated in an online group activity so that they could proceed with item 12 up to 30
Item 12	Multiple choice	Frequency of use on the collaborative tools
Items 13-21	Multiple choice	Group orientation in terms of how the groups were formed, managed and students' satisfaction with their group membership
Item 22	Multiple choice	Instructor's role during the group activity
Items 23, 24, & 25	Multiple choice	Level of individual participation in the group activity
Items 22, 26, & 28	Multiple choice	Student experiences during the group activity
Items 27 & 29	Likert Scale	Student level of agreement on group work challenges as observed from literature review.
Item 30	Open ended	Students' worst experiences in an online group activity from their own perspective

Data Collection and Analysis

The questionnaire was distributed through email invitations to the participants. The invitation email contained the purpose of the study and a link to the URL where the questionnaire was located. Each participant was given only one token to ensure single response to the questionnaire. The questionnaire was made available for a period of two weeks as most of the students did not respond immediately. A total of 183 students responded: This was an 87% response rate which was adequate for analysis. The collected data was exported to SPSS version 14 and coded as per the research objective. A quantitative analysis was carried out, such as frequencies and percentages on: demographic information, collaboration tools, level of access on group activity and students' perceptions on various aspects of group activity. Since the questionnaire items were meant for a bigger study, not all analysis has been included in this paper.

Results

Participants' Demographic Information

A total of 183 students responded out of 210, with 44.9% from a private university and 53.5% from a public university while three respondents (1.6%) did not provide university names. One respondent did not provide any demographic information including age and gender. Table 4 summarizes the demographic information.

Table 4

Demographic Information of the Sample (N=183)

	Characteristic	Frequency	Percentage
1.	Age in bracket(at the time of survey)		
	15-25 years	108	59.0%
	26-35 years	59	32.2%
	36-45 years	13	7.1%
	46-55 years	2	1.1%
	N/A	1	0.5%
2	Gender		
	Male	116	63.4%
	Female	66	36.1%
	N/A	1	0.5%
3	University		
	AUSI (Private)	14	7.7%
	JKUAT (Public)	50	27.3%
	KU (Public)	48	26.2%
	USIU (Private)	68	37.2%
	No Answer	3	1.6%
4	Level of Study		
	Certificate	14	7.7%
	Diploma	5	2.7%
	Postgraduate	21	11.5%
	Undergraduate	142	77.6%
	No Answer	1	0.5%
5.	Modules Studied online		
	2-3 modules	35	19.1%
	4-5 modules	27	14.8%
	More than five modules	51	27.9%

	One module	68	37.2%
	No Answer	2	1.1%
6	Internet Skills[1]		
	Excellent	138	75.4%
	Good	32	17.5%
	Moderate	11	6.0%
	No Answer	2	1.1%

Group Characteristics

Two group characteristics were collected to determine how the students were assigned to group membership and the group sizes. As shown in Table 5, students were assigned to group membership in different ways and group sizes were also different. Out of 108 students who responded a higher percentage was done by the instructor (59%), 16% at random through default assignment in Moodle, 18% self assignment and 7% were not aware how the assignment was done. The number of students in a group ranged from 2 to 5 (32%), 6 to 10 (27%) and more than 10 students (35%). While 6% were not aware of the number of students in their group. This shows that more than 50% of students discussed in groups of more than five students which is contrary to the recommended small group sizes of 2 to 5 students for effective group learning which enables each group member to express his/her own ideas and increases group cohesion (North, Linley, & Hargreaves, 2000; Schellenberg, 1959; Forsyth, 2009)

[1] The level of access to internet services like emails, Chats, Facebook, Twitter, Telnet, Google Docs. etc.

Table 5

Frequency on Group Assignment Method and Group Sizes

Group characteristics (n=108)	Frequency	Percentage
1. Criteria used to assign group membership		
Assigned by instructor	64	59%
Default assignment in Moodle	17	16%
I assigned myself	19	18%
I don't know	8	7%
2. Number of members in a group		
2- 5 members	34	32%
6-10 members	29	27%
More than 10 members	38	35%
I don't know	7	6%

Popularity of Various Collaborative Tools

As shown in Table 6 of all the respondents, 91.8%, 74.8%, 72.9% and 71.9% frequently use email, social media (Facebook and Twitter), telephone (mainly mobile phones), and chats respectively. Tools like Skype, video conference, workshops[2] and podcasts[3] had the lowest frequency of use, which is an indication that these tools are rarely used by students to collaborate online. Table 6 shows the percentage, mean ranking and standard deviation on the frequency of use on various collaboration tools.

[2] Peer assessment activity in Moodle
[3] Audio files created by students for peer learning

Table 6

Frequency of Use on Various Collaborative Tools

Collaboration tool	n	Rarely	Often	Mean	Std. Deviation
Emails	182	8.2%	91.8%	.92	.276
Social media	182	25.2%	74.8%	.75	.436
Telephone	181	27.1%	72.9%	.73	.446
Chats	181	28.1%	71.9%	.72	.451
Google Doc.	180	47.2%	52. %	.53	.501
Wikis	178	65.8%	34.2%	.34	.476
Forums	181	67.4%	32.6%	.33	.470
Skype	182	72.5%	27.5%	.27	.448
Video conference	181	84.0%	16.0%	.16	.368
Workshops	178	84.3%	15.7%	.16	.365
Podcasts	178	93.8%	6.2%	.06	.241

Level of Collaboration in Various Collaborative Tasks

Out of 183 students who responded only 108 students (59%) indicated that they had done some group work online in their e-learning modules. The rest of the respondents (41%) were not involved in an online group work for reasons which included: instructor not providing an online group activity (41.3%), lack of time (29.3%), lack of skills to participate in online discussion (12%) and not enrolling to a group (17.3%).

More than 80% of the respondents had very low access to posts and they were not replying to posts; only less than 20% accessed or replied to posts more than 4 times in a week. It was found that 39.8% of the respondents indicated that either they accessed or replied to posts only once in a week, 42.7% accessed the posts 2-3 times in a week, 48.5% replied to posts 2-3 times in a week. Table 7 summarizes the observed level of access and reply to posts.

Table 7

Students' Level of Access and Reply to Post in an Online Group Activity (N=108)

No. of times of accessing and sending posts to the discussion forum	Access to posts Frequency	Percent	Sending new posts/replies Frequency	Percent
Only once	41	39.8%	41	39.8%
2-3 times in a week	44	42.7%	50	48.5%
4-5 times in a week	6	5.8%	7	6.8%
More than five times in a week	12	11.8%	5	4.9%

Perceived Challenges

The questionnaire item on the perceived challenges had nine key challenges which respondents were required to rate with a yes or no response. The study revealed that the majority of respondents (54%) perceived that lack of participation by other members was a big challenge as most students lacked time to participate (53%). The difference in skills or knowledge level among group members was not perceived as a big challenge (19%). Table 8 shows the distribution of responses on the nine key challenges from 108 respondents. In addition to these nine key challenges, slow internet connectivity (30%), disruptions from incompetent peers (3%), lack of clarity on the posted work (2%), free-riders (2%), no consensus on the discussions (3%) and no original ideas posted (5%) were also mentioned by respondents as some of their worst experiences during their group work. For example, participant number 9 stated: "My worst experience was when the internet was not consistent and it kept on logging users ON and OFF; and we ended up wasting almost one hour without active participation".

To establish whether there was any relationship between the type of university (public or private) and the perceived challenge chi-square test of independence was done. Table 9 summarizes the results of the chi-square test and the corresponding p values. Statistical significance association was found only in two cases: lack of feedback from instructor (p =.041) and work load not shared equally (p =.000).

Table 8

Mean Ranking and Standard Deviation for the Nine Key Challenges as Perceived by the Respondents (N=108)

Challenges	Mean	Std. Deviation
Low or no participation of other group members	.54	.501
Lack of time to participate	.53	.502
Lack of feedback from instructor	.47	.502
Lack of feedback from peers	.43	.497
Off-topic posts in the discussion	.31	.463
Work load not shared equally	.27	.445
Lack of group mentor	.25	.435
Single student dominating	.25	.435
Difference in skill/knowledge level among group members	.19	.390

Note. The mean is equivalent to the proportion of *yes responses* in the above table.

Table 9

Associations Between University Type (Private or Public) and the Perceived Challenges in Using Online Collaborative Learning Environment

Perceived Challenge	x^2	p
Low or no participation of other group members	0.255	0.613
Lack of time to participate	0.400	0.527
Lack of feedback from instructor	4.176	0.041*
Lack of feedback from peers	0.844	0.358
Off-topic posts in the discussion	0.000	0.990
Work load not shared equally	12.802	0.000*
Lack of group mentor	1.913	0.167
Single student dominating	0.004	0.947
Difference in skill/knowledge level among group members	0.179	0.672

* $p<0.05$

Discussion

First, the study aimed to investigate how often students collaborate online while engaging in group work in HLIs in Kenya. The findings indicate that out of 183 respondents who were doing a module/unit through e-learning, only 108 students (59%) were engaged in an online group activity, while 75 students (41%) were not involved in an online group work. The study found that failure of the instructor to provide an online group activity contributed highly to non participation in collaborative learning. Moreover, for those who participated in group work, 47% mentioned that they perceived lack of feedback from the instructor as a big challenge. This was an indication online instructors were not fully engaging students in collaborative learning in blended e-learning programs. This could be due to the known situation that in most HLIs in Kenya, instructors use e-learning platforms to send notes and assignments, are heavily burdened with many duties and lack skills in e-pedagogy (Nyerere et al., 2012). The study also found that for those who were engaged in collaborative work the level of collaboration was very low as most of the respondents (90%) accessed the discussion forum less than two or three times in a week. Consequently the rate of posting to the discussion forum was found to be very low with only 11.7% of the respondents sending an average of 4 to 5 posts in a week. The findings revealed that students in these HLIs do not often collaborate online. Hence, there is a need to hire more trained instructors or train the current instructors who can engage students in an online collaborative work and create time to monitor their participation.

Secondly, the study aimed to investigate the components of online collaborative learning which learners perceive as challenging in HLIs in Kenya. In this study it was found that 54% strongly perceived that lack of participation by other members was a big challenge. This could be supported by the factor that 53% also responded they did not have time to participate. Lack of feedback both from instructor and peers was also perceived as a challenge by 47% and 43% respectively. This concurred with results from other researchers who found that low participation by members and lack of feedback both from instructor and peers was a major hindrance to collaborative learning (Liu et al., 2010; Capdeferro et al., 2012; Kim et al., 2005). Although Roberts et al. (2007) identified seven common problems, contrary to this study the problems were not major as few respondents were in agreement. Furthermore, 30% of the participants mentioned slow internet connectivity as one of their worst experiences even though previous research had not captured it. This could be due to low internet bandwidth (4.22Mb/s per 1,000 students) availed to students in Kenyan Universities (Karshoda et al., 2014). This was somewhat surprising given that the study was conducted in Nairobi where internet infrastructure is far better than other regions in Kenya where fiber optic network is yet to be established. This implies that for other regions the problem will be more critical. Therefore, in order to maximize the use of e-learning platforms we do concur with Karshoda et al. (2014) in their e-readiness report to have HLIs in Kenya invest more in campus backbone and wireless network infrastructure to increase the level of internet availability to students.

Thirdly, there was significant difference between the public and the private university in terms of lack of instructor feedback (p = 0.046) and workload not shared equally (p = 0.000). The study found that lack of instructor feedback as a challenge was reported more in public universities (31%) than in private universities (16%). This could be due to the big numbers of students enrolled per class in public universities which makes the instructor to student ratio higher than in private universities. Consequently, the instructors in public universities are overloaded with work and this could have affected the low level of feedback observed. The study also found that the challenge of workload not shared equally among the students in an online collaborative learning group was reported to be higher in private universities (20%) than in public universities (7%). This seems to support the perception that students in public universities are more independent, working with minimal instructor supervision, which probably gives them an advantage to work more cohesively in group work. This requires further investigation to establish why such a significant difference existed.

Conclusion

Despite the potential advantages in collaborative learning, this study reveals that lack of participation among group members and lack of feedback from instructors are major hindrances to effective online collaboration in HLIs in Nairobi, Kenya. This coincides with other studies in other regions(Liu et al., 2010; Capdeferro et al., 2012; Kim et al., 2005). Furthermore, some instructors did not include collaborative learning activities in their online courses and therefore 41% of the participants were not engaged in collaborative learning. Therefore, further research should also be carried out to investigate instructors' level of awareness, utilization and perceived challenges of online collaborative learning tools which are available in e-learning platforms. This could also shed more light on how to improve the quality of online collaborative learning in HLIs in Kenya. We do also concur with Karshoda et al. (2014) that internet bandwidth should be increased in HLIs in Kenya in order to avoid the challenge of slow internet connectivity as reported by 30% of the participants in this study. In order to make collaborative learning more effective in these HLIs the researchers do recommend that institutions should:

- Ensure their instructors do engage students in collaborative activities in their online courses and instructor's role is more emphasized during collaborative learning
- Find ways of motivating the students in order to increase their level of participation in collaborative learning
- Find ways of motivating the instructors in order to make them more active in monitoring students' collaboration and come up with

mechanisms of training instructors with e-pedagogy skills which can enhance collaborative learning

- Find ways of increasing internet bandwidth in order to avail more bandwidth to students who are studying online.

Future Work

Similar future studies should adopt large scale empirical approaches, within different universities or geographical regions in Kenya in order to confirm some of the findings observed here in other universities and also to be able to generalize the results to the larger population of Kenyan universities. Future studies could also consider examining the effectiveness of collaborative learning in enhancing students' critical thinking skills and improving the level of knowledge constructed in blended e-learning platforms.

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Appendix

Questionnaire

Online collaborative learning: Students perceptions

0% 100%

elearners

*
Gender

- Female
- Male

*
What is your age bracket?

Choose one of the following answers

- 15-25 years
- 26-35 years
- 36-45 years
- 46-55 years
- 56 years and above

*
Which level of study are you currently in? Indicate the programme you have enrolled in e.g. Bsc. maths, BIT, DIT, etc on the comments side.

Choose one of the following answers

- PostGraduate
- Undergraduate
- Diploma
- Certificate
- Short Course

Please enter your comment here:

*
In which university are you currently studying or did you take an online course?

Choose one of the following answers

- Jomo Kenyatta University of Science and Technology
- Kenyatta University
- Strathmore University
- USIU
- AUSI

*
Rate your internet skills

Choose one of the following answers

- Moderate (I know how to access emails and browse)
- Good(I know how to access emails, browse and download materials online)
- Excellent (I know how to access emails, browse, download materials and use Social media)

*
How many modules/ units have you ever studied online?

Choose one of the following answers

- One module
- 2-3 modules
- 4-5 modules
- more than five modules

*
Why did you choose to undertake an online unit/module

Check any that apply

- It was cheaper than other modes
- Parent/sponsor insisted
- My ICt skills are well polished
- My work schedule cannot allow other modes
- My home location is not favourable for modes
- It was a university requirement
- Other(Please specify)

*
Which gadgets do you (did you) use to access learning materials online? Comment on the right side why you prefer to use the gadget.

Check any that apply

- My Mobile Phone and Bundles
- My Desktop/LapTop and Bundles

☐ My IPad/NotePad and Bundles

☐ University Desktop/LapTop WIFI/Internet

☐ Cyber Cafe internet

☐ My own gadgets but University WIFI/Internet

Other(Please specify)

*

Indicate how often you utilize(d) the following communication tools in an online learning enviroment:

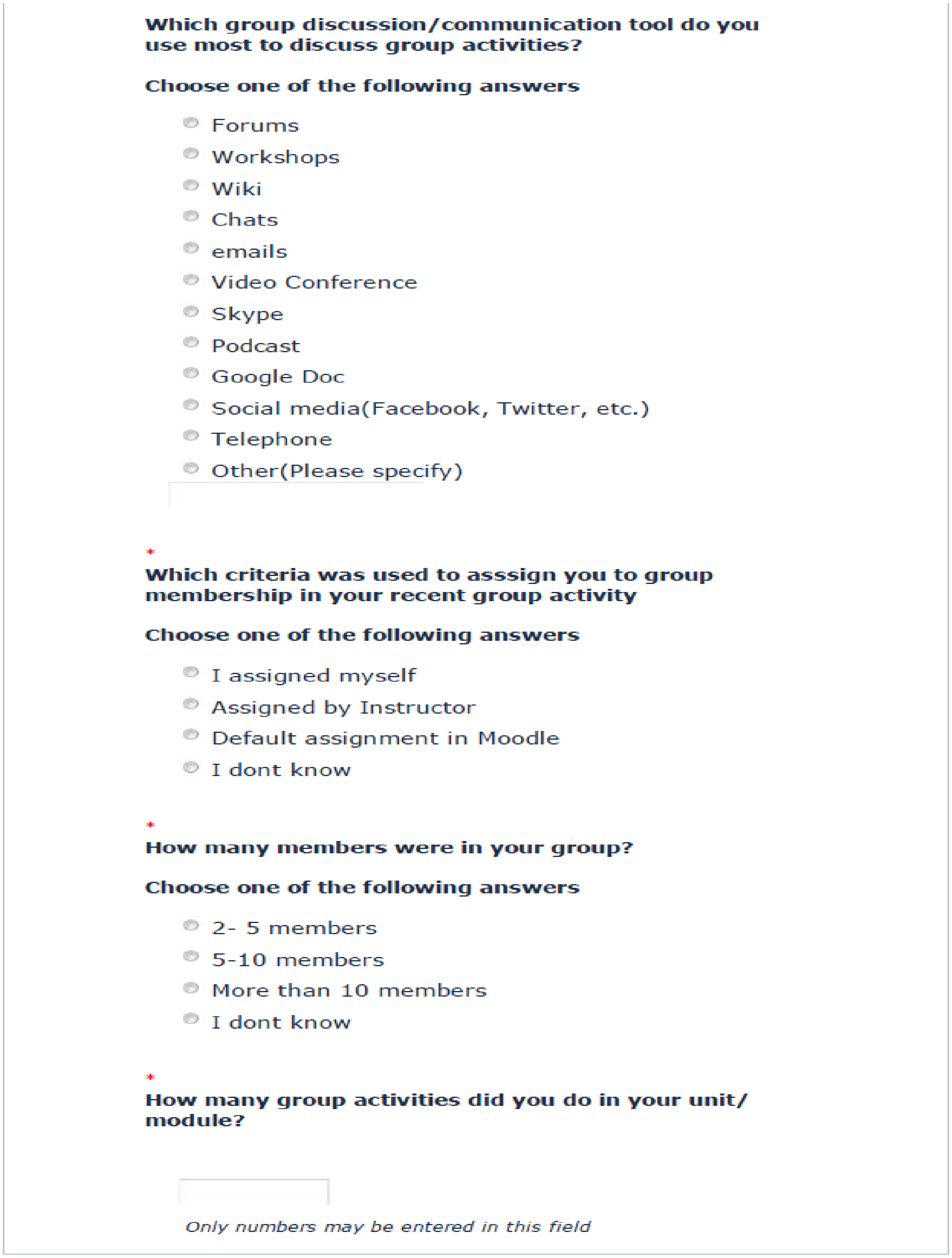
	Very Often	Often	Sometimes	Rarely	Never
Forums	○	○	○	○	○
Wikis	○	○	○	○	○
Workshops	○	○	○	○	○
Social Medial(Face book, Twitter, etc)	○	○	○	○	○
emails	○	○	○	○	○
Skype	○	○	○	○	○
Video Conference	○	○	○	○	○
PostCads	○	○	○	○	○
Google Doc	○	○	○	○	○
Chats	○	○	○	○	○
Telephone	○	○	○	○	○

*

Have you ever discussed a group activity online?

◉ Yes ○ No

*



Which group discussion/communication tool do you use most to discuss group activities?

Choose one of the following answers

- Forums
- Workshops
- Wiki
- Chats
- emails
- Video Conference
- Skype
- Podcast
- Google Doc
- Social media(Facebook, Twitter, etc.)
- Telephone
- Other(Please specify)

*

Which criteria was used to asssign you to group membership in your recent group activity

Choose one of the following answers

- I assigned myself
- Assigned by Instructor
- Default assignment in Moodle
- I dont know

*

How many members were in your group?

Choose one of the following answers

- 2- 5 members
- 5-10 members
- More than 10 members
- I dont know

*

How many group activities did you do in your unit/ module?

Only numbers may be entered in this field

*

Did your group membership change during the study of the unit/module?

- Yes
- No

*

Was there a moderator/Mentor for the discussion in your group activity

- Yes
- No

*

Were you comfortable with the team members in your group?

- Yes
- No

*

Which role did the instructor play during the discussion period in your group activity?

Check any that apply

- Encouraged learners to interact with one another
- Rewarded thoughtful contributions
- Summarized key concepts
- Moderated the discussions(policing and enforcing discussion rules and policies)
- Intervened when conflict arose
- Intervened when we were stack on an isssue
- Discouraged personal criticism
- Discouraged off topic posts
- Rated the discussion
- Provided timely feedback
- Played no role
- Other(Please specify)

*

On average how many times were you accessing the discussion posts in a week?

Choose one of the following answers

- Once in a week

- 2-3 times in a week
- 4-5 times in a wek
- More than five times in a week

*
On average how many post did you send to your group activity in a week?

Choose one of the following answers

- Only Once
- 2-3 times in a week
- 4-5 times in a wek
- More than five times in a week

*
How quickly were you responding to posts related to the discussion forum in your group activity?

Choose one of the following answers

- Never Responded
- Responded with some delay
- Immediately

*
During the discussion period with your peers in your group activity, which among the following happened?

Check any that apply

- I got a feedback every time i posted an idea
- I was informed about my participation status from time to time
- My contributions were rated by the peers
- I was informed about my individual score
- I was adviced how to improve my particiaption by the instructor
- I replied to all posts
- I challenged my peers contributions
- I read all messages/posts from my peers
- The group activity improved my understanding on the topic under discussion
- Some members of the group never contributed
- Other(Please specify)

*

Indicate you opinion in the following issues:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disgree
While forming group the group members should have different collaborative competences.					
It 's important to have group leader to mentor others in discussion forums.					
A group leader should be among those who are most active in the discussion.					
Timely feedback from Instructors is very useful in an online group discussion.					
I often fill very frustrated whenever a reply to my request takes too long.					
Group discussion help me improve my understanding of the subject under discussion.					

*
In your own opinion what would hinder you from actively participating in an online group activity?

Check any that apply

- ☐ Lack of feedback from peers
- ☐ Lack of feedback from instructor
- ☐ Differences in skill/knowledge level of group members
- ☐ Low or no participation of other group members
- ☐ Workload not shared equally
- ☐ Off-topic posts in the discussion
- ☐ Single student dominating the group discussion
- ☐ Lack of leader/mentor to guide/advice you
- ☐ Lack of time to participate
- ☐ Other(Please specify)

*

From what you experienced during your online group activity, indicate your opinion on the following issues:

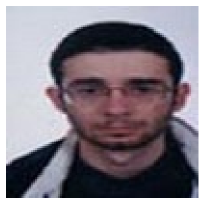
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disgree
I was satisfied with the level of contact I had with my instructor	○	○	○	○	○
I was satisfied with the level of contact I had with my peers	○	○	○	○	○
Replies from peers on my post/requests took too long	○	○	○	○	○

*

Briefly describe the worst online experience you have had in an online group activity

THE INTERNATIONAL REVIEW OF RESEARCH IN OPEN AND DISTANCE LEARNING

Level of Proficiency and Professional Development Needs in Peripheral Online Teaching Roles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Abstract

Teaching in virtual environments demands mastery of several teaching competencies. Although the most accepted ones are pedagogical, in order to successfully teach online it becomes necessary to acquire and develop some other competencies, sometimes referred to as peripheral roles (Denis et al., 2004).

The aim of this study is to analyse perceptions on the level of proficiency that online teachers have regarding these peripheral roles (social, evaluator, manager, technologist, advisor/counsellor, personal, and researcher), and their professional development needs required to improve their online teaching competencies. A questionnaire was specifically created and validated by experts, and data was gathered from 166 university teachers.

The findings show that teachers highlight the importance of the peripheral roles for quality teaching, and thus, professional development programmes should be based on a balance between central and peripheral roles to better train online teachers and increase the quality of their teaching.

Keywords: Online teaching; professional development; peripheral roles; online learning environments; teaching competences

Introduction

The use of information and communication technologies (ICT) for educational purposes has been widely adopted in the last decade (Bates & Sangrà, 2011; Bullen & Janes, 2007; Carr-Chelleman, 2005), and Higher Education institutions could not avoid their proliferation in universities. In such a context most of the universities have embraced online teaching and learning as a means of better serving their students by giving more flexibility to their programmes and providing blended or complementary courses. As a result of this growing interest and use, online education has finally been taken into account as a serious player in the field of Higher Education, including being used for attracting potential students.

No matter the initial reaction from the faculty at these institutions, the organization and the technologies of teaching in most of them have changed, and the culture of teaching itself has undergone significant adaptation (Lokken & Womer, 2007; Sangrà & González-Sanmamed, 2004).

The large number of available studies enables us to observe the enormous interest raised by the analysis of teaching skills, not only as a research issue, but also as a theoretical conceptualization. As importantly these studies have institutional, academic, and professional relevance in outlining the appropriate teacher's profile and characteristics needed to face online teaching functions as a benchmark for the design of professional development actions and plans. This article, in order to deal with the perspectives that have been mentioned, starts with a literature review to establish a list of competencies that undergo the judgment of teachers from a university that is starting a process of introduction of a blended learning mode offer, in order to identify their perceptions regarding their level of proficiency and their professional development needs, with the purpose of guiding training programmes that would improve their professional performance.

University teachers in particular are being challenged to obtain the necessary competencies to work in online environments. In contrast with other studies focused on the central pedagogical competency, this study is interested in ascertaining the level of proficiency that teachers perceive they have regarding the peripheral online teaching roles (Denis et al., 2004), and their willingness and need for professional development programmes aimed at broadening and improving their current level of proficiency.

Literature Review

Although there is agreement that online teaching demands different teaching tasks and skills (Major, 2010; Spector, 2007), two different approaches can be found when reviewing the current literature on the competencies online teachers need to have for performing effectively. On one hand, some authors argue that online teaching competencies are similar to those needed for face-to-face teaching (Bautista, Borges & Forés, 2006). Conversely, others argue that some competencies are specific to online teaching, even if some others might seem quite similar (Ardizzone & Rivoltella, 2004; Laat et al., 2007). Varvel (2007) contends that online teaching includes the creation of an effective learning environment using activities and resources that are dispersed, and this is not an easy task. Bawane and Spector (2009) pointed out that programme characteristics, the available resources and the role the teacher has to perform determine the competencies the teachers should acquire.

Muñoz-Carril, González-Sanmamed and Hernández-Sellés (2013) recently carried out a literature review of the roles required of the online teacher. In this previous work, two tables were drawn to classify and show the associated competencies to each of the roles of the online teacher identified by the reviewed authors. One table (Muñoz-Carril, González-Sanmamed and Hernández-Sellés, 2013, 466-467) synthesised the work carried out by each author, resulting in a framework summarising eight major roles required of online teachers. A second table pointed out the associated competencies related with the different roles (Muñoz-Carril, González-Sanmamed & Hernández-Sellés, 2013, 469-470). This table was drawn after holding a focus group with online teachers in order to identify, based on practice, the competencies associated with each of these roles.

This initial literature review has been utilised as a starting point for this article, giving the appropriate framework for the study presented here. Despite the fact that most of the authors reviewed agree on the importance of all the roles, their publications have always given predominance to the pedagogical role (Bawane & Spector, 2009). In the review carried out by Muñoz-Carril, González-Sanmamed and Hernández-Sellés (2013) they also highlight that the pedagogical role is most often mentioned in the literature.

These results are in line with the classical vision in which the main function of a teacher is to teach, and thus, for decades teaching has been identified with expository transmission of knowledge. Thus, teachers with extensive experience teaching face-to-face who move to online teaching often have "the tendency of carrying traditional educational practices into the online environment" (Kreber & Kanuka, 2006, 422). When approaching online education, teaching should assume another important function: to make students' learning easier by taking advantages and affordances of the new digital context (Anderson & Elloumi, 2008) which involves significantly more roles than expository teaching.

In this virtual scenario, teaching becomes a complex task that requires teachers to possess and perform a diverse set of competencies associated with each role, and to make effective use of the resources and support that might be available (Bawane & Spector, 2009). To do that, those functions that Denis et al. (2004) name peripheral roles are at least as important as the central pedagogical role.

The relevance of these peripheral roles is highlighted by some authors, who point out the aspects that could have a bigger influence on the process of enhancing learning. Authors such as Coppola, Hiltz and Rotter (2002), Varvel (2007), Bawane and Spector

(2009), Guasch, Alvarez and Espasa (2010) and Baran, Correia and Thompson (2011) mention the importance of the social or affective role, regarding the relationships between students and the teacher, the ways that emotions could be expressed online, and how they can improve the online classroom atmosphere. They also consider the managerial or administrative role as one that demands great attention, because it involves establishing rules and regulations, carries out planned teaching actions, and requires student-monitoring. Varvel (2007) indicates that the administrative role also involves processes related to the proper functioning of the institutional process in the online context. He considers that these administrative rules, though in many ways unrelated to instructional competencies, are "nonetheless inclusive of knowledge that an instructor should have". These authors and others like Aydin (2005), Berge (1995), Egan and Akdere (2005), Salmon (2004), and Williams (2003) also emphasize the technological role, referring to the knowledge the teacher should have to adequately use the necessary technology and to find and integrate educational software, in addition to being able to solve small technical problems and provide some level of technical support to the students.

An evaluator role appears in the classification developed by Bawane and Spector (2009), Varvel (2007), and Egan and Akdere (2005), whose main functions are to provide feedback, grades and to acknowledge student performance, either individually or in groups. Aydin (2005) also adds to this providing students assurance of authenticity.

In the advisor/counsellor role, Bawane and Spector (2009), and Aydin (2005) contend that the teacher helps the students to achieve the greatest benefit from their engagement with the course, providing guidance and measures to enhance their confidence and performance which may persist even beyond the end of the course.

Varvel (2007) adds a personal role that involves all the physical and mental abilities and their personality attributes, which are independent of the institution where they work. Teachers' personal beliefs and their vision and perception of teaching condition this role and thus influence the processes in which teachers are involved.

The research role focuses on creating new relevant knowledge, not only in the disciplines that the teacher is working in, but also on research into the improvement of online teaching (Goodyear et al., 2001). Furthermore selection, creation and use of online resources for gathering information on online learning, including the development of new theories, are expected (Aydin, 2005). In addition, conducting research on their own classroom teaching and integrating their research findings into their teaching practice are characteristics of this research role (Bawane & Spector, 2009).

All the revised literature focused on the description of the online teaching competencies and roles, but mostly from a theoretical perspective. Methodologies used in these studies are mainly descriptive and using experts for defining which the competencies and the roles should be. Delphi techniques and experts workshop-based data gathering are the most utilized ones. They give a powerful insight on the issue, but the voice of the practitioner is generally missed. The present study asked directly to the teaching staff who is currently living the transition between a traditional full classroom-based and a blended model.

Purpose of the Study

The purpose of this study is to identify and analyse the perceptions on the level of proficiency that online teachers have regarding the peripheral roles of online teaching (social, evaluator, manager, technologist, advisor/counsellor, personal, and researcher), and their professional development needs required to improve their online teaching competencies. Implications for professional development and for evaluation of online teaching performance might also be found.

Study Context

The context of the research is situated in A Coruña University (hereinafter UDC), a Spanish public university located in the north-west of the Iberian Peninsula. The university has 25 academic centres, offering 42 bachelor, 53 master, and 46 PhD programmes. These programmes are supported by a total of 1,458 teachers (512 female; 946 male), with 19,581 bachelor students, 1,054 master students, and 1,362 PhD students enrolled.

The university traditionally provided face-to-face classes, but since 2000 has been moving to a blended learning mode integrating online teaching and learning in some of the programmes. The plans for implementing this evolution have been analysed and published (Bates & Sangrà, 2011; González-Sanmamed, 2004). Through this transition to blended learning, the university has had to develop and implement a series of professional development activities.

Despite there is no single or unified understanding between all the UDC faculty on which is the theory underlying the term of online teaching, there are some commonalities regarding the concept. On one hand, online teaching is considered as an extension of their current teaching, that is, a good support for traditional lecture-based teaching. On the other hand, they envisage online teaching as a way for modernizing and improving the way in which they teach and their students learn. It is from this conception that they deal with the need of being provided with more professional development to take advantage of the potential of this new situation (González-Sanmamed, 2004; Bates & Sangrà, 2011).

Methodology

The research method is a non-experimental quantitative survey (Cohen, Manion &

Morrison, 2007; McMillan & Schumacher, 2005). An online questionnaire was designed and sent, via electronic means. The sample was accidental, applying a non-probabilistic technique survey (Cohen, Manion & Morrison, 2007). The sample population was defined by the teaching staff practicing within the online teaching system from the A Coruña University. A census of teachers facilitated by the e-Learning Unit of the university was used to know how many teachers usually used the learning management system and carried out e-learning activities, and which was their disciplinary environment. A total amount of 628 subjects were identified, 399 belonging to the Science, Health, and Technical disciplinary environment, and 229 to the Socio-legal and the Humanities.

To allow these teachers to participate in the research, a letter was written inviting them to be a participant in the study by answering an attached questionnaire. This letter was sent through e-mail from the Vicerrectorate for Quality and European Harmonization. In addition, the same invitation letter was posted in the LMS to which all the teachers have access. After this process, a total of 166 valid questionnaires were gathered. Distribution of the respondents is shown in Table 1.

Table 1

Characteristics of the Sample Population Arranged by Categories: Administrative, Scientific Environment, and Teaching Experience within Virtual Learning Environments

Identification variable	Administrative category		Disciplinary environment		Online teaching experience				
	Full time faculty	Part time teachers	Science. Health, and Technical	Social-legal and Humanities	Less than 1 year	Between 1 and 2 years	Between 3 and 4 years	Between 5 and 6 years	More than 6 years
N	107	59	104	62	26	37	55	17	25
%	64.5	35.5	62.7	37.3	16.3	23.1	34.4	10.6	15.6

This article outlines the results from one of the blocks within the questionnaire, analysing the teachers' self-perceived level of proficiency on the competencies of the online teaching peripheral roles, as well as their interest in increasing their professional development. Specifically, it outlines the results achieved regarding the peripheral roles, because the ones associated with the pedagogical role have already been published in another work (Muñoz-Carril, González-Sanmamed & Hernández-Sellés, 2013). To build this block of the questionnaire, items were developed based on the competencies associated with each of the peripheral roles shown in Table 2 in that previous work (Muñoz-Carril, González-Sanmamed & Hernández-Sellés, 2013). The first iteration of the items underwent a double process of validation through the judgement of six experts, and also through a pilot test, after which some items were altered. Tables 2 to 8 show the items developed to test subjects' perceptions of the aforementioned peripheral roles.

Each item is assessed on a 5-point Likert scale. This scale looks at teachers' perceptions, understanding 5 as the higher rate of their perceived level of proficiency and 1 as the lowest. Cronbach's alpha internal reliability index was then applied. The internal consistency coefficient obtained in the peripheral roles' competencies section was considerably higher. The category "level of proficiency" scored $\alpha = 0.987$; and the category "professional development need" scored $\alpha = 0.990$.

Results

As can be seen in Table 2, for the competencies associated with the social role, all the mean rank values related to the variable "professional development needs" (positive ranks) are higher than "level of proficiency". Particularly, it is interesting to note that teachers show a high professional development need for competencies such as "Encourage and stimulate positive participation in a friendly learning environment" (sum of ranks= 5505.00).

On the other hand, for the median contrast carried out through Wilcoxon signed ranks test and shown in Table 2, the evidence suggests that there are significant differences in every social role for associated competencies between the two variables, "level of proficiency" and "professional development needs". The most significant differences taking into consideration the sum of ranks, are found in the competencies "Encourage and stimulate positive participation in a friendly learning environment" and "Streamlining training and online networking", which are very similar elements from a conceptual point of view.

Table 2

Wilcoxon Signed Ranks Test. Median Difference on the Level of Proficiency and Professional Development Needs Regarding the Social Role Competencies Applied to Online Teaching

			N	Mean rank	Sum of ranks	Test statistics
34-Encourage and stimulate positive participation in a friendly learning environment	Negative ranks	25	42.00	1050.00	Z	-6.392[a]
	Positive ranks	89	61.85	5505.00	Asymp. Sig.	.000
	Ties	52				
	Total	166				
35-Suggest activities to facilitate knowledge development amongst participants	Negative ranks	18	40.19	723.50	Z	-6.443[a]
	Positive ranks	84	53.92	4529.50	Asymp. Sig.	.000
	Ties	64				
	Total	166				
25-Give feedback on student interactions and public and private recommendations on their work and its quality	Negative ranks	30	41.43	1243.00	Z	-4.252[a]
	Positive ranks	68	53.06	3608.00	Asymp. Sig.	.000
	Ties	68				
	Total	166				
36-Streamlining training and online networking	Negative ranks	18	42.50	765.00	Z	-6.677[a]
	Positive ranks	89	56.33	5013.00	Asymp. Sig.	.000
	Ties	59				
	Total	166				
5-Summarize the inputs from students in group discussions	Negative ranks	19	37.68	716.00	Z	-6.375[a]
	Positive ranks	82	54.09	4435.00	Asymp. Sig.	.000
	Ties	65				
	Total	166				
33-Integrate and lead discussions	Negative ranks	22	39.50	869.00	Z	-6.283[a]
	Positive ranks	84	57.17	4802.00	Asymp. Sig.	.000
	Ties	60				
	Total	166				

a. Based on negative ranks.

With respect to the competencies associated with the evaluator role (see Table 3), and as happened in the case of the social role, higher mean rank scores appear for the variable "professional development needs" (positive ranks) than for "level of proficiency" (negative ranks) and involve significant differences bilaterally. These results make visible the teachers' interest in improving those aspects related to assessment processes in virtual teaching and learning environments.

Based on the data collected, the differences are particularly significant in the item concerning "Conduct evaluation practices" and "Keep the students Informed about their progress in the study".

Table 3

Wilcoxon Signed Ranks Test. Median Difference on the Level of Proficiency and Professional Development Needs Regarding the Evaluator Role Competencies Applied to Online Teaching

		N	Mean rank	Sum of ranks	Test statistics	
26-Keep the students informed about their progress in the study	Negative ranks	25	37.70	942.50	Z	-5.699[a]
	Positive ranks	77	55.98	4310.50	Asymp. Sig.	.000
	Ties	64				
	Total	166				
4-Make global and individual assessments of the activities carried out	Negative ranks	28	47.30	1324.50	Z	-4.615[a]
	Positive ranks	76	54.41	4135.50	Asymp. Sig.	.000
	Ties	62				
	Total	166				
8-Conduct evaluation practices	Negative ranks	20	40.90	818.00	Z	-6.741[a]
	Positive ranks	90	58.74	5287.00	Asymp. Sig.	.000
	Ties	56				
	Total	166				
2-Ensure that the students meet course objectives	Negative ranks	33	46.73	1542.00	Z	-4.029[a]
	Positive ranks	72	55.88	4023.00	Asymp. Sig.	.000
	Ties	61				
	Total	166				

a. Based on negative ranks.

Regarding the analyses of the competencies associated with the managerial role (see Table 4), the Wilcoxon test yields significant results in all the considered variables, except in the case of "Plan and manage the schedule of course events". The fact that it is quite easy, at the managerial level, to introduce in the learning content management system any key course event, as activities, news, tutoring hours, and so on can result in a lower perception of professional development needs in this competency.

Otherwise, we should highlight the relevance for teachers of improving their training in competencies related to those processes that can help them to improve the support they can provide to the students, such as "Manage efficiently the procedures for supporting students to work online". This is a basic issue, especially in those cases in which teachers tend to carry out collaborative learning activities, as well as in the case of "Perform a welcome protocol for the students participating in the online course, establishing rules and regulations", another key issue to improve the learning process.

Table 4

Wilcoxon Signed Ranks Test. Median Difference on the Level of Proficiency and Professional Development Needs Regarding the Managerial Role Competencies Applied to Online Teaching

		N	Mean rank	Sum of ranks	Test statistics	
19-Plan and manage the schedule of course events (activities, assessment tests, discussions, tutoring, etc.)	Negative ranks	39	53.05	2069.00	Z	-1.119[a]
	Positive ranks	58	46.28	2684.00	Asymp. Sig.	.263
	Ties	69				
	Total	166				
31-Perform a welcome protocol for the students participating in the online course, establishing rules and regulations	Negative ranks	21	33.88	711.50	Z	-6.991[a]
	Positive ranks	88	60.04	5283.50	Asymp. Sig.	.000
	Ties	57				
	Total	166				
20-Establish online communication structures based on its ease of use (usability and information architecture)	Negative ranks	29	47.79	1386.00	Z	-4.081[a]
	Positive ranks	72	52.29	3765.00	Asymp. Sig.	.000
	Ties	65				
	Total	166				
27-Perform as a reference for students in the context of the institution	Negative ranks	27	37.19	1004.00	Z	-5.016[a]
	Positive ranks	70	53.56	3749.00	Asymp. Sig.	.000
	Ties	69				
	Total	166				

		N	Mean rank	Sum of ranks	Test statistics	
15-Manage efficiently the procedures for supporting students to work online	Negative ranks	89	37.75	89	Z	-7.033[a]
	Positive ranks	61	55.74	61	Asymp. Sig.	.000
	Ties	166				
	Total	166				
21-Get in touch with the rest of the organizational and teaching team	Negative ranks	29	47.21	29	Z	-4.022[a]
	Positive ranks	71	51.85	71	Asymp. Sig.	.000
	Ties	66				
	Total	166				

a. Based on negative ranks.

Related to the competencies associated with the technological role (see Table 5), the Wilcoxon signed ranks test indicates that there are significant differences between the "level of proficiency" and the "professional development needs". Among the several competencies associated with the technological role, the item which shows the highest difference, being highlighted over the other ones is: “Select and create multimedia educational resources meeting recognized standards in e-learning”. This is likely linked to the fact that it sometimes becomes difficult to work with multimedia software to produce new digital resources, and also for the often-assumed association between “create digital content” and “teaching online”.

Table 5

Wilcoxon Signed Ranks Test. Median Difference on the Level Of Proficiency and Professional Development Needs Regarding the Technological Role Competencies Applied to Online Teaching

		N	Mean rank	Sum of ranks	Test statistics	
12-Become aware of the use of the virtual learning environment, by carrying out specific activities	Negative ranks	27	39.67	1071.00	Z	-5.453[a]
	Positive ranks	77	57.00	4389.00	Asymp. Sig.	.000
	Ties	62				
	Total	166				
10-Ensure that students understand the technical operation of the virtual learning environment	Negative ranks	29	45.98	1333.50	Z	-3.677[a]
	Positive ranks	67	49.59	3322.50	Asymp. Sig.	.000
	Ties	70				
	Total	166				

		N	Mean rank	Sum of ranks	Test statistics	
11-Provide advice and technical support	Negative ranks	33	46.61	1538.00	Z	-3.450[a]
	Positive ranks	67	52.42	3512.00	Asymp. Sig.	.001
	Ties	66				
	Total	166				
17-Select and create multimedia educational resources meeting recognized standards in e-learning	Negative ranks	9	41.83	376.50	Z	-8.321[a]
	Positive ranks	106	59.37	6293.50	Asymp. Sig.	.000
	Ties	51				
	Total	166				
9-Suggest modifications or new resources to be included in the virtual learning environment	Negative ranks	31	50.6 6	1570.50	Z	-3.573[a]
	Positive ranks	71	51.87	3682.50	Asymp. Sig.	.000
	Ties	64				
	Total	166				
16-Stay up to date and use proper software needed for the teaching process	Negative ranks	18	45.36	816.50	Z	-6.437[a]
	Positive ranks	88	55.16	4854.50	Asymp. Sig.	.000
	Ties	60				
	Total	166				
14-Use synchronous and asynchronous communication tools in a proper way	Negative ranks	20[s]	45.03	900.50	Z	-5.089[a]
	Positive ranks	74[t]	48.17	3564.50	Asymp. Sig.	.000
	Ties	72[u]				
	Total	166				
13-Keep in touch with your system administrator	Negative ranks	15[v]	44.53	668.00	Z	-6.480[a]
	Positive ranks	85[w]	51.55	4382.00	Asymp. Sig.	.000
	Ties	66[x]				
	Total	166				

A. Based on negative ranks.

Regarding the competencies associated with the advisor role, significant differences were detected after application of the Wilcoxon signed ranks test (see Table 6). Some competencies such as “Facilitate intellectual work techniques for networked studying” or “Provide guidance based on student needs” stood out because of its high positive rank in front of its negative one. This means a strong need from the teachers of improving their professional development in such issues.

Table 6

Wilcoxon Signed Ranks Test. Median Difference on the Level Of Proficiency and Professional Development Needs Regarding the Advisor Role Competencies Applied to Online Teaching

		N	Mean rank	Sum of ranks	Test statistics	
29-Ensure that students work at an appropriate pace and suggest measures to enhance performance	Negative ranks	26	41.52	1079.50	Z	-5.134[a]
	Positive ranks	75	54.29	4071.50	Asymp. Sig.	.000
	Ties	65				
	Total	166				
28-Provide guidance based on student needs	Negative ranks	38	45.20	1717.50	Z	-3.933[a]
	Positive ranks	71	60.25	4277.50	Asymp. Sig.	.000
	Ties	57				
	Total	166				
22-Provide meaningful information about the institution	Negative ranks	23	39.76	914.50	Z	-4.628[a]
	Positive ranks	67	47.47	3180.50	Asymp. Sig.	.000
	Ties	76				
	Total	166				
1-Reply to students' work (offer advice, suggestions, and clarify doubts)	Negative ranks	36	51.71	1861.50	Z	-3.367[a]
	Positive ranks	72	55.90	4024.50	Asymp. Sig.	.001
	Ties	58				
	Total	166				
30-Motivate students	Negative ranks	29	45.9 0	1331.00	Z	-4.166[a]
	Positive ranks	71	52.38	3719.00	Asymp. Sig.	.000
	Ties	66				
	Total	166				
24-Facilitate intellectual work techniques for networked studying	Negative ranks	17	35.94	611.00	Z	-7.103[a]
	Positive ranks	89	56.85	5060.00	Asymp. Sig.	.000
	Ties	60				
	Total	166				

a. Based on negative ranks.

As for the competencies associated with the personal and the researcher roles (see Tables 7 and 8), and following the trend of data presented in the preceding lines, significant contrasts between the "level of proficiency" and "professional development need " are found again. Among the competencies associated with the personal role, it is interesting to note that "Adapt educational content to accessibility standards, and to ethic and legal requirements" scores significantly low with regard to "level of proficiency" (see negative ranks), while for the "professional development needs" it scores much higher (see positive ranks). This leads us to question the importance for teachers of adapting to teaching situations with high level of diversity, and with compliance with the ethical codes in their profession.

Table 7

Wilcoxon Signed Ranks Test. Median Difference on the Level of Proficiency and Professional Development Needs Regarding the Personal Role Competencies Applied to Online Teaching

		N	Mean rank	Sum of ranks	Test statistics	
18-Adapt educational content to accessibility standards, and to ethic and legal requirements	Negative ranks	12	49.71	596.50	*Z*	-7.448[a]
	Positive ranks	99	56.76	5619.50	*Asymp. Sig. (2-tailed)*	.000
	Ties	55				
	Total	166				
32-Encourage students to exchange ideas and discuss with peers online	Negative ranks	23	37.13	854.00	*Z*	-6.731[a]
	Positive ranks	88	60.93	5362.00	*Asymp. Sig. (2-tailed)*	.000
	Ties	55				
	Total	166				
23-Collaborate with experts to strengthen the potential of e-learning	Negative ranks	22	33.48	736.50	*Z*	-5.789[a]
	Positive ranks	73	52.38	3823.50	*Asymp. Sig. (2-tailed)*	.000
	Ties	71				
	Total	166				

a. Based on negative ranks.

Table 8

Wilcoxon Signed Ranks Test. Median Difference on the Level of Proficiency and Professional Development Needs Regarding the Researcher Role Competencies Applied to Online Teaching

		N	Mean rank	Sum of ranks	Test statistics	
7-Experiment and perform different teaching methodologies	Negative ranks	20	48.68	973.50	Z	-6.285[a]
	Positive ranks	90	57.02	5131.50	Asymp. Sig.	.000
	Ties	56				
	Total	166				
3-Diagnose and perform teaching and learning situations	Negative ranks	27	43.00	1161.00	Z	-4.947[a]
	Positive ranks	75	54.56	4092.00	Asymp. Sig.	.000
	Ties	64				
	Total	166				
6-Structure knowledge by developing reflexive processes	Negative ranks	39	45.17	1761.50	Z	-2.528[a]
	Positive ranks	60	53.14	3188.50	Asymp. Sig.	.011
	Ties	67				
	Total	166				

a. Based on negative ranks.

Finally, all the competencies have been grouped considering the role they belong to. In all cases, the Wilcoxon test informs that significant differences between “level of proficiency” and “professional development needs” exist. Scores achieved through “positive ranks” show that teachers confer a particular importance to the social, technological, and advisor roles, regarding their professional development needs.

A point of particular interest is the contrast of significant differences between professional variables, such as administrative category, disciplinary environment, and the online teaching experience. With regard to the professional development needs of university teachers and the different competencies associated with the online teaching peripheral roles, the conducted nonparametric tests have shown significant results, except for the variable "disciplinary environment”. The Socio-legal and the Humanities fields are the ones that have shown higher professional development needs, in front of the Science, Health and Technical fields that scored lower.

Another relevant question was to find out how the variable "professional development needs" influenced the "level of proficiency" in online teaching in the university setting. Analysis for each of the roles showed out a moderate direct and positive correlation. The highest coefficient was achieved by the "researcher" role (0.636).

Calculations for the set of all the roles also reveal that there is a positive (or direct) correlation (0.536), which is moderate. This allows us to reject the null hypothesis and to conclude that the variables are correlated in the population from which the sample comes (Figure 1).

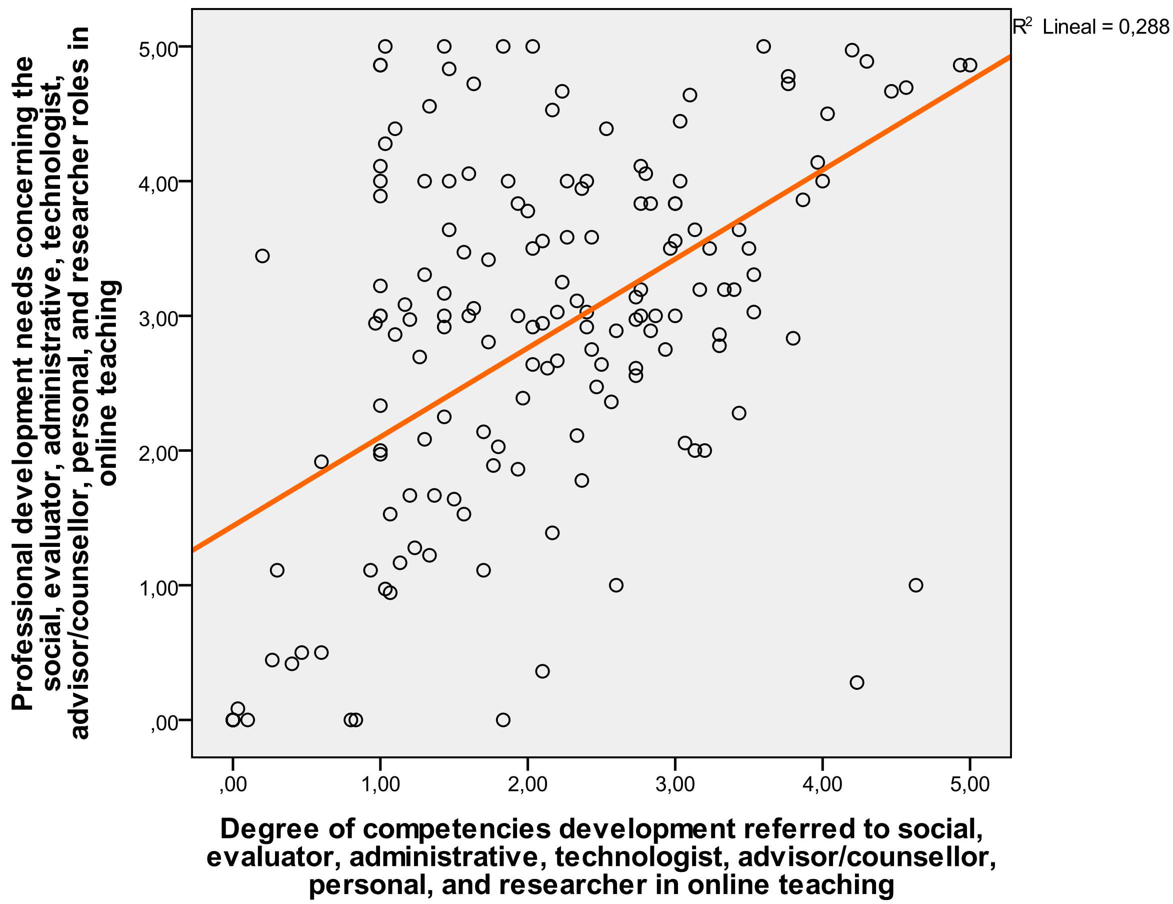

Figure 1. Scatter plot with regression line.

Thus, given the existence of linear correlation (*r*> *0.3* and *p* associated with the contrast of the correlation <*0.05*), statistical analysis was completed using a simple linear regression analysis to evaluate the relationship and estimate a regression line that could allow for making predictions.

In the simple linear regression model, the coefficient of determination (R squared) indicates that 28.8% of the variability in online teaching professional development needs is associated with the level of proficiency in the required competencies.

An ANOVA hypothesis testing for regression, which separates the variability explained by the regression and the unexplained or residual variability, was carried out. The results are statistically significant (p <0.001), so there is an association between the two variables through linear regression.

A second inferential approach provides the coefficients of the model: the constant ($\beta_0 = 1{,}440$) or value of the intercept, and the regression coefficient ($\beta_1 = 0{,}661$) or slope of the line. These regression coefficients resulted significant (p-value=0,000).

The resulting equation is:

$$Y_{i=}\ \beta_0 + \beta_1 X_1$$

$$Professional\ development\ needs = 1{,}440 + (0{,}661 * Level\ of\ proficiency)$$

In summary, the analyses show that the higher the online teaching competency performance levels, the higher the professional development needs.

Discussion and Conclusions

The present study aims to widen the current available knowledge on online teaching. Both the theoretical background and the practical approach brought to light by teachers' perception of the level of proficiency and their professional development needs regarding the peripheral – and usually forgotten – online teaching roles contribute to this body of knowledge.

Competencies associated with online teaching roles are much more specific than those related to general teaching. At the same time, depending on the context and the situation, a competency could be perceived as being more important than another, and to have a large number of competencies may be necessary (Bawane & Spector, 2009). In fact, teachers can have sets of competencies with different levels of proficiency between them. Proficiency refers to the levels of achievement of a particular competency. Most competency models have four or five levels of proficiency, from basic understanding to expert level. Some authors (Russ-Eft et al., 2008; Klein et al., 2004) have done research into establishing standards of performance as a means of considering the expected task to be developed by the teachers. This research has only been based on the self-perceived level of competency the teachers said they had. It is important to make the faculty aware of their basic and previous knowledge in order to build on the new one (Borko &

Putnam, 1996). Self-awareness is the starting point for self-demanding an increase in the knowledge and performance of any particular function and role (Joinson, 2001).

The findings show that when values in the variable "professional development needs" increase, higher values are also obtained for the variable "level of proficiency of competencies". The more training teachers have, the more aware they are of their skills-gap for each one, which makes the professional even more demanding.

However, significant mean differences have been found between teachers from the Socio-legal and Humanities disciplines, and the ones from the Science, Health and Engineering. The former demands more professional development opportunities regarding online teaching than the latter. This matches with the existence of intellectual clusters or styles of intellectual inquiry stated by Kolb (1981) and developed by Becher (1994), where Humanities and Social Sciences belongs to the concrete reflexive cluster, and the other ones to the abstract active cluster.

Even though most of the literature on online teaching roles focuses on the pedagogical role, peripheral roles are highly considered by the teachers, thus stressing the fact that online teaching needs an inclusive approach (Guasch, Alvarez & Espasa, 2010).

For the evaluator role, it becomes clear that assessment and the processes around it are a fundamental pillar about which students can ascertain the level of learning they have achieved. But building complex assessment mechanisms that could be consistent with socio-constructivist-based teaching models requires teachers to have clear learning design principles, to design student-centred assessment activities, and to encourage self-reflection (Pallof & Pratt, 2008).

The administrative role takes care of the management of the course and all the issues related to pedagogy. Teachers have clearly understood the importance of course planning, organizing, leading, and management (Coppola, Hiltz & Rotter, 2002), as well as establishing rules and regulations for the proper development of the course, acting as the interface with the institution (Goodyear et al., 2001).

As for the advisor/counsellor role, teachers feel the need to be better trained on "reply to students' work" as a means to improve the advisor's role. Tasks such as provide advice, give suggestions, and clarify doubts are highly valued (mean= 3.02). This highlights the professional development need for feedback provision strategies, a line of work well defined by several authors (Espasa & Meneses, 2010; Espasa, Guasch & Alvarez, 2013). Likewise, students' motivations arise as another important task in this role (mean= 2.97). Both feedback provision strategies and students' motivation are very relevant issues in face-to-face teaching situations as well. But when considering online teaching as teaching at a distance, it becomes particularly important in pure distance education systems, which are usually criticised because of their high drop-out rates (Park & Choi, 2009; Pierrakeas et al., 2004).

Online education is inseparably linked to technology. But this doesn't mean that the online teaching role of technologist will have to necessarily be assumed by technology experts. Specific technology competencies for online teachers will vary depending on the mode of delivery of instruction to distance students (Williams, 2003). This explains teachers' continuous interest in being trained in technology. The knowledge of basic technology competencies is crucial, and to know how new technologies can influence online teaching in the very next future is a must. However, the training of technology competences should not be separate from those related to other online teaching roles. As stated by Mishra and Koehler (2006), teachers need a more integrated and multidimensional knowledge.

Personal and researcher roles are the ones less perceived by online teachers. In both cases, they ask for more professional development in these areas, probably because they are not very aware that these roles exist for online teaching, and they would like to strengthen these roles. Action research is usually conducted by some online teachers, integrating their research findings in their teaching (Bawane & Spector, 2009).

However, the current faculty professional development programmes at the universities don't seem to adequately consider the research and the literature regarding online teaching roles and competencies (Baran, Correia & Thompson, 2011; Sangrà, González-Sanmamed & Romeu, 2013).

The results of this study, and especially the way teachers call for a more focused professional development on online teaching, could help to make people and institutions aware that online teaching goes beyond the simple fact of transferring the usual classroom-based teaching behaviour into another dimension by just using a different means of delivery. Understanding the different roles and tasks in an online teaching and learning environment is crucial for the evolution of institutions in the future. As stated by Painter (2003), institutions could construct barriers to acknowledging the success of teachers by not reflecting on everything involved in online teaching and ignoring the teachers' professional development needs.

In addition, those current programmes that are sensitive to the professional development needs are usually led to focus on planning and designing, or on introducing technical resources into teaching (Alvarez, Guasch & Espasa, 2009; Turner, 2005), forgetting the above mentioned peripheral roles. As suggested by Baran, Correia and Thompson (2011), the literature suggests that the proposed roles and competencies of online teachers are useful in the curriculum, training, professional development of online teachers (Bawane & Spector, 2009; Williams, 2003). This means that there should be significant efforts in carrying out inclusive professional programmes for online teaching.

The use of social networks in online education can also strengthen the development of the peripheral roles – especially those related to social roles (community, interactivity, teamwork) – which could become key for the improvement of online teaching performance (Singleton, 2004, also quoted by Bawane & Spector, 2009). Berge (2008) calls to analyze how new emergent technologies and its use in online teaching could affect the need for a permanent revision of the competencies, roles and professional development need of online teachers.

Implications for Future Development

The results of this study envisage three main fields in which strong implications can be found.

The first one regards teacher training/professional development. The study shows teachers ask for more professional development in the so-called peripheral roles. As stated by Baran, Correia and Thompson (2011), specialized training related to each of the competences is needed. Higher levels of proficiency could be achieved through training and experience, so institutions should put in practice different programmes to increase the capacity of teachers to become good online teachers. Considering the above, it is logical that online training for teachers is necessary to efficiently teach in online environments (Mcdonald & Poniatowska, 2011).

These programmes should consider both the central and the peripheral roles, and take into account the professional development needs that teachers have made evident. The balance between the roles is important, in order not to bias in a particular one (i.e., technology, which will continue to change quickly). In fact, technology should always support pedagogy, and it should be integrated in any of the approaches teachers adopt in their teaching.

The second one relates to the evaluation of online teaching performance. Deeper understanding of the whole set of roles online teachers have to carry out might be very useful for improving the way in which online teaching is going to be evaluated. Most of the current online teaching evaluation models focus mainly on the whole course (materials and resources, and on students' satisfaction), resulting in a sort of guidelines more than in actual online teaching assessment. Evolution of this issue since Chickering and Gamson (1987) has been relatively scarce.

And the third one faces the transformation of universities. The transition of moving from traditional classroom-based models to blended and online learning is becoming a critical point in the transformation of universities. In this process the three main elements that conform to the TOP triangle for an appropriate online education model implementation, technology, pedagogy and organization, should be strongly considered (Bates & Sangrà, 2011). They cannot be considered separately, but strongly linked and influencing each other. Future research will have to focus on the collective transformations occurring in the institutions in which the individuals are very important agents (Baran, Correia & Thompson, 2011). The peripheral roles of online teaching and its training programmes are an important part of this triangle, especially affecting organization and pedagogy.

This research has been an attempt to highlight the online teaching dimensions that are not usually addressed by the current teacher training practices. To be aware about what the online teachers say from their practitioners' role will result of great usefulness, especially considering the importance that teaching staff has regarding the process of integration of online teaching in blended models.

Despite this study was conducted in a specific context, but the characteristics of a classroom-based institution which was in the process of incorporating online courses might be of interest because their issues and the implemented solutions may be transferable to other institutions given the interest of higher education institutions to incorporate technology and to design and implement online teaching ... "It is critical to gain access to the perspectives of teachers in examining the transformation" (Baran, Correia & Thompson, 2011, 435). This is one of the contributions of this study, getting the data gathering closer to the teachers' practice and reflection.

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THE INTERNATIONAL REVIEW OF RESEARCH IN OPEN AND DISTANCE LEARNING

Promoting Distance Learners' Cognitive Engagement and Learning Outcomes: Design-Based Research in the Costa Rican National University of Distance Education

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Abstract

To explore effective learning design for students' cognitive engagement, a design-based case study was conducted in a quality control course in the Costa Rican National University of Distance Education between the 2011 and 2012 academic years. The course was revised for the 2012 provision in terms of the assignment structure, the number of face-to-face sessions, and facilitation strategies. This study documents how the course redesign impacted the distance learners' cognitive engagement and learning outcomes. Theories of cognitive engagement and transactional distance informed the design-based investigation. Research findings indicate that the design revisions positively influenced both students' cognitive engagement and learning outcomes within this distance higher education context; however, the student performance represented by their assessment grades might not always reflect this improvement.

Keywords: Distance higher education; transactional distance; cognitive engagement; learning outcomes; design-based research

Introduction

Design-based research integrates empirical investigation with theory-based learning design (Swan, Mattews, Bogle, Boles, & Day, 2012). The ultimate goal of design-based research is to improve students' learning in real-world educational environments through systematic innovations (Wang & Hannafin, 2005). Since research and development simultaneously occur through continuous cycles of design, enactment, analysis, and redesign in a design-based research project (Cobb, 2001), this approach enables educators to elucidate "how, when, and why educational innovations work in practice" (The Design-Based Research Collective, 2003, p. 5). Particularly, design-based research entails the study of learning in context through systematic design and instructional strategies (Brown, 1992). It thus leads to "contextually-sensitive design principles and theories" (Wang & Hannafin, 2005, p. 7), which also can create a number of meaningful implications for distance education.

The purpose of this study is to report on the first cycle of a design-based research process for designing, implementing, and revising a quality control course in the Costa Rican National University of Distance (*Universidad Nacional Estatal a Distancia* in Spanish). Considering the iterative nature of design-based research and the dual purpose to redesign the course and to create design principles (Swan et al., 2012; Wang & Hannafin, 2005), the study documents the design changes made for the 2012 course provision and their effect on students' cognitive engagement and learning outcomes. The target course has been provided at an undergraduate level in a hybrid format; it features field trips related to students' individual research projects as well as a series of supplementary face-to-face classes.

Lauzon (1992) pointed out that one of the fundamental challenges for distance educators is to "search out means of reducing structure and increasing dialogue so that learners may move from being simply recipients of knowledge to actively embracing and working with objective knowledge to make it their own" (p. 34). In an attempt to improve the course quality through ongoing design experiment, we attempted to determine how the redesign influenced the pedagogical processes and outcomes in this specific context of open and distance higher education. The quality control course in the Costa Rican National University of Distance Education was chosen for this design-based research because the course involved multiple pedagogical elements which might illuminate how the changes intended to enhance the course quality influenced students' learning experiences.

The conceptual framework of the research is described in Figure 1. After reviewing the student survey results compiled after the 2011 course, we redesigned the course structure and content with two guiding theories of cognitive engagement and transactional distance in order to facilitate engagement with learning. More specifically, the assignment structure, facilitation strategies, formats of supplementary face-to-face sessions, and examination contents were redesigned in the line with the two theories.

Subsequently, we examined the impact of the design changes in terms of the students' cognitive engagement and performance as well as knowledge development.

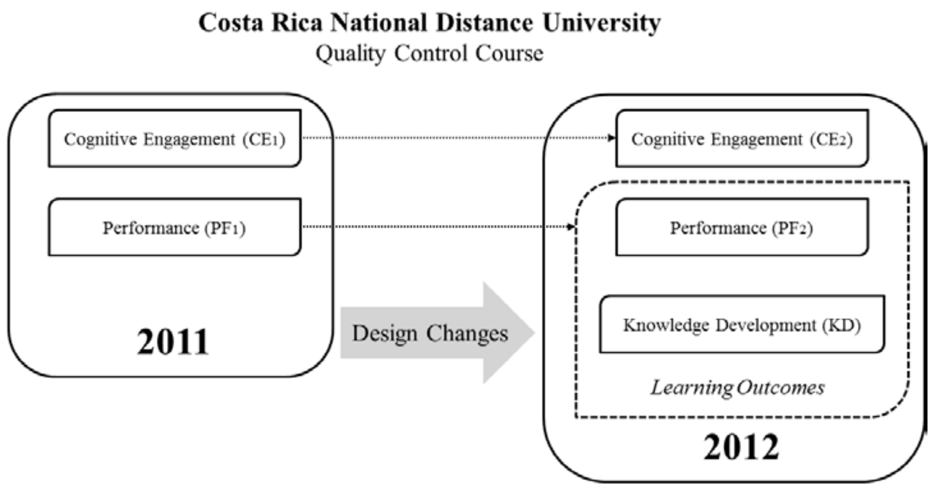

Figure 1. Conceptual framework of the research.

Theoretical Frameworks

Cognitive Engagement

Given complex online learning environments, how distance learners engage in a specific educational circumstance and attendant instructional materials has been posited as a significant research inquiry because learners' cognitive engagement is pivotal for any distance educational pedagogy. Distance learners' engagement in and/or commitment to learning has been examined along with diverse pedagogical issues, such as learning effectiveness (Swan, 2003), student satisfaction (Sun, et al., 2008; Shea, Pickett, & Pelz, 2003), learning motivation (Hoskins & Van Hoof, 2005), and learning strategies (Brown, Meyers, & Roy, 2003; Stoney & Oliver, 1999). Cognitive engagement, as a theoretical construct, bridges among those heterogeneous conceptions in explicating how distance learners experience a learning context while accounting for their individual experiences and characteristics (Biggs, 1987). Since "the integration and utilization of students' motivations and strategies in the course of their learning" are the key to a successful distance education pedagogy (Richardson & Newby, 2006, p. 23), a conceptualization of cognitive engagement in relation to online course design supports effective teaching strategies, high learner motivation, and productive distance education pedagogy.

The term *cognitive engagement* was first coined by Corno and Mandinach (1983) to investigate students' learning in relation to the pedagogical process as well as individual characteristics. As cognitive engagement affects the amount and quality of effort that students exert in classroom activities, it indicates the level and/or kind of their motivations (Corno & Mandinach, 1983). Corno and Mandinach (1983) further argued that self-regulated learning is a representative form of cognitive engagement that leads students to a higher level of thinking. The conception of cognitive engagement has been used in various areas, such as literacy (Guthrie, 1996), multimedia (Bangert-Drowns & Pyke, 2001; McLoughlin & Luca, 2000; Stoney & Oliver, 1999), and mathematics (Henningsen & Stein, 2002; Marks, 2000). These primary inquiries encompass cognitive abilities, affective motivations, and learning experiences as defining aspects of students' cognitive engagement.

In the current study, cognitive engagement was regarded as one significant indicator of students' learning motivation in the context of open and distance higher education. The students revealed varying amounts and kinds of motivation and strategy in their learning tasks. This phenomenon can be further explained along with the distinction between deep and surface engagement with their learning (Biggs, 1987; Craik & Lockhart, 1972). Deep engagement is associated with intrinsic motive to create a more complex knowledge structure by means of one's existing knowledge and pedagogical materials (Biggs, 1987; Kardash & Amlund, 1991). On the other hand, surface engagement involves mere memorization, simple reproduction, and other kinds of superficial engagement with learning materials, such as just re-reading textbooks or class notes (Walker, Greene, & Mansell, 2006). Whereas surface engagement frequently results in unmet learner needs or underachievement in learning tasks, deep engagement with learning can be embodied in students' thoughtful cognitive processing and self-regulatory strategies (Corno & Mandinach, 1983; Greene & Miller, 1996; Wolters & Benzon, 2013). Furthermore, the students' experience of deep cognitive engagement is more likely to influence their future use of meaningful strategies that they develop through the learning process (Schunk, 1991).

In addition to individual motivation, interaction also plays a crucial role in the students' engagement with learning. In most educational environments, a classroom culture has a significant impact on the conditions that either restrict or improve certain pedagogical strategies and particular types of interaction among the pedagogical subjects (Edwards & Mercer, 1987). That is, cognitive engagement of students can be influenced by certain teaching strategies and interactions in the educational context (Blumenfeld, Puro, & Mergendoller, 1992). Moore (1989) identified three major categories of interaction in any pedagogical context: learner-teacher, learner-content, and learner-learner. The learning (re)design in this research thus included various strategies to promote interaction among the students (e.g., by changing discussion assignments) as well as between the students and the instructor (e.g., by increasing the number of face-to-face sessions). Interaction between the students and learning content was accounted for through variations in lesson units and reading assignment.

To this end, the changes made to improve students' cognitive engagement was assessed through course content reviews, such as discussion forums, assignments, and the mid and post self-assessments as well as the Cognitive Engagement/Transactional Distance (CE/TD) survey implemented at the end of the course. Survey questions particularly focused on the themes of e-learning, metacognitive ability, and self-regulation, which were specifically intended to capture transactional distance perceived by the students and to gauge their cognitive engagement in learning.

Theory of Transactional Distance

To further promote various interactions through our course (re)design, the theory of transactional distance (or transactional distance theory) was considered. Moore (1997), the pioneer of this theory, defined transactional distance as "a concept describing the universe of teacher-learner relationships that exist when learners and instructors are separated by space and/or by time" (p. 22). Most importantly, the concept of transactional distance denotes the psychological, rather than physical, distance among the pedagogical subjects. This observation is premised with physical separation between individuals that creates "a psychological and communications space to be crossed, a space of potential misunderstanding between the inputs of instructor and those of the learner" (Moore, 1997, p. 22). One of the fundamental theoretical implications of transactional distance is that an educational exchange among the pedagogical subjects, which is facilitated by educational mediations, can reduce miscommunication or psychological disconnection in order to lead to an effective educational transaction (Shearer, 2009).

In a nutshell, the theory of transactional distance concerns the pedagogical phenomenon of interaction between teachers and learners, or among learners themselves, in the distance educational context primarily influenced by diverse relations between dialogue and structure. More specifically, the structure consists of course design elements, such as learning objectives, activities, assignments, and assessments, whereas dialogue refers to the meaningful communication between the pedagogical subjects. Moreover, the theory accounts for the importance of autonomy, which indicates a learner characteristic in line with the degree of self-control or self-management in learning (Moore, 1997; Shearer, 2009). The theory thus allows us to elucidate how relations among the three fundamental variables in distance educational settings can "describe the extent to which course components can accommodate or be responsive to each learner's individual need" (Moore & Kearsley, 1996, p. 200).

Even though Gorsky and Caspi (2005) pointed out that few studies had carried out empirical research to test the validity of the theory's central constructs—dialogue, structure, and learner autonomy—a number of empirical studies have recently utilized the theoretical framework to scrutinize various pedagogical phenomena in online and distance educational settings internationally (e.g., Falloon, 2011; Flowers, White, & Raynor Jr., 2012; Hussein-Farraj, Barak, & Dori, 2012; Larkin & Jamieson-Proctor, 2013; Shaw & Chen, 2012). Goel, Zhang, and Templeton (2012) re-examined the core tenets of transactional distance theory in order to illuminate the congruence between the theory's face and empirical validities. Their findings attest that the theoretical underpinnings are empirically valid in explaining the participants' e-learning experiences (Goel, Zhang, & Templeton, 2012).

At a macro level, transactional distance theory helps us to understand how the three variables interact in the context of distance education (Shearer, 2009). As discussed by Moore (1980; 1997) and supported by Saba and Shearer (1994) and Shearer (2009), transactional distance or psychological separation is diminished when dialogue is high and structure is low. However, in the occasion that learners are highly autonomous, low dialogue does not necessarily exasperate the transactional distance. These relationships imply that a high level of dialogue may not always be required by autonomous learners for their effective learning. The relationships among the three variables are visualized in Figure 2.

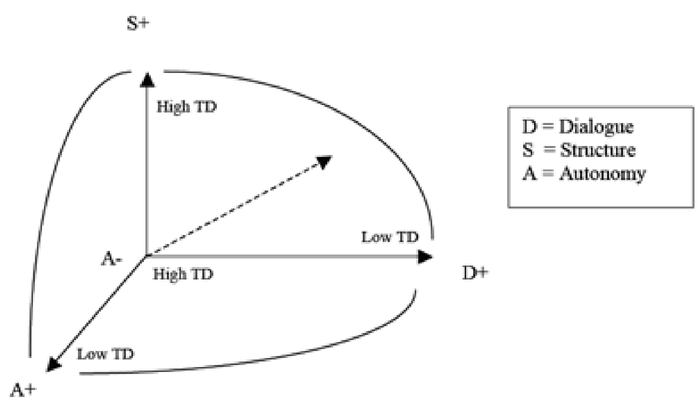

Figure 2. Three dimensions of transactional distance (Adpated from Shearer, 2009, p. 17).

In the process of designing a distance education course, Moore (1997) listed six fundamental components that could substantially alleviate or aggravate the transactional distance: (1) organizing the presentation of information; (2) supporting the learner's motivation; (3) stimulating analysis and criticism; (4) giving advice and counsel; (5) arranging practice, application, testing, and evaluation; and (6) arranging for student creation of knowledge. These design elements have commonalities in some epistemological purviews of cognitive engagement, especially in terms of learning motivation and pedagogical strategies. Our research explores connections between design and students' learning experiences through a redesign of the course as guided by the two theoretical frameworks.

Course Redesign

To examine the relationship between course design and learning processes/outcomes, the research team focused on the review and revision of a hybrid, though mostly online, undergraduate course in engineering developed in line with the two guiding theories.

Educational Settings

The Costa Rican National University of Distance Education was established in 1977. It is a public higher education institution created with a pedagogical model of open and distance education within the national university system of Costa Rica. This open and distance higher education institution generally requires high school diplomas for admission; however, some programs also implement placement tests as they provide professional certificates such as the English/French language teacher certificate and the industrial engineering professional certificate. Because a majority of the students pursue higher education degrees through this open educational opportunity, the institution's chief goal is to help disadvantaged adult groups participating in higher education. Approximately 3,000 students in diverse social groups are admitted to the institution annually.

This design-based research was conducted with the Quality Control course that is offered in the Agroindustry Engineering program once a year. The overarching course mission is to develop necessary skills for students to use key quality control methods and statistical techniques as well as total quality standards in a variety of food production stages, which leads to constant quality control and improvement. The course involves multiple hands-on activities entailing a high level of statistical exercises. Communication between the instructor and the students in those class activities are very important because students need an effective guide when they face difficulties at a distance. The regular quota enrollment of this course is 30. 31 students registered, and 29 students completed the course in 2011; 26 students registered and completed the course in 2012.

Course Revisions

The Quality Control course consists of four units (see Table 1). The course generally involves four types of evaluation: two exams, case study, a research project (plant tour), and participation (i.e., discussion forums and communications). In the case study, students are asked to present a problem case that a food factory may confront in its production lines, usually related to statistics and control graphs. Students should identify specific non-conformities that might cause the problems and provide adequate resolutions, using either their own experiences or readings. The case study covered 20% of the total grade in both 2011 and 2012. Additionally, students are required to visit food factories for their research projects, which is designed to improve their skills in identifying and analyzing major problems in real industrial context. The research report is expected to clearly demonstrate their observations of the circumstances, specific problems identified, possible solutions based upon statistical analyses, and reflections. While 25% of the total grade was allocated to the research project in 2011, 30% of the total grade was evaluated by the research project in 2012.

Table 1

Course Objectives and Assessments

Unit		Objective	Assessment
1	Quality control systems: Components and benefits	Acquire the basic knowledge related to quality control and quality assurance according to the theories and tendencies applied to the food industry.	• Q/A forum
2	Elemental statistics, variables, and attributes of control graphs	Apply the inferential, descriptive statistical concepts, and the quality tools that support the implementation of a quality control and assurance system in a food factory.	• Case study • First exam (Units 1–2)
3	Standards and norms applicable to quality control	Acquire knowledge about the correct application of the different normalization systems of a food company.	
4	Quality engineering and quality administration	Analyze the quality management process in a real situation through a visit to a food company.	• Second exam (Units 3–4) • Research project (plant tour)

After the 2011 course provision, the department decided to redesign the quality control course according to two reviewers' comments[1] and the results of the CE/TD survey. The pedagogical issues identified through these review processes are threefold. First, the course structure needed a revision as the majority of students pointed out problems that stemmed from giving them flexibility to explore broad topics to be covered in the course. This problem led us to rethink the amount of knowledge and information that students must focus on in their learning. Particularly, for those who had less statistical skills and experiences, this problem appeared even more salient. Second, the students highlighted the necessity to promote communications between the instructor and themselves, especially when they had confronted difficulties with the assignments and

[1] In the Costa Rican National University of Distance Education, lesson materials and course outcomes in each course are reviewed and evaluated by at least two administrators.

examinations. Some students at a distance requested a video conference with the instructor to grapple with this issue. Third, more clearly stated guidelines were requested for the assessment activities. In particular, many students reported that the instructions for the research project and exams were so ambiguous that the instructor should have provided more precise and concrete information.

Those issues mainly highlighted the needs for improvement in assignments, communication, facilitation, and assessment. Thus, the course revisions for the 2012 version centered on restructuring the reading assignments, increasing the number of face-to-face classes, employing facilitation strategies through diverse communication channels, and recalibrating the foci of the examinations. The specific changes made between 2011 and 2012 are described in Table 2.

Table 2

Changes Conducted Between 2011 and 2012 in the Quality Control Course

Redesign element	2011 course	2012 course
Reading assignment	Students were guided to read the entire textbook.	Students read specific topics in the textbook.
Number of face-to-face sessions	There was one face-to-face class during the course.	There were two face-to-face classes during the course.
Facilitation strategy	The instructor used no facilitation strategies other than answering students' questions.	The instructor employed multiple facilitation strategies through diverse communication channels (e.g., phone calls, e-mails, video conferences, etc.).
Examination	Exams included questions developed from a wide variety of topics in the course.	Exams were designed to measure students' expertise and deep learning in a limited number of topics.

Taken together, the design changes for the 2012 course provision were grounded in the two guiding theories of cognitive engagement and transactional distance. The improvements were intended to promote the students' deep engagement in their learning and to reduce the transactional distance between the instructor and the students.

Methodology

Research Questions

As noted earlier, the research reported in this study drew upon a design-based approach to a Quality Control course in the Costa Rican National University of Distance Education. The primary focus of the investigation was comparing learning experiences and outcomes of two student cohort groups in 2011 and 2012. The course redesign was based upon the cognitive engagement (CE) and transactional distance (TD) frameworks for the purpose of promoting the course quality and student learning. The following research questions informed the research:

- Was there a significant difference in the students' cognitive engagement between the 2011 and 2012 cohort groups?
- How did the course redesign affect the transactional distance and student learning outcomes reported by each student group?

Preliminary Findings

The preliminary findings of this research included results from the review of the 2011 course. At the end of the 2011 course, the students' learning was evaluated by two evaluation methods: (1) final course grades based upon student participation, the case study, the research project, and two written exams and (2) self-evaluation sent to the students in the Moodle platform. Figure 3 describes the range of grades per each assessment in 2011.

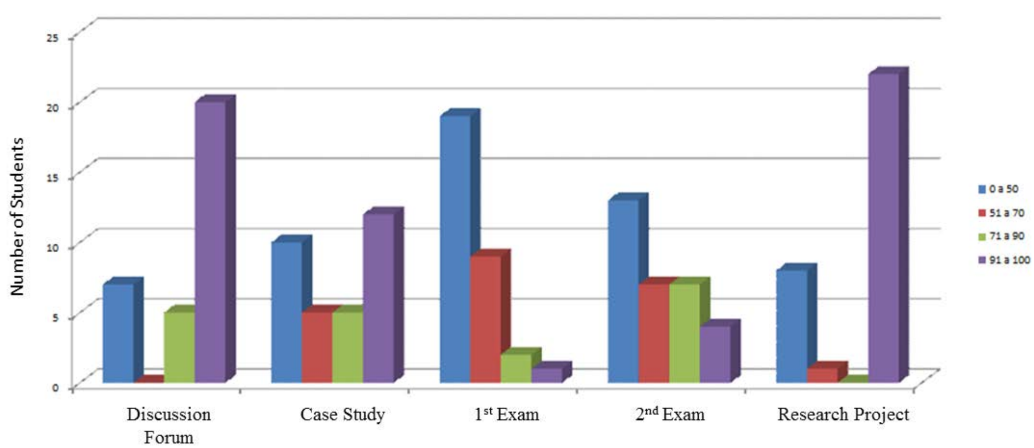

Figure 3. Range of grades per each assessment in 2011.

Students gained higher scores in the assessments of the forum and the research project, whereas they accomplished relatively low scores in the first and second exams. This analysis highlights the gap between their motivation or cognitive engagement, which is represented by the discussion forum and the research project scores as well as the learning outcomes measured by the written exams. Despite the gap, a positive correlation between cognitive engagement and learning outcomes was observed; that is, the more a student was engaged in the course, the higher scores he/she attained in the exams (Spearman's rho = 0.78). In total, a third of the students obtained final grades between 71% and 90% in 2011.

In 2012, the students were also required to complete an online self-checklist (Appendix II) where they were asked to reflect upon the improvement of their knowledge and skills in regards to the subject. This self-assessment encompassed three topics (i.e., descriptive and inferential statistics, control graphics and other techniques, and normalization and quality administration) and 13 yes/no question items. In sum, the students marked "yes" on 54% of the question items.

Data Collection and Analysis

This design-based research was adapted to explore the effects of course revisions on students' cognitive engagement and learning outcomes. Even though the research team used some qualitative data such as reviewers' comments and course materials in the process of this design-based research, the students' grades, surveys, and self-assessment conducted in 2012 were three major methods for data collection and analysis.

The participants were distance learners in the Quality Control course in 2011 (n = 31) and 2012 (n = 26). The research team reviewed both versions of the 2011 and 2012 Quality Control course, including instructional content as well as student materials (e.g., discussions, communications, assignments, exams, etc.). The structural changes made for the 2012 course were primarily determined by the review of the 2011 course. Learning outcome measures included scores on each assessment method as well as the final course grades. On the one hand, the first exam measured students' learning of quality control systems, elementary statistics, and process control graphs, whereas the second exam tested their knowledge about standards, norms, quality engineering, and quality administration. The case study aimed to assess the students' abilities to apply relevant statistics and process control graphics, and the research project represented the course goal of analyzing the quality management process in a real situation.

In order to evaluate students' cognitive engagement and experiences of transactional distance, all students were asked to complete the CE/TD survey that was composed of 5-point Likert questionnaires concerning e-learning, course content and structure, facilitation and communication, metacognition and self-regulation, and overall course feedback. This survey was initially validated by a previous study (Andrés, Menacho, & Rey, 2010) that used a Delphi method to select pertinent question items to measure cognitive engagement and transactional distance in the context of distance higher education. Additionally, every student in both 2011 and 2012 was asked to submit the self-assessment of their knowledge and skills developed through this course.

A quasi-experimental approach was employed to compare students' grades before and after the course revisions. That is, the revisions were posed as the independent variables while the dependent variables were students' scores in the series of course assessment methods. Additionally, a two-sample t test was applied to the CE/TD survey results (Appendix I) in order to verify if there was a significant difference between 2011 and 2012 ($p < 0.0001$). The students completed a self-checklist (Appendix II) to measure their own knowledge development at the end of 2012. The statistical program used for the analyses was InfoStat, a free software program last updated on Oct 17, 2010.

Results

Given the small sample size, the students' cognitive engagement measured by the survey and learning outcomes measured by their performance in each assessment could not be statistically generalized. Nevertheless, descriptive statistics show that students' cognitive engagement and performance were notably improved after the course redesign (t (30) =22.09, $p < 0.0001$). In particular, the students perceived that course content and their engagement in the units were significantly improved along with the course revisions (Figure 4).

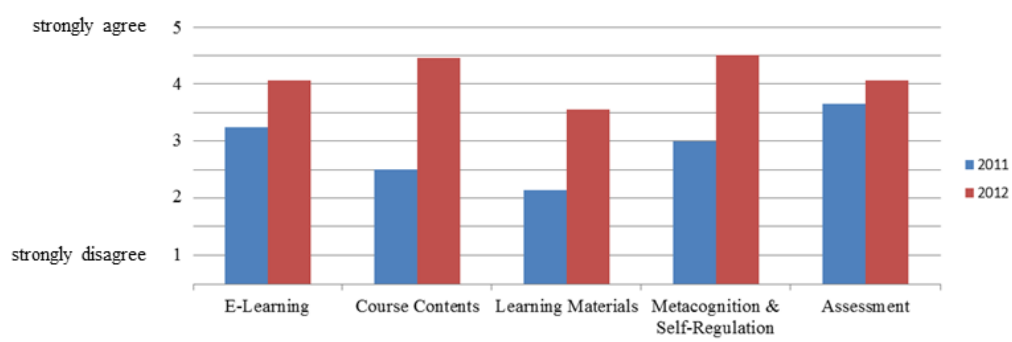

Figure 4. CE/TD survey result.

In terms of students' performance, the most contiguous difference was observed in Exam 1 and the case study, which supported the revision of the course assignments and the increased number of face-to-face sessions.

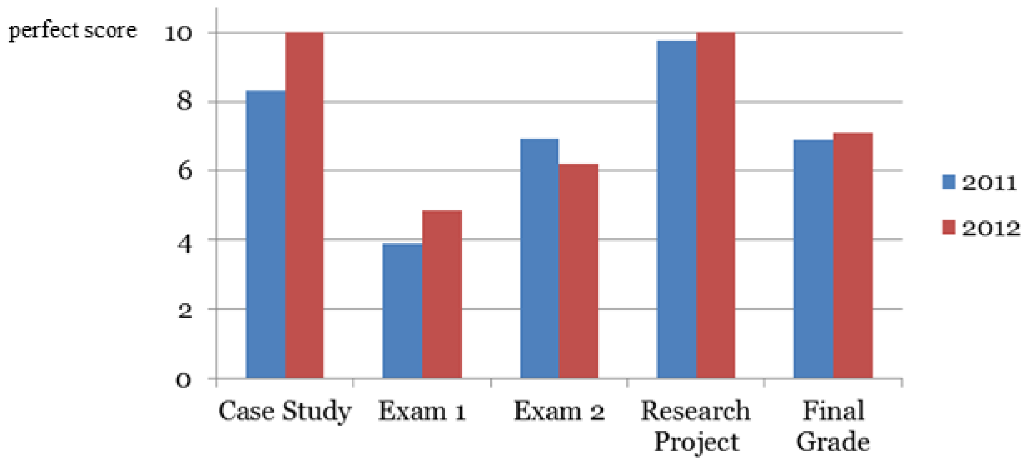

Figure 5. Student grades before and after course redesign.

Figure 5 indicates students' average scores in each assessment between 2011 and 2012. Positive influence of the course redesign on the student scores were observed in every assessment except Exam 2. The decreased average scores in Exam 2 could be partially due to the higher-level statistical analysis required for the 2012 exam. The 2011 exam was more theoretical, whereas the 2012 exam had more application-level questions.

Table 3

T Test Results and Effect Sizes for Learning Outcomes (in Each Category Including the Final Grade, 10 Points Equaled a Perfect Score)

Assessment	2011		2012		*t* (2-tailed)	Eta	Eta-Squared
	M	SD	M	SD			
Case Study	8.33	17.49	10.0	0.00	22.75**	.164	.027
Exam 1	3.90	17.96	4.85	14.92	8.29*	.041	.002
Exam 2	6.92	2.09	6.21	1.58	15.74**	.093	.009
Research Project	9.77	0.41	10.0	0.00	14.53	.442	.195
Final Grade	6.90	1.93	7.10	2.07	18.19**	.253	.064

* $p < 0.001$ and ** $p < 0.0001$

The final grade mean in 2011 was 6.90, with a standard deviation of 1.93. On the other hand, the final grade mean in 2012 after the redesign was 7.10, with a standard deviation of 2.07. The difference was statistically significant: $t(30) = 18.19$, $p < 0.0001$. In other words, the 2012 course revisions were effective for assessment performance. To this end, the result shows how the revisions oriented toward reducing the transactional distance between the instructor and students as well as promoting students' cognitive engagement for the 2012 course enhanced the quality of the course.

The result of the self-checklist completed by the 2012 students also reflected this positive impact of the course redesign. Even though the self-checklist is subjective and constructivist by nature, the fact that a majority of the students in 2012 checked off most key subject areas of the course as well understood attests to effective facilitation of students' development as intended by the design changes. Over 80% of the students answered "yes" to more than 12 out of 16 checklist items, and only 2 student marked "yes" to less than 8 questions. Since the self-checklist was not provided to the students in 2011, this result is not comparable between the two student cohort groups.

In summary, the improvement of the learning processes and outcomes measured by the CE/TD survey and the checklist assessment suggest that interventions aimed to enhance students' cognitive engagement as well as reduce the transactional distance led to positive learning processes and outcomes in this open and distance higher education context. Therefore, these design-based research findings seem to correspond to the theoretical assumptions of cognitive engagement and transactional distance.

Discussion and Conclusion

Linking online learning design to students' motivation and learning outcomes is a persistently significant quest for distance education researchers and scholars. To further develop our knowledge regarding these constructs, this study attempted to measure the impact of the course redesign in terms of cognitive engagement and transactional distance as experienced by distance learners in an institution of open and distance higher education. Results of the study indicate that, taken together, the revisions based upon the theories of cognitive engagement and transactional distance could be linked to the improvement of students' motivation and learning outcomes.

This finding suggests a need to consider the specific implications of the range of educational contexts in which learning in distance higher education takes place. The theory of transactional distance (Moore, 1980) was employed to examine the educational context, especially by accounting for the multiple relationships between learners or between teacher and learners. More specifically, the study exemplifies that the changes in the facilitation strategies and the increased number of face-to-face sessions could lead to improved dialogue, which results in the reduction of psychological distance among the pedagogical subjects and the students' cognitive engagement in this distance higher education context.

Furthermore, the 2012 revisions oriented toward clarifying learning tasks by changing the structure enhanced learning outcomes. This result might contradict the theoretical assumption of transactional distance, which is grounded in the inverse relation between dialogue and structure in a distance education course (Dron, Seidel, & Litten, 2004). However, as Moore (1977) previously noted the possibility of high dialogue and high structure (as in correspondence programs) or low dialogue and low structure (as in self-directed independent programs), the desired balance between dialogue and structure is only reliable when it is based on the educational sophistication of the learner and the subject content (Moore, 1997). Given the learner characteristics (i.e., mostly part-time distance adult learners and transitioning or returning college students) and the subject content that requires high-level statistical skills and hands-on exercises in the current research, the heightened level of the structure in lessons, assignments, and assessments of the 2012 course had a positive impact on dialogue, which made students feel less transactional distance.

More significantly, "[a] delicate balance between course structure and dialogue of the instructor and learners is critical for online learner success" (Murphy & Cifuentes, 2001, p. 298). Previous studies that investigated the role of course structure in student satisfaction and perceived learning in online learning environments, such as Shea, Pickett, and Pelz (2003) and Stein, Wanstreet, Calvin, Overtoom, and Wheaton (2005), also support reduced transactional distance with high structure and high dialogue. By tightening the structure, the course redesign consequently promoted the level of student motivation and adaptability of content, which resulted in deeper cognitive engagement and richer learning outcomes among the student group.

To sum up, this design-based research reaffirms the strong correlation of less transactional distance with productive learning outcomes recently attested by Benson and Samarawickrema (2009) and Flowers, White, and Raynor (2012). Specifically, this study implies that the learning context for distance higher education is highly dependent on the learning design delicately prepared to support learners' characteristics as well as dialogue. Since an effective instructional systems design model considers various aspects of the learning context, such as process, systems, outcomes, and delivery (Morrison, Ross, & Kemp, 2010), transactional distance in relation to those heterogeneous design elements can inform future design-based research studies that are similar in context to the one examined in the current research. To this end, drawing upon the lessons that we have obtained through the first cycle of this design-based research, we will investigate how the combination of those multiple pedagogical components can be optimized to reduce the transactional distance in this specific context of open and distance education in the next cycle of course redesign.

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Appendix A

Quality Control Course CE/TD Survey

Name:

Date:

Questions asking about your experience of this distance education course are categorized into five topic areas as below. Please provide your answers to the questions.

***1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, and 5: Strongly Agree**

Topic	Question	1	2	3	4	5
E-Learning	This online course was more useful than face-to-face courses.					
	This online course was more convenient than face-to-face courses.					
	The amount of instructional presentation was appropriate.					
	Intervention of the instructor through the course was timely appropriate and useful.					
	I could easily find any necessary information in the lessons.					
	I always have access to this online course during this semester.					
	It was easy for me to use the virtual platform of this course.					
	I prefer working on and submitting assignment and assessment online to doing them in hard copies.					
	The communication through the platform e-mail was seamless.					
Course Contents	Course contents met my expectations and needs.					
	Exams were adequately designed to assess my learning.					
	The difficulty-level of course contents were appropriate.					
	I would use knowledge and skills that I learn from this course.					
Learning Materials	The study guideline was useful for my learning experiences in this course.					
	I could easily understand the textbook contents.					
	I could easily understand what the online course materials indicate without further explanations.					
Metacognition & Self-Regulation	I was motivated to further explore challenging concepts and problems in the course.					
	A series of assignments and exams facilitated my knowledge development.					
	The instructor's advice and tutoring effectively					

	led to productive and authentic learning.					
	Learning took place in a self-paced fashion.					
	I managed well to balance my work or everyday life and learning in this course.					
Assessment	The discussion forums were useful for my learning.					
	The case study helped me to integrate concepts and ideas in the lessons.					
	Through the research project, I could develop my analysis skills.					
	The difficulty level of the exams were appropriate.					

Appendix B

Quality Control Course Knowledge Self-Checklist

Name:

Date:

Objective		Item	Yes	No
1	Inferential & Descriptive Statistics	1-1. I can define what a quality control system is.		
		1-2. I can list the fundamental factors of Quality Control.		
		1-3. I can specify benefits that a Quality Control system brings.		
		1-4. I can apply basic statistical concepts (such as a "z" contrast test and a variance analysis) to Quality Control practice.		
2	Control Graphics & Other Techniques	2-1. I can create control graphics with different variables.		
		2-2. I can build control graphics using key attributes.		
		2-3. I can interpret the control graphics.		
		2-4. I can make Ishikawa diagrams.		
		2-5. I can make cause-effect diagrams.		
		2-6. I can interpret ladder diagrams.		
		2-7. I know how to use Codex Alimentarius Normative.		
		2-8. I can define quality specifications.		
3	Normalization & Quality Administration	3-1. I can articulate principal norms related with Quality control of agro industrial food.		
		3-2. I can carry out sampling in an effective fashion.		
		3-3. I can explain various aspects of quality administration in different contexts.		
		3-4. I can keep a product from being out of specifications.		

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THE INTERNATIONAL REVIEW OF RESEARCH IN OPEN AND DISTANCE LEARNING

Framework of Quality Assurance of TEL Integration Into an Educational Organization



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Abstract

This research paper addresses the issues of integration of technology enhanced learning (TEL) into an educational organization. Good practice experience cannot be directly transferred to new organisations due to different contextual conditions. The TEL integration depends significantly upon a very rapid development of services and information communication technologies (ICT). Some organizations have managed to go step by step with the developments and have become leaders in TEL provision, however others, though having successful examples, have not succeeded in reaching the service level they want. While many positive examples exist in research literature, it is rare that institutions have complete strategies or solutions for integrating TEL that meet their specific pre-conditions and satisfy quality assurance parameters at the same time.

The research reported here aims at the development of a theoretical framework for quality assurance of TEL integration into educational organizations. During the research, the development of the TEL concept has been discussed, success indicators for TEL integration in an educational organization have been described, the quality parameters of TEL integration into an educational organization have been identified and the model for TEL integration into an organization has been developed.

Keywords: Technology enhanced learning (TEL); TEL integration; quality parameters; educational organization

Introduction

The mission of academic institutions to ensure up-to-date learning service provision is facilitated by technology enhanced learning (TEL). The strategies and actions taken vary depending on the country, prior experience, and other prerequisites established at each individual institution and the country. The interests of the majority of institutions target improving transparency and quality of learning services, modernizing curriculum through TEL affordances, and meeting the needs of their target learners.

The very rapid development of technological devices and software has been another driving force for decades. Society has become more and more interactive with the help of mediated communication tools at hand. Learners have become aware of the possibilities of receiving learning content at any time and in any place.

Problem

However, the introduction of TEL into an organization remains a challenge. Good practice experience cannot be directly transferred to new organisations due to different contextual conditions. TEL integration depends significantly upon very rapid development of services and information communication technologies (ICT) themselves. Some organizations managed to go step by step with the development and became leaders in TEL provision, however others, though having successful examples, have not succeeded in reaching the service levels they want. Although many examples exist in research literature discussing the strengths and weaknesses of TEL in its different modes (technical skills and accessibility [Anderson, 2008], curriculum designing [Minnaar, 2013; Reeves, Herrington, Oliver, 2002], institutional transformation and management issues [Laurillard, 2002, Bates, 2010], learner satisfaction factors [Shen, Cho, Tsai, Marra, 2013], technological solutions to support learning designing [Ferreira, Andrade, 2011], advancement of open educational resources [Lane, 2008], new learning methods and knowledge sharing options [Law, Ngai, 2008]) and many many others, it is rare that institutions have complete strategies or solutions of integration of TEL to meet their specific pre-conditions and quality assurance parameters at the same time (Bates, 2010; Kukulska-Hulme, Jones, 2012).

This research addresses the problems highlighted above and aims at the development of a theoretical framework for quality assurance of TEL integration into educational organizations.

The aim of the research is to define the quality parameters of technology enhanced learning (TEL) integration into an educational organization.

The objectives of the research are:

1. to define success indicators for the integration of TEL as an innovation in an organization;

2. to propose a model for TEL integration into an organization on the basis of quality parameters.

Method

Research question: What are the quality assurance parameters for TEL integration into an educational organization?

Research Methodology

Ten experts from European professional organizations (European Distance and eLearning Network [EDEN] and European Foundation for Quality Development [EFQUEL]) participated in the research data collection and analysis. The data collection took part in international events, network conferences, and internal meetings online. The researchers invited network members to participate in the qualitative inquiry process. Ten experts agreed to participate in the research.

The experts' age ranged from 27 to 55, and professional experience in distance and e-learning was from 5 to 15 years. They represented the following countries: Italy (2), Slovenia (1), Germany (1), Hungary (2), Lithuania (2), Belgium (1), and the Netherlands (1). This group (further referred to as International Expert Group - IEG) participated in both data collection and inductive and deductive analysis of research data.

Another group who participated in data analysis consisted of 12 experts from the Lithuanian Distance and eLearning (LieDM) association. The experts represented professionals from adult, vocational education and training, and higher education institutions. All 12 experts were professionals who had worked in distance and e-learning for more than 10 years. Their age ranged from 38 to 58. They occupied responsible positions for the organization of distance and e-learning in adult, vocational education and training, and higher education organizations in Lithuania. This group will be referred further in the text as National Expert Group - NEG.

Methods

Qualitative analysis of content as qualitative inquiry was used as the research method.

Following Marchall and Rossman (1998), two methods for data collection were used: 1) analysis of documents and materials, and 2) group discussions (which are termed expert discussions in this research).

For data analysis method inductive and deductive research methods were used (Savin – Baden, Mayor, 2013).

The phases of data collection and analysis, as well as their sequence, are presented in Table 1.

Table 1

Phases of Data Collection and Data Analysis Process

Data collection process	Data analysis process
IEG implemented internal meetings with their organizations in order to review existing regulations for technology enhanced learning. First data was selected for IEG meeting discussion.	During the first EIG meeting, the data were analysed and inductive versus didactive analysis was carried out, in order to define the first categories of quality features for technology enhanced learning integration into an organization.
IEG implemented literature analysis and collected data on TEL quality assurance characteristics.	IEG met to analyse the data and to implement inductive and deductive analysis on TEL theoretical and empirical quality assurance characteristics.
IEG organized national seminars with TEL target groups in order to collect data on quality assurance requirements for TEL.	IEG shared the results and implemented data analysis by measuring the relationships of single criteria with the categories of quality assurance called criteria groups.
IEG presented quality criteria to their national and institutional experts for data validation.	IEG members brought feedback from national expert groups and finalised quality assurance categories for TEL integration.
NEG collected data on the quality characteristics in terms of quality criteria (features) for TEL implementation in vocational education and training, adult education and higher education institutions.	NEG gathered to review experts' results from national vocational education and training, adult learning and higher education organizations to establish relationships of criteria and to group individual criteria into criteria groups.

Tools

Collaborative online tools were used for data collection and analysis during the whole process of research. Google documents and forms, as well as Excel spreadsheets were used for this purpose. Qualitative research data were entered into the document after each phase. The key question addressed during the meeting with both the IEG or NEG was "How is TEL introduced in an educational institution, what are the stages and important factors, what are the quality criteria of this process?" All IEG and NEG meetings were recorded and data collected were inductively inserted in the document. If experts were not able to participate in the meeting, the online form was sent to them to be filled in with the open answer. These answers were again transcribed and copied into the data collection document.

During the data analysis phases, the data were deductively analysed and intermediate results were presented in the collaborative working document (Google doc or Excel spreadsheets). All editing versions were saved and reviewed during the data analysis, and editing history was used. Online collaborative documents were used among these two groups only.

Ethics

All data collection and data analysis records were used anonymously outside the groups. Data collection was implemented using all ethical standards and rules. If data were collected during international expert group meetings with other professionals, outside the group, all discussions were recorded and transcribed anonymously for research purposes only.

Results

TEL Services Offered by Organizations

The term technology enhanced learning (TEL) is used extensively throughout the educational world. It is the latest in an assortment of terms that have been used to describe the application of information and communication technologies (ICT) to learning and teaching. Unlike other terms such as e-learning or on-line learning, technology enhanced learning implies a value judgement: the word "enhancement" suggests an improvement or betterment in some way (Price & Kirkwood 2010).

According to the authors, TEL seeks to improve the student learning experience by aiding their engagement, satisfaction, and retention, helping to provide skills to compete in a global business environment, encouraging innovative teaching, personalising learning, promoting reflection, and delivering and supporting internationalization.

In this paper, the concept of TEL is treated as the broadest concept, following the definition by Price and Kirkwood, meaning that it embraces e-learning, on-line learning, and other forms of TEL. Following this approach, TEL has developed along with generations of distance education and now creates new forms or is the means for the realization of innovative learning and teaching scenarios using information and communication technologies (ICT).

According to Anderson and Dron, "distance education evolved from a Gutenberg-era print and mail system to one that supports low-cost, highly interactive learning activities that span both time and distance with equal facility" (2012, p. 1). Distance education, according to the authors, does not follow a single paradigm mode, but is rather diverse and depends upon pedagogy solutions. The authors provide arguments for the classification of distance education pedagogy into three generations of pedagogies that provided solutions for technology affordances and learning scenarios.

E-learning ("terms commonly used for online learning include e-learning, internet learning, [...] web-based learning, and distance learning. All of these terms imply that the learner is at a distance from the tutor or instructor, that the learner uses some form of technology (usually a computer) to access the learning materials, that the learner uses technology to interact with the tutor or instructor and with other learners, and that some form of support is provided to learners", Anderson, 2008) is one of the most popular forms of TEL service in universities, vocational education and training, as well as adult learning institutions. According to Govindasamy (2002), many institutions use e-learning to solve authentic learning and teaching problems.

Blended learning is the most popular form of TEL. Garrison, Kanuka (2004), Laurillard (2002), and others proved that integration of blended learning in an organization is an effective and low–risk strategy for an organization to reconceptualize and reorganize pedagogical strategies, even though all blended model designs are absolutely different and no identical strategies exist. However, the unique characteristic in the introduction of blended learning approaches within an institution is that there is one very significant factor, that is, the engagement of academic community.

Besides on-line learning, e-learning, and distance learning (which dominated for the last decades), new forms of TEL emerged. Universities introduced innovative solutions, such as open educational resources in order to widen participation possibilities (Atkins, Brown, Hammond, 2007; Lane, 2008) or virtual and blended mobility forms to contribute to intercultural and multilateral collaboration scenarios (Volungevičienė, Teresevičienė, & Daukšienė, 2011). The TEL concept has significantly changed existing dominant practices, introduced innovations, and continues to change the landscape of learning services at education institutions. Thus today the TEL concept carries a broader focus than the previous ones, which would concentrate on online, distance, or e-learning, and it should be re-considered in the light of common practices.

Summing up the novelty of TEL services offered by educational organizations one could say that a broader concept of TEL has emerged out of e-learning, on-line learning, and distance education. The new TEL concept implies the value of judgement of improved learning services for students and new, innovative scenarios in learning and teaching. Though new forms of TEL emerged, like open educational resources and virtual mobility, blended learning forms remain the safest for organizations.

Quality Assurance of TEL Integration

Bates (2010) argues that TEL is not engaged with by senior management, or that quality assurance procedures do not seem to be enforced with the same rigour as for other courses. This may arise from an unwillingness to confront risk as an essential part of innovation, rather than develop procedures able to manage this risk appropriately. Consequently, these innovations are seen as inherently risky, are treated as special cases, and simply excluded from oversight. Mellar and Jar (2009) suggest that "higher education institutions need to re-examine the way that they approach the quality assurance and enhancement of e-learning courses" (2009, p. 30). Institutions need to develop approaches to the quality management of innovation (and especially innovation involving technology) that support innovation rather than stifle or sideline it.

Different standards and quality guidelines are available and used with regard to quality assurance in different countries (Stracke & Christian, 2010; Canadian Recommended E-Learning Guidelines, 2002). The standards for quality assurance guidelines for different levels of education institutions also exist, but, for example, specific TEL (including online and e-learning quality assurance guidelines) do not agree with more general, for example, European quality assurance guidelines for higher education institutions (see European Association for Quality Assurance in Higher Education website, http://www.enqa.eu/index.php/home/esg/). Moreover, higher education quality assurance guidelines in Europe do not suggest specific criteria for TEL service provision or integration within an organization.

Ferreira and Andrade (2011) discuss the "E-learning quality - ELQ" model developed by the Swedish National Agency for Higher Education. The model was identified through the analysis of the following: i) policies, projects and working networks developed by several European organizations; ii) policies of governmental agencies and national organizations dedicated to quality assurance in higher education, especially in e-learning; iii) published scientific articles. The model consists of 10 dimensions: 1. material/content; 2. structure/virtual environment; 3. communication, cooperation and interactivity; 4. student assessment; 5. flexibility and adaptability; 6. support: student and staff; 7. staff qualifications and experience; 8. vision and institutional leadership; 9. resource allocation; and 10. the holistic and process aspect.

The Australasian Council on Open, Distance and e-learning (2014) set eight benchmarks to support continuous quality improvement in TEL. The approach reflects an enterprise perspective, integrating the key issue of pedagogy, with institutional dimensions such as planning, staff, and student development and infrastructure provision. The benchmarks were developed for use at the organisational level. The benchmarks cover the following eight topic areas: 1. institution-wide policy and governance for TEL; 2. planning for institution-wide quality improvement of TEL; 3. information technology systems, services and support for TEL; 4. the application of TEL services; 5. staff professional development for the effective use of TEL; 6. staff support for the use of TEL; 7. student training for the effective use of TEL; and 8. student support for the use of TEL.

Bacsich (2009) reviews benchmarking methodologies used in United Kingdom universities, and references parallel work in New Zealand, Australia, Sweden, and EU based organisations. Typically these methodologies specify sets of criteria which are scored by evaluators. They differ mainly in how the criteria are set and the ways in which the scores are arrived at. They are all outcome-based, and do not prescribe how a project should be set up or e-learning materials developed.

In sum, quality assurance models are under discussion in the research literature. Available examples suggest sets of benchmarks to support quality improvement for TEL and e-learning services. The uptake of quality assurance procedures for TEL services by senior management is identified as problematic in practice. TEL service introduction is not fine-tuned yet nor treated adequately as integration of innovation in an organization.

Success Factors for Integration of TEL as an Innovation in an Organisation

Having analysed successful innovations and their cases, Tidd and Bessant (2009) provide the following successful innovation implementation criteria identified in their empirical research:

- product advantage (superiority in the eyes of the customer);
- market knowledge;
- clear product definition (including target markets, benefits, positioning strategy, product requirements);
- risk assessment (market, technological, manufacturing and design sources of risk);
- project organization (cross–functional, multidisciplinary teams);
- project resources (financial, material resources, human skills, management and technological skills);
- proficiency of execution (quality assurance and pre-commercialization business analysis);
- top management support (from concept to launch).

The authors claim that “these factors have all been found to contribute to new product success, and should therefore form the basis of any formal process of new product development” (2009 , p. 160).

According to Groff and Mouza (2008), there exist six critical factors influencing the integration of technology and innovation in the classroom: legislative factors (McMillan-Culp, Honey, Mandinach 2005, cited in Groff, Mouza, 2008), institutional level factors, factors associated with the teacher staff in this research (McKenzie 2003, cited by Groff and Mouza, 2008), technology enhanced project factors (Honey, McMillan, Carrigg, 1999, cited by Grodd, Mouza, 2008), student factors, and factors inherent to technology itself.

The authors agree on the outcomes of the research and indicate the following obstacles to successful integration of technology enhanced projects in the classroom: lack of teacher input on the development of innovations, insufficient support in the form of resources, time, professional development, human and technological infrastructure, inadequate institutional culture, teacher attitudes and concerns about technology use – inexperience, technology itself, and others (Groff, Mouza, 2008, 42).

It should be noted that this research is implemented on the level of an organization, focusing upon the main areas of its activity. The authors recognize the prominence of a learner – as the key actor in researching and identifying success or failure of a learning service provision. Learner satisfaction factors (discussed by Shen, Cho, Tsai, & Marra, 2013), technological solutions to support learning designing (Ferreira & Andrade, 2011), interaction (Woo &Reeves, 2007) and knowledge sharing ((Law & Ngai, 2008), and many other factors influencing learning success are not left behind by the authors.

Moreover, during this research, the authors focused on the institutional activity areas and the decisions that should be accepted in order to change existing practices within an organization so that they are all in favour of a learner and its support.

Having analysed the factors indicated by Tidd and Bessant (2009), as well as critical factors and obstacles by Grodd and Mouza (2008), the following representation of TEL integration quality criteria groups can be derived and tested.

Table 1

TEL Integration Quality Criteria Groups

Theoretically supported successful innovation implementation criteria (by Tidd and Bessant, Groff and Mouza)	TEL integration quality criteria groups (derived)
Legislative (and top management support)	Strategy and management
Technology (and resources)	Information technologies and infrastructure
Teacher (and proficiency of implementation)	Continuous professional staff development
TEL Project (also product advantages, clear product definition)	TEL curriculum
Student	Support systems
Institutional level factors (and proficiency of implementation, time and support with resources, culture issues)	Quality assurance
Market knowledge	Marketing and business development

The criteria of risk assessment and TEL organization will be analysed within the scope of the integration concept, rather than parameters for qualitative service development.

By applying theories of integration of innovation in an organization, the main criteria groups of TEL integration quality assurance have been identified and listed below in the following sequence: 1) strategy and management, 2) information technologies and infrastructure, 3) continuous professional staff development, 4) TEL curriculum, 5) support systems, 6) quality assurance, and 7) marketing and business development.

Strategy and Management

Many organisations are still in the initial stages of incorporating TEL into their repertoire of capacity strengthening. TEL creates new variables, constraints, and issues, making it fundamentally different from face-to-face learning environments (Veletsianos & Kimmons, 2012). As they gain experience incorporating TEL into their practice and learning, institutions will begin to find their niches in the new virtual environment. Yet, documentation of the issues, constraints, and challenges in implementing online courses continue to be limited both in educational institutions and business organisations.

While TEL implementation in educational institutions is in a more advanced position, in business organisations it still is in its infancy, with researchers identifying success factors, frameworks, models for organisational context (Nichols, 2008). Notably, results show (Liu, Huang, & Lin, 2012) that management support, organisational learning culture and institutional policy are crucial for the implementation of TEL.

Bates (2010) argues that resistance to change and barriers to TEL integration arise from the issues related to funding, vision development, and TEL organization. Kukulska-Hulme and Jones (2012) state that restriction also originates from the inability of universities to design new models of learning and emphasize resource constraints and reduction of staff student ratios.

It is clear that to ensure success the integration of TEL needs careful and systematic planning. Minnaar has analysed how ODL can be implemented in a university and pointed out that “planning starts with strategic planning, followed by the development of ODL policies for alignment with efforts, strategies, and processes” (2013, p. 104). Technologies are chosen by individuals with different experience, sometimes long before the management has delivered solutions. This is in contrast to effective technology integration, which, according to Iansiti (1998), should start with the decision makers’ visualization and perspective planning, including technological outlook.

It can be summarized that support from management, strategic planning, and TEL service policies in an organization are crucial factors for TEL service development. Resistance to new forms and services may result in issues related to the lack of resources and reduction of staff.

Infrastructure and Technological Resources

New technologies have altered the way students interact with their instructor and classmates; internet self-efficacy has been shown to be a significant predictor of students' satisfaction in fully online learning settings (Kaminski, Switzer, & Gloeckner, 2009; Kuo, Walker, Beland, & Schroder, 2013).

Usefulness and ease of use are compulsory for TEL services (Sela & Sivan, 2009) and system quality proves positively related to service quality (Kettinger, Park, & Smith, 2008). An easy to use system gives users a greater perception of usefulness and promotes a positive attitude towards the system, which implies that a system with better quality (such as better response time, reliability and accuracy) can deliver better services.

Learning management systems make up the critical element of an institutional online learning infrastructure. Salinas claims that it is perhaps the most widely used and most expensive educational technology (Salinas, 2008). An e-learning environment is more than just the sum of a technical system and quality learning 'content'; its success, or otherwise, is strongly mediated by actions taken in management of the system (Hilgarth 2011). Palmer, Gosper, Sankey, and Allan suggest "distributed models of leadership" for virtual learning environments that would be "proposed as appropriate for the good governance of both large IT systems and higher education" (2013, 73). The authors conclude that this is an important insight into the quality management of virtual learning environments.

Blumenfeld et al. (1991, cited by Edelson, Gordin, Pea, 1999) have identified six contributions that technology can make to the learning process: 1) enhancing interest and motivation; 2) providing access to information; 3) allowing active, manipulable representations; 4) structuring the process with tactical and strategic support; 5) diagnosing and correcting errors; 6) managing complexity and aiding production.

It can be stated in summary that infrastructure, learning management systems, technological solutions make up critical elements directly related to the quality of TEL services. Various models of IT solutions exist on the basis of management model needed, each of them having direct impact upon the TEL process.

TEL Curriculum and Programs

Morrison and Anglin (2012) argue that curriculum authors should have attributes and affordances to create efficient and effective instructional strategies. The authors claim that curriculum designers should be supplied with applicable technologies for presentation of information, for interactions, and for pacing of the instruction. Feedback should be ensured in any type and manner, and pacing possibilities should ensure full control over curriculum sequence and openness.

The characteristics of an effective activity design were described by Macdonald and Black (2010) claiming that effective activity design makes use of interaction in an online community, when participants have a sense that they belong to an active group of fellow participants.

Reeves, Herrington, and Oliver (2002) identify guidelines for educational applications of authentic activities within online learning environments. They describe authentic activities as characterised by the following features: having real-world relevance, comprising complex tasks to be investigated by students over a sustained period of time, providing the opportunity for students to examine the task from different perspectives, using a variety of resources, establishing the opportunity to collaborate and reflect, having the capability of being integrated and applied across different subject areas and lead beyond domain-specific outcomes, being seamlessly integrated with assessment, creating polished products valuable in their own right rather than as preparation for something else, and allowing competing solutions and diversity of outcomes.

To conclude, TEL curriculum design represents the key component to create efficient and effective TEL services. TEL authors should ensure effective activity design scenarios, openness of the learning process, integrated assessment solutions, and authentic activities online.

Continuous Professional Development of Staff

Many faculty members who are currently teaching online courses may not previously have taken online courses, since TEL offerings were not available then. Therefore, it seems necessary for instructors who are planning to teach online to consider taking at least one online course plus some ongoing faculty development training on issues of e-learning.

Web-based technologies can improve access, equity, and quality of professional learning opportunities; at the same time establishing online cohorts of teachers in courses can provide rich interactions and ongoing or work-embedded support (Robinson, 2008; Dede, Ketelhut, Whitehouse, Breit, & McCloskey, 2009, p. 9).

Researchers (Moore & Kearsley, 2005) stress that implementation of TEL might be good to start with teacher education since teachers are invariably keen, disciplined TEL students.

Bawane and Spector (2009) identify eight main roles of the teacher performing online:

1. pedagogical (content expert, organizer, instructional designer, tutor);
2. social (supports students, facilitator);
3. evaluator (monitors and assesses students);

4. administrator/manager (manages time and course);

5. technologist (selects the appropriate resource for learning, demonstrates awareness of synchronous and asynchronous communication tools);

6. advisor/counselor (provides guidance, motivates students);

7. personal (positive attitude to e-learning, sensitivity to students);

8. researcher (research in classroom teaching, reflection about teaching practice).

According to Angeli and Valanides (2009) teachers need to be explicitly taught about the interactions among technology, content, pedagogy, and learners in order to effectively use technology to improve learning. Pedagogic change in online learning might be understood in terms of the development of the teacher's knowledge of how to teach effectively with technology.

Georgina and Olson (2008) carried out a study to determine how faculty literacy and technology training impact their pedagogy, which, according to the study, is directly correlated. Moreover, the researchers stated that technology training may be maximized for the integration of pedagogy. By technology training the authors use the concept of technological literacy defined by Shackelford, Brown, and Warner (2004, cited by Georgina & Olson, 2008) as "the capacity to "design, develop, control, use and assess technological systems and processes" (p. 7). The researchers conclude that the most effective training is peer to peer training, however, discussion forums, workshops, and other forms of training are recommended by the authors.

It can be concluded that staff need to be consistently trained and given professional development in order to create new pedagogical models for TEL and integrate them in TEL service provision. A range of staff roles are identified for TEL service provision, which demand constant improvement of skills for TEL design.

Support Systems

Woo and Reeves (2007) claim that instructional designers lack theoretical knowledge about interaction. Rovai (2002), Thompson, and MacDonald (2005) and Shea (2006) explain the role of community in supporting online learning in relation to three elements in particular: social presence, teaching presence, and cognitive presence. Social presence is understood as the degree to which learners feel socially and emotionally connected with others in the virtual environment; cognitive presence means the ability of learners to construct and confirm meaning through sustained discourse and reflection; teaching presence means the design, facilitation, and, most importantly, the direction of cognitive and social processes in order to achieve learning outcomes.

Woo and Reeves (2007) argue that not every interaction is meaningful; nevertheless, it is one of the key components of good pedagogy, no matter whether technology is used or not. They claim that "interaction is … fundamental process for knowledge acquisition and the development of both cognitive and physical skills" (p. 15) and should be used in learner support, but only when it is reconceptualized in terms of learning theories. The authors claim that interaction is meaningful when it has direct influence on learners' intellectual growth.

Shen, Cho, Tsai, and Marra (2013) argue that self-efficacy is affected by prior experience, by student participation in learning activities, by social interaction of students, by students' ability to handle tools and content management systems, and by gender differences.

It can be stated in conclusion that interaction and support are critical elements of TEL service design and provision. Designing effective presential modes of teaching, planning, and implementing interaction with students to monitor their learning progresss and to handle interactivity and support with technological tools make up success factors for efficient and effective support in TEL.

Quality Assurance

Skeptics continue to question the quality of electronically delivered educational programs. It is not always clear how the participants who get education through online courses fare compared to those who receive face-to-face course content in formal settings (Ogunsola 2010). Mulwa, Lawless, O'Keeffe, Sharp, and Wade (2012) state that the reasons for evaluating learning provision might include: (a) determination whether the TEL solution is accomplishing its objectives; (b) identification of who benefited the most or the least from the TEL program; and (c) clarification of areas for improvement. Evaluation provides valuable feedback about potential users' perceptions of the TEL system, how well the software is written, and the extent to which the system really does support decision making (Jiang & Klein 1999).

Mulwa, Lawless, O'Keeffe, Sharp, and Wade (2012) summarized the scientific literature (Ehlers et al., 2005; Drachsler et al., 2010; Breitner, Hoppe, 2005; De Jong, Schellen, 1997; Nielsen 1993; all cited in Mulwa et al., 2012) and proposed a summary of quality assurance approaches for TEL services, including quality assurance based on the survey approach,the lifecycle approach placing evaluation at the centre of the development process, combined and layered evaluation approaches used to measure the impact of TEL recommendations, the pedagogical objective approach, the user–centred evaluation approach, empirical approach, and the utility approach where ICT solutions are implemented for internal quality assurance level (surveys, communication, etc.).

It can be summarized that TEL services need quality assurance procedures to give credibility for innovative service quality assurance, as well as to leave no doubt that innovative methods deliver, and importantly, highlight and reveal all quality aspects in TEL curriculum and programs.

Marketing

An ongoing market research study carried out by Lawless, O'Keeffe, Sharp, and Wade on e-learners (clients) can provide institutions with comparative advantage over others in their e-learning offerings. Market researchers and recruiters (salespersons) should be part of the overall e-learning initiative. The scope of this marketing operation may depend on institutions' e-learning policies and types of clients (learners). One of the important marketing strategies is to make accurate and updated information about their e-learning offerings known to as many potential learners as possible. This can be accomplished by registering e-learning sites with search engines, banner advertising, postings, and list servers, endorsement by credible people and institutions, and so on. Effective marketing will help institutions to attract and recruit students for their courses and programs (Khan, 2005).

Martin and Matlay (2003) discuss how organizations can gain considerable competitive advantage from Internet usage if they achieve the right mix of managerial capacity and marketing focus in terms of image, brand, and customer needs. Their human resource base could allow such organisations to "reinvent" themselves, mainly by effectively accessing and embedding new knowledge." It appears that organisational culture facilitates and supports wider access and application of new knowledge through organisational learning mechanisms.

Law and Ngai (2008) state that business process improvement and product and service offerings are positively associated, and, in their turn, they are positively related to organizational performance. The findings reinforce the importance of knowledge sharing and learning to companies. Executives should encourage knowledge management and organizational learning activities within their firms, and give proper considerations to the strategies and implementation of programs supporting these activities in order to enhance a company's performance.

To summarise the need for marketing and business plan development, one could say that improved and increased accessibility reveals new managerial capacities and possibilities to share and market TEL services. Marketing strategies should be developed at strategic and managerial levels to foster TEL service provision and new organizational learning modes.

The Model of TEL Integration into an Organisation

As discussed above, TEL should be introduced into an organization responding to the needs of an organization and taking into consideration existing contextual preconditions. TEL integration into an organization will be affected by seven organization activity areas (see Figure 1) which are described in the model as seven quality criteria groups.

An organisation which is willing to integrate TEL in an educational organization should see the process of integration as embedded into the issues that an organization can and cannot control. The first block represents the quality parameters that an organization cannot control. It is called “Identifying preconditions” in Figure 1. However, this is exactly the first step that should be made in the process of TEL integration in an organization. The preconditions, such as global and regional trends and dimensions in education policy, TEL demand, and information technology infrastructure in terms of internet permeability in the country, new devices and trends, should be examined and described.

As a second step, an institutional case should be developed. Self-assessment based on the seven key quality parameters of TEL integration (namely, 1. Strategy and management, 2. IT infrastructure, 3. TEL curriculum and programs, 4. Staff continuous professional development for TEL service design and provision, 5. Support systems for TEL participants, 6. Quality assurance of TEL services, and 7. Marketing and business plans) should be implemented by the organization, which would result in a case study report. The case study report should describe how TEL is addressed by all seven key areas and how it meets quality criteria: how TEL is represented in the strategy of the organization, how information technology infrastructure is developed, what experience the organization has in TEL curriculum and program development, what policy and practice are implemented in the area of staff continuous professional development, what kind of teacher and learner support system is implemented, how quality assurance systems work for TEL and innovations in the organization, and if new TEL services are linked with marketing and business development (see Figure 1).

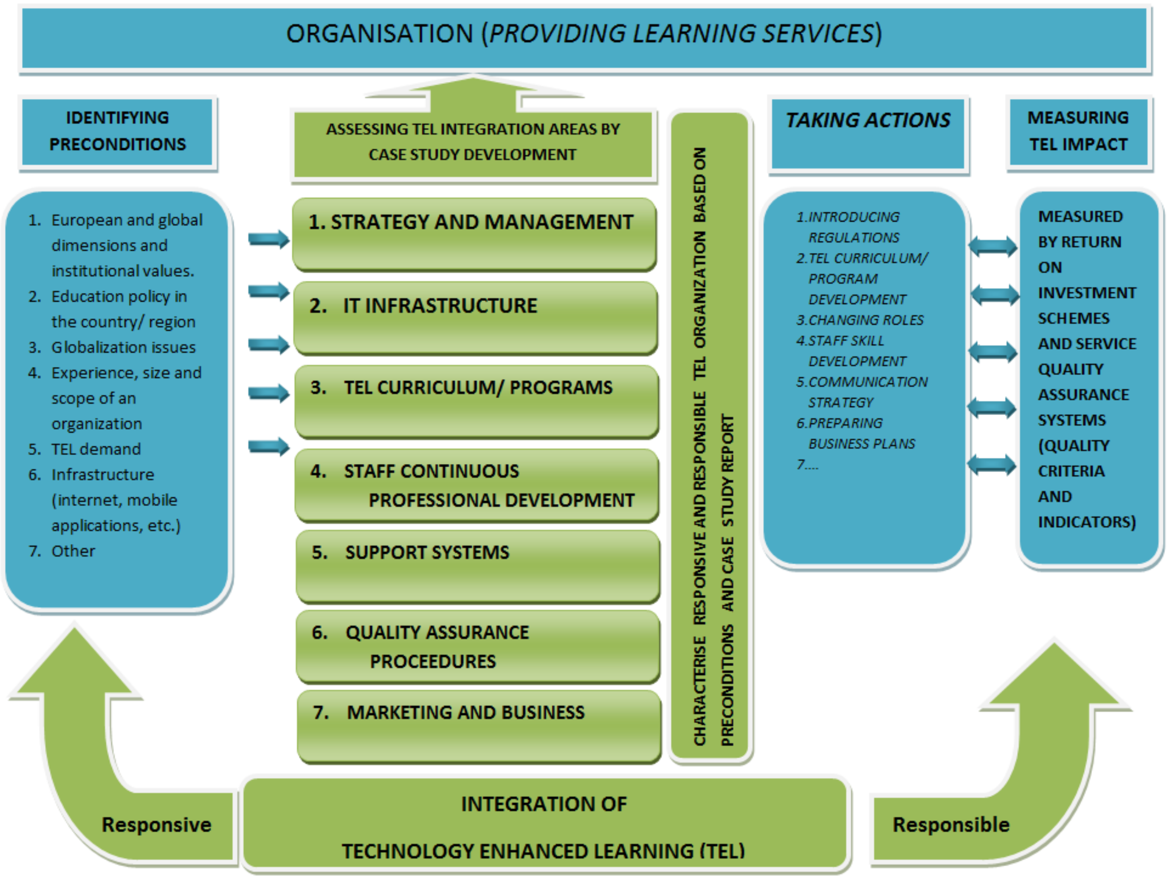

Figure 1. The model of TEL integration in an organization.

The case study report should characterize TEL development status in an organization, as well as include the needs described by all stakeholders of the organization. When the needs and the demand are agreed and described in the case report, the process of integration becomes *responsive* to existing preconditions, the needs and demand of the organization stakeholders and potential target groups, and is described by the case which records all this data. As the case is developed against TEL integration quality parameters (the seven key quality criteria groups), the case and the process of integration becomes *responsible*, as it carries the information of the primary causes and ensures that they are taken into account and are credited for further case development.

Following the logical sequence of the model, the results of the case report are presented for the next phase of TEL integration, namely, for reviewing the case report by an expert or experts and preparing the *action plan* for case further development. Characteristics and pre-conditions for TEL integration in an organization represent the data, the expert(s) implement data analysis, and the action plan is the outcome of the expertise. The organization should consider the action plan as direct recommendations for TEL integration.

The following steps can be recommended for an organization in application of the model: 1) identify and assess pre-conditions existing in global, regional, national, and institutional contexts; 2) implement a case study and prepare the case study report covering institutional preparedness for all seven areas of activity; 3) prepare the action plan to integrate TEL; 4) integrate TEL in the organization; 5) continue monitoring of TEL integration and measure TEL impact upon the core services provided. The process of TEL integration has the aspiration to be characterized as responsive (towards preconditions, organization needs, and demand from the market), as well as responsible (as case development is based on quality parameters and is implemented in organizational context). Moreover, there is one more step in the process of TEL integration, namely, the phase of measuring TEL impact upon the organization activities, success, and service quality. Even though this research does not propose recommendations on how to measure TEL impact upon an organization, this is an important phase of the process of TEL integration. Where the model is applied by experts, it is important to include negotiation and agreement with an organization into which TEL is being integrated about the possibilities of and measures on how TEL impact can be measured within a specific due time.

Discussion/Conclusions

This research addressed the problem of TEL integration into educational institutions aiming to develop a theoretical framework of quality assurance parameters. Inductive and deductive research data analysis was used by the authors, who, using qualitative analysis of content research method, collected research data during meetings with international and national expert groups. Theoretical scientific research literature analysis was analysed, as were existing frameworks, benchmarking methodologies, quality assurance models. Institutional practices and documents were analysed during the meetings with the experts, during international (European Distance and eLearning network [EDEN], International Council for Distance Education [ICDE], and European Federation for Quality in eLearning [EFQUEL]) conferences, workshops, and seminars. Moreover, TEL was discussed and analysed on the basis of the theories of integration of innovations.

As a result of the qualitative and theoretical research, the model of TEL integration in an organization was developed by the authors of this paper, describing the process of TEL integration in five main phases: a) identifying preconditions for TEL integration, b) developing the case of the institution on the basis of seven TEL quality assurance criteria groups, c) reviewing the case and characterizing responsive and responsible TEL integration in the organization based on preconditions and case review results, d) taking actions to integrate TEL in the organization, and e) measuring TEL impact upon the quality of organization services.

The process described in five phases in Figure 1 highlights the principles to be applied during TEL integration, that is, the process of integration being responsive and responsible. The principle of responsive integration ensures the reflective character of the process and decisions taken during it. It implies the need to reflect upon the preconditions existing and demand expressed by the stakeholders of the organization before any decision taken for change or innovation integration. During step three, when the case should be reviewed and TEL integration should be characterized in a responsive manner, consistency is ensured between the preconditions existing (within and outside the organization, needs of the organization, the demand, etc.) and further actions to be taken.

The TEL integration process can be described as well-managed, if the case development is based on the framework of quality assurance criteria groups and if taking actions are agreed and confirmed by both external experts and stakeholders of the organization. Otherwise, it can hardly be treated as responsive to the needs and responsible in terms of carrying responsibility or targeting changing the primary cause/situation and seeking agreement on the actions proposed.

The most difficult phase of the model proposed is the phase of measuring TEL impact upon the quality of organization services. First, it should be decided what data should be collected at which stage and measured. Second, the organization should give consent and allow measurement of change. Subjective and objective measurement should be implemented, at different stages of TEL pre-per and post integration.

The seven quality assurance parameters have been identified during the research: 1) Strategy and management, 2) IT infrastructure, 3) TEL curriculum designing, 4) Staff continuous professional development, 5) Support systems, 6) Quality assurance procedures, and 7) Marketing and business. All these criteria groups do not carry direct subordination to each other, however some groups are prior in the process. The first internal pre-condition in the organization is to have TEL identified in the strategy and on the management level. Second, IT infrastructure needs to be established, as well as support systems and quality assurance regulations put in place. Third, staff development should be in place and running, and TEL curriculum designing implemented. Even though quality assurance procedures would be running after TEL curriculum is designed, the quality criteria are needed well in advance in order to set the requirements for the curriculum design. Marketing and business planning should be running from the very beginning of the process.

All the seven quality assurance criteria groups have direct correlation to preconditions of TEL integration, to case development and action plans. All the criteria groups and their development will have direct impact upon TEL impact within the organization and TEL success indicators.

It must be noted that the model itself highlights the areas of organization activities that will be affected during the integration of TEL. This paper does not suggest the solutions for organizations, but highlights where changes will be needed and which activity areas will have to be adapted to new modes of service delivery. The model also illustrates interoperability of the areas with the pre-conditions (coming from the more global context) and related with the consequences and impact of TEL integration.

The complexity of the process of quality assurance must be emphasized in this discussion. Further research must be conducted to identify and validate quality criteria and descriptors for each quality parameter. In this way, an organization applying the model of TEL integration quality parameters would be facilitated to identify criteria of qualitative integration of TEL and would be able to prepare and accept proper decisions to adapt and change operating areas of activities. Thus it can be presumed that with good professional skill development of the staff, updated institutional strategy oriented for TEL services, proper methodology for TEL curriculum and program designing, learning support system available and running, quality assurance processes with all stakeholders involved, as well as marketing strategies employed, the TEL integration process should be successful in an education organization. However, each of these tasks is complicated and should be further researched and described. Success factors, costs, impact factors, and other interactive variables remain open for international research and review.

Moreover, the roles of all stakeholders should be discussed in further research. The learner as undertaking the prominent role and decisive position on the success of TEL services remains undoubtfully the key actor in the process and research. On the other side, teachers and institutional administration representatives are the target groups for early validation of the model in the future research, to bring more variables and to validate already drafted quality criteria descriptors for each of the quality parameters.

Last, but not least, facilitation of TEL integration in an educational organization has been researched and created as a result of this paper. Even though the model of TEL integration in an organization has already been approved by experts and professionals contributing to data collection and analysis during this research, the authors of the paper identified the need for further discussions on application of the TEL integration model in future international events and gatherings.

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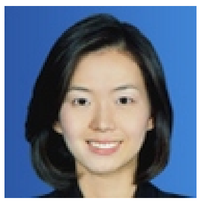
Adoption of the Mobile Campus in a Cyber University



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Abstract

The advantages of mobile technologies have not been lost on higher education institutions, and they have tried to provide educational services through the use of mobile learning management system (LMS). However, offering such services does not necessarily mean that the students will adopt the new technology. Thus, the purpose of this study was to examine what factors facilitate and hinder the students' adoption of the mobile campus. The study was based on the diffusion of innovation model and compared the perceptions of mobile LMS users and nonusers. Eighty-five students in a cyber university responded to the survey, and the results revealed that even though nonusers perceived the advantages of using mobile LMS, they did not adopt the system because of its complexity and resistance. A discussion and the implications for further development of mobile LMS followed.

Keywords: Mobile LMS; diffusion of innovation; cyber university

Mobile Campus Innovation in a Cyber University

The widespread use of mobile phones and other portable and wireless devices has been changing the landscape of technology-supported learning. Many universities and educational institutions have made efforts to develop mobile applications and/or mobile campuses for academic, social, and administrative support. Mobile applications increase accessibility to learning contents and activities, and questions/answers, especially for students who are taking e-learning courses. It has turned out that mobile technologies are well aligned with strategic educational goals, such as improving student retention and achievement, helping differentiate learning needs, and reaching learners who would otherwise not have the opportunity to participate in education (Kukulska-Hulme et al., 2009).

A few years ago, cyber universities introduced the mobile campus, although not all functions in the traditional web-based learning management system (LMS) were implemented in the early stages. The mobile campus has evolved according to what was learned from trial applications. The features of the current mobile campus include attending online courses, posting questions, checking messages, and monitoring academic calendars. Moreover, mobile application is connected with traditional LMS; that is, learning activity that occurred in the mobile campus is recorded as regular attendance and participation in the traditional one. Therefore, learners are normally observed attending online courses and posting messages in bulletin boards while commuting or at any other time they are available.

However, no matter how promising innovative technologies are, in this case, mobile applications for learning, not all students readily take to them. Learners have different attitudes toward the use of new technology, and the mere act of adopting it cannot change the learning experience. We need to carefully examine what factors facilitate and hinder the students' adoption of the mobile campus so that we can further develop it to support learning.

This study aimed to investigate how students perceived the mobile campus initiative of a cyber university. This purpose is addressed by two research questions. First, what opportunities and challenges do students encounter in adopting the mobile campus? Second, what are the differences between the traditional learning management system and the mobile campus?

Literature Review

Mobile Learning

Mobile learning has been defined as learning facilitated by mobile devices such as mobile phones, table PCs, and personal media players (Herrington & Herrington, 2007; Valk, Rashid, & Elder, 2010) in both formal and informal educational settings (Quinn, 2011; Traxler, 2007, 2010). Increased awareness of the potentials of mobile learning has expanded the body of related literature. From the meta analysis of more than 160 articles published between 2003 and 2010, Wu et al. (2012) found that research has focused (in descending order) on evaluating the effects of mobile learning, designing mobile learning systems, investigating the affective domain during mobile learning, and evaluating the influence of learner characteristics on the mobile learning process. In addition, it has been found that 86% of the studies that were reviewed reported positive outcomes (Wu, Wu, Kao, Lin, & Huang, 2012).

However, in previous studies, the use of mobile devices was limited to supplementary activities to the regular learning processes, such as engaging in online interaction with peers and instructors using a specific social media application (Gikas & Grant, 2013; Hoffman, 2009; Pang, 2009), creating and sharing video/audio files, taking photographs, and receiving or sending text messages (Vavoula, Sharples, Rudman, Meek, & Lonsdale, 2009), and using other miscellaneous functions such as calculators or dictionaries embedded in mobile devices (Taleb & Sohrabi, 2012). Students want more than these fragmentary uses that partially enhance learning activities designed within a certain course; they want to be able to access learning contents, such as reading materials or multimedia resources (Al-Mushasha, 2010; Cheon, Lee, Crooks, & Song, 2012), discuss course content, communicate with teachers, and access course information (Cheon et al., 2012). These activities for course works are typically provided through learning management systems that are commonly available in the Web and accessed with computers. Indeed, current mobile technologies can help meet the students' needs for increased accessibility to course work through mobile devices, so that higher education institutions are now offering LMS with mobile devices. However, research on the use of mobile LMS remains insufficient.

Mobile LMS in Higher Education

A traditional LMS is usually a Web-based platform that enables the planning and delivery of learning events for both virtual and instructor-driven face-to-face classes (Greenberg, 2002). Through the LMS, students are able to access their course materials, take online tests, access their grades, share resources with other students or an instructor, upload assignments, and collaborate with classmates (Cavus, 2011; Watson & Ahmed, 2004). Recent technological advances, such as wireless transmission and mobile devices, allow learners to access the LMS anytime and anywhere (Andronico et al., 2004; Corlett, Sharples, Chan, & Bull, 2004), thus enhancing learner mobility and the accessibility of information and learning activities (Andronico et al., 2004). Mobile LMS also facilitates interaction and collaboration between learners, and learners and instructors (Goh & Kinshuk, 2006).

Since college students use mobile devices more than K-12 students do (Traxler, 2007), mobile learning has been most frequently used in higher education contexts (Hwang & Tsai, 2011; Wu et al., 2012). In particular, the advantages of mobile LMS and growing number of mobile users on university campuses have increased the awareness of mobile LMS in higher education institutions. One survey conducted among university IT professionals across the United States reported that more than two-thirds of the participants agreed/strongly agreed that mobile LMS was an important part of their campus plan to enhance instructional resources and campus services (Green, 2010). However, in reality, mobile LMS deployment is still in its early phase (Green, 2010), and research on the use of mobile LMS has not been actively conducted yet. Few studies have addressed pertinent issues, such as the students' perceptions of the use of mobile LMS (Cavus, 2011), different usage behaviors between mobile and traditional LMS users (Modritshcer, Neumann, & Brauer, 2012), and the design and development of mobile LMS including assessment tools (Riad & El-Ghareeb, 2008) and context-aware mobile technologies (i.e., sensors and cameras) for detecting the context of the users' situation and providing the appropriate university services and information (Lehsten, Zender, Lucke, & Tavangarian, 2010). However, there is little research exploring what makes students choose to use mobile LMS in the first place. Hence, considering that students play decisive roles in the diffusion of mobile LMS throughout university campuses, what hinders or facilitates their adoption of new learning technologies should be addressed.

Factors Related to Mobile LMS Adoption: From the Diffusion of Innovations Model

Various factors affect the adoption of innovative technologies. In this study, the innovative technology is mobile LMS, which is gaining acceptance in higher education settings. Thus, a service provider should know what factors influence the students' adoption of a particular innovation technology to improve decision-making processes and quality.

A well-known framework for innovation studies is the diffusion of innovations (Rogers, 1995) model, which provides a paradigm for understanding the adoption of innovations and acceptance or resistance to change (Dooley, 1999; Rogers, 2000; Adams, 2002; Bennett & Bennett, 2003; Petherbridge, 2007). According to this model, there are five innovation attributes that affect the decision to adopt/reject an innovation: Relative Advantage, Compatibility, Complexity, Trialability, and Observability. Relative Advantage is the extent to which the innovation is perceived as better than what is currently available. If mobile LMS provides a more effective learning management, students will likely use it. Compatibility is how well the innovation matches existing values and models. The degree to which the functionalities of mobile LMS are matched with the existing PC and Web-based LMS affects its adoption. Complexity is the extent to which the innovation is easy to comprehend and use; mobile LMS should afford ease of use. Trialability is the degree to which a potential user can experiment with the innovation without having to commit to use it. Thus, the greater the opportunity for students to try out mobile LMS, the easier it is for them to evaluate its effectiveness and ultimately adopt it. Finally, Observability is the extent to which a potential adopter can see the usefulness of the innovation in his/her situation. For example, if students in higher education institutions can easily observe other students' use of mobile LMS and realize its educational benefits, they would be more willing to adopt it.

The perception of the attributes of innovation might differ between those who have already adopted mobile LMS and those who have not. Hence, in this study, the perceptions of users and nonusers will be compared to determine which attributes foster or hinder the adoption of mobile LMS. Also, by analyzing the limitations of current mobile LMS from the perspective of users' perceptions, the implications for the future development of mobile LMS can be discussed.

Methods

Participants

The participants, recruited from A Cyber University located in Seoul, South Korea, were undergraduates majoring in Educational Technology, Social Welfare, Counseling Psychology, Child Studies and Education, and Hospitality and Tourism Management. The students were invited to voluntarily take part in a survey without monetary compensation or credit reward. Only the complete responses from 85 students were included in the data analysis.

Around two-thirds of the participants were female, 26 to 45 years old–the typical composition of the student population in most South Korean cyber universities (Suh & Kim, 2013). Further, half of the participants were in 3rd year. Students in cyber universities are adult learners, most of whom work during daytime; they were not able to pursue a face-to-face four-year college course when they were between 19 and 25 years old (typical age of university student). Cyber university students start to take up four-year courses when they are in their middle 20s or later, or transfer to cyber universities after graduating from two-year college courses, which thus makes the 3rd year population the largest among universities. In terms of majors, 79% of the participants were from the two largest departments in A Cyber University: 46% were in Social Welfare and 33%, in Counseling Psychology. Meanwhile, 13% were in Hospitality and Tourism Management; 7%, in Child Studies and Education; and 1%, in Educational Technology (Table 1).

Table 1

Participants' Background Information

		Frequency	Percent
Gender	Female	66	77.6
	Male	19	22.4
Age	19–25	6	7.1
	26–35	31	36.5
	36–45	28	32.9
	46–55	17	20.0
	Above 56	3	3.5
Year in college	1st year	1	1.2
	2nd year	23	27.1
	3rd year	46	54.1
	4th year	15	17.6
Major	Educational Technology	1	1.2
	Social Welfare	39	45.9
	Counseling Psychology	28	32.9
	Child Studies and Education	6	7.1
	Hospitality and Tourism Management	11	12.9

Mobile LMS

The mobile LMS used in this study was the official learning management system of A Cyber University, which managed learners' activities through a mobile application in line with a traditional Web-based LMS. Mainly, the mobile LMS provided online learning contents, monitored learning activities, fostered instructor-learner interaction, and provided information. The specific functions of each category are shown in Table 2.

Table 2

Main Features of the Mobile LMS

Main features		Functions
Main page	Providing information	About the university Admissions Student services: academic calendar, FAQ, technical services, personal authentication certificate Community services: announcement board, bulletin board
Virtual classroom	Providing multimedia learning contents	MP3 file format – VOD, AOD AVI file format – electronic board, traditional board, e-Stream
	Monitoring learning activities	Attendance Learning time Learning progress
	Facilitating interaction	Instructor-learner interaction - Announcement - Q&A - 1:1 consulting Learner-learner interaction - Bulletin board

With mobile LMS, students have access to a virtual classroom that is connected to the virtual classroom in the traditional LMS. In the mobile virtual classroom, the learning contents are delivered in streaming audio or video format, depending on the type of lecture developed (Figure 1). The students' learning record in the mobile LMS, such as attendance, learning time, and learning progress, can be synchronized with the traditional LMS at the same time. To enable this monitoring feature, students have to log in to the system with a personal authentication certificate, which is meant to prevent proxy attendance.

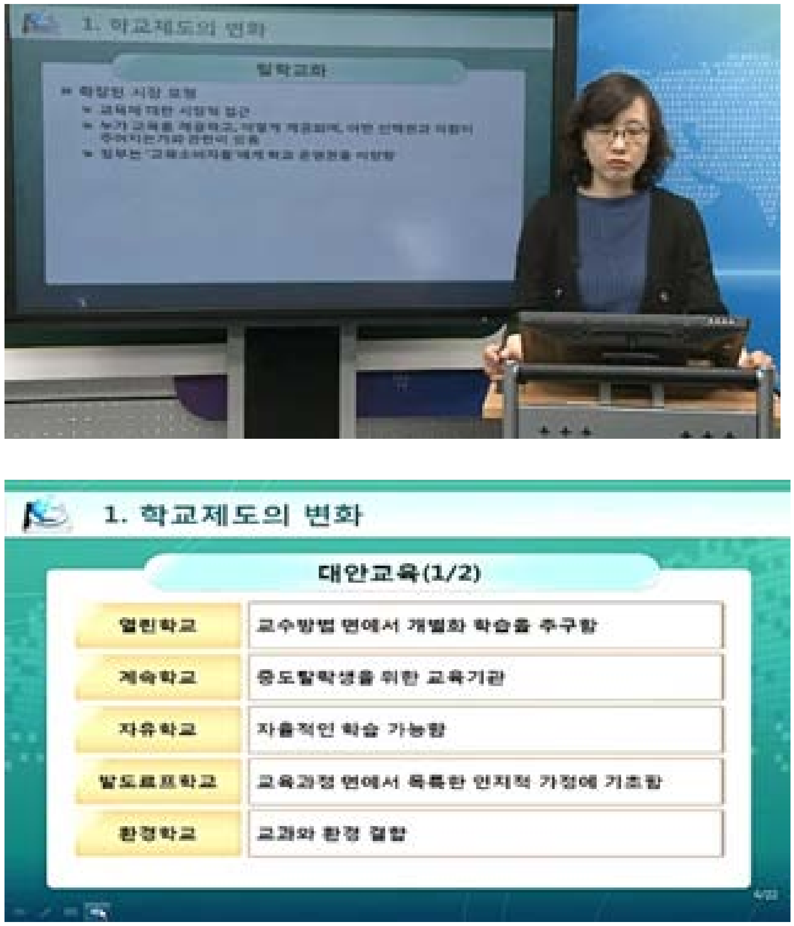

Figure 1. Screenshot of the video lecture on mobile LMS.

In the mobile virtual classroom (Figure 2), diverse interaction opportunities are offered as well. Instructors can post assignment deadlines, test schedules, and other course-related announcements on the announcement board. They can also answer the students' questions through 1:1 consulting and Q&A. The 1:1 consulting feature is for closed inquiries, which are not available to other students, while the Q&A is for open inquiries, which are shared with all other students in the same classroom. Students can also interact with their classmates through the bulletin board. All records of interactions in mobile LMS are sychronized with the traditional Web-based LMS. However, some of the features offered in the traditional LMS (e.g., online discussions, chatting, and surveys; quizzes; test-taking; and assignment submission) are not yet available in the mobile LMS.

Figure 2. Lecture lists (left) and Q&A (right) in the virtual classroom.

In the main page of the mobile LMS, students can access all information about the university, admissions, student services, and community services. Student services include the academic calendar, FAQ, technical services, and detailed information about the personal authentication certificate. Community services offer the opportunity to socially interact with other students in the same major by posting on the bulletin board.

Survey Instrument

A survey instrument was developed to examine the factors influencing learners' adoption of mobile LMS. Firstly, an open-ended survey was conducted with 160 students in the Department of Educational Technology, who were asked to spontaneously answer the questions based on their experiences. The survey had 11 items, which asked about the type of mobile technology they used; the time, place, and purposes of using mobile LMS; for nonusers, their reasons for not using mobile LMS; intention of using mobile LMS; and suggestions for improving the system. Of the 160 students, 89 responded. The responses were classified according to the five categories proposed in the diffusion of innovations model, which resulted in a total of 41 items. Relative Advantage had 5 items; Compatibility, 16; Complexity, 7; Trialability, none; and Observability, 7. The remaining 6 items were classified as Resistance, a category that was added based on the participants' answers. Resistance is related to the psychological resistance to the adoption of new technology because the innovation forces a change of behavior (Hall & Hord, 2006). Since no items related to Trialability emerged, the survey did not include this category.

The 41 preliminary items were then reviewed by a panel of experts to secure content validity. Seven experts in educational technology and distance education numerically rated each survey item in a five-point Likert scale as to how much it represented the category it belonged to. Also, they described how each item should be qualitatively revised so that it would clearly present what it was intended to. The content validity ratio (CVR) was then calculated based on the experts' numerical ratings. Items with a CVR of less than .70 were removed, recategorized, or revised to reflect the experts' reviews, which brought the total down to 35 items: five in Relative Advantage, four in Compatibility, four in Complexity, nine in Observability, and seven in Resistance.

Reliability tests were performed on the finalized survey items in each category; the survey was conducted on 135 students from the Introduction to Educational Technology course in the spring of 2013. The Cronbach's alpha values of .70, .95, .77, .92, and .71 for Relative Advantage, Compatibility, Complexity, Observability, and Resistance, respectively, were all acceptable or higher for the survey items' internal consistency (Kline, 2000).

Procedures

Before conducting the main survey for this study, a survey instrument was developed following the procedures shown in Figure 3. Then, using the survey instrument, the main study was conducted by distributing the survey to students registered in courses. An online survey link was provided in the cyber classroom and the students were invited to participate for two weeks. The purpose of the study was explained to them before starting the survey, and only those who clicked the "start" button could participate in the online survey.

Open-ended survey	➔	Experts' review	➔	Reliability test
With 11 items Received 89 responses Prepared a preliminary survey with 41 items		With 41 items Received 7 responses Prepared a revised survey with 35 items		With 35 items Received 135 responses Finalized the survey with 35 items

Figure 3. Procedures in developing a survey instrument.

Results

Use of Mobile Device and Mobile LMS

Of the 85 students who participated in the survey, almost 80% were using mobile devices, such as mobile phones or smart pads. However, only half of the participants said that they were currently using mobile LMS for learning (Table 3).

Table 3

Number of Participants Using Mobile Devices and Mobile LMS

		Frequency	Percent
Use of mobile devices	Yes	67	78.8
	No	18	21.2
Use of mobile LMS	Yes	41	48.2
	No	44	51.8

An interesting tendency was found in the descriptive statistics of the participants' answers (Table 4). Among the five factors examined in this study, Relative Advantage, Compatibility, and Observability are considered positive factors that influence the adoption of new technology, while Complexity and Resistance are considered negative factors. Mobile LMS users were expected to perceive relative advantage, compatibility, and observability more than nonusers did. In contrast, nonusers were expected to perceive more complexities in and resistance to using mobile LMS than the users. Unexpectedly, however, nonusers seemed to have a higher degree of perception regarding the three positive factors. Even though they were not using mobile LMS, the nonusers still anticipated that using mobile LMS would give them easier and faster access to the university system and information. Also, nonusers tended to perceive more convenience in the mobile LMS's being in line with the traditional Web-based LMS. While users did expect mobile LMS to give them more opportunities to interact with professors, participate in campus life, and be more punctual for academic deadlines, nonusers exhibited a somewhat higher level of perception for these positive factors. Regarding the two negative factors, users perceived less complexity and resistance than nonusers did, as expected. In other words, nonusers thought that using mobile LMS was difficult and complex, as well as uncomfortable and worrisome.

Table 4

Means and Standard Deviations of the Participants' Answers to the Survey

Survey items	Users (*N*=41)		Nonusers (*N*=44)	
	M	SD	M	SD
Relative advantage				
Being able to use spare time to attendcourses with mobile LMS	4.20	1.10	3.91	.96
Being able to use spare time to post on bulletin board with mobile LMS	3.10	1.16	3.84	1.01
Being able to use mobile LMS on the move	4.27	1.10	4.00	1.10
Easier access to mobile LMS	3.37	1.26	3.48	1.07
Faster access to academic schedules with mobile LMS	3.63	.99	3.82	.99
Compatibility				
Convenient to check attendance with mobile LMS in line with Web-based LMS	4.07	1.13	3.95	.89
Convenient to use 1:1 consulting and Q&A with mobile LMS in line with Web-based LMS	3.56	.95	3.91	.83
Convenient to use bulletin board with mobile LMS in line with Web-based LMS	3.68	.91	3.91	.83
Convenient to use community services with mobile LMS in line with Web-based LMS	3.63	.94	3.91	.86
Complexity				
Difficult to download mobile LMS application	2.80	1.08	3.00	1.08
Difficult to login with authentication certificate	2.49	1.31	3.34	1.12
Difficult to check lectures available in mobile LMS	2.63	1.28	2.95	1.08
Difficult to use mobile LMS interface	2.66	1.06	2.89	.97
Observability				
Better grade due to mobile LMS	2.98	.91	2.80	1.00
Better learning due to mobile LMS	3.10	1.07	2.98	.93
More frequent access to a virtual classroom with mobile LMS	3.56	1.27	3.41	1.15
More interaction with a professor with mobile LMS	2.88	.90	3.27	.97
More active participation in campus life due to mobile LMS	3.24	1.02	3.39	.99
More enjoyable campus life due to mobile LMS	3.14	1.01	3.34	.94
Being less late or absent for class with mobile LMS	3.17	1.14	3.68	1.07
More punctual for assignment deadlines with mobile LMS	3.02	1.01	3.48	.99
Fewer missed academic schedules due to mobile LMS	3.20	1.17	3.59	1.00
Resistance				
Feeling worried about the payment	2.59	1.38	3.43	1.30
Preferring a PC or laptop to a mobile phone	3.49	1.33	3.84	1.12
Feeling worried about getting interrupted (with calls or messages) while listening to a lecture	3.34	1.35	3.73	1.11
Feeling worried about battery usage	3.24	1.43	3.95	1.08
Feeling that the network is reliable [a]	3.54	1.10	2.91	.98
Not being accustomed to mobile learning	2.73	1.07	3.14	1.19
Feeling of not being in the learning	2.88	1.19	3.11	1.10

[a] reverse-coded item; in bold: items that are perceived higher by nonusers among those representing positive factors

Perception of Factors Influencing the Adoption of Mobile LMS: Differences Between Users and Nonusers

To investigate whether mobile LMS users and nonusers had different perceptions of the factors influencing the adoption of mobile LMS, an independent samples t-test was conducted on Relative Advantage, Compatibility, Complexity, Observability, and Resistance. Table 5 presents the descriptive statistics for each factor influencing mobile LMS and t-test results comparing the perceptions of the users and nonusers. Both groups showed similar levels of perception of Relative Advantage, Compatibility, and Observability. However, users and nonusers showed different perceptions of Complexity (t = -2.123, $p < .05$) and Resistance (t = -2.313, $p < .05$), both of which were statistically significant.

Table 5

Mean, Standard Deviation, and T-Test Results for the Perceptions of Mobile LMS Users and Nonusers

		N	M	SD	t	sig.
Relative advantage	Users	41	18.56	3.93	-.550	.584
	Nonusers	44	19.05	4.18		
Compatibility	Users	41	14.95	3.21	-1.040	.301
	Nonusers	44	15.68	3.26		
Complexity	Users	41	10.59	3.54	-2.123	.037*
	Nonusers	44	12.18	3.40		
Observability	Users	41	28.29	7.32	-1.026	.308
	Nonusers	44	29.93	7.40		
Resistance	Users	41	21.80	5.12	-2.313	.023*
	Nonusers	44	24.11	4.05		

* $p < .05$

To further examine where the two groups differed in the category of Complexity, an independent samples t-test was conducted in terms of four items (Table 6). A general tendency showed that mobile LMS nonusers perceived the use of mobile LMS as more complex than users did. In particular, nonusers perceived the use of an authentication certificate for attendance and test-taking as more complex, and this difference was statistically significant (t = -3.240, $p < .05$).

Table 6

Mean, Standard Deviation, and T-Test Results for Complexity

		N	M	S.D.	t	sig.
Difficult to download mobile LMS application	Users	41	2.80	1.08	-.834	.407
	Nonusers	44	3.00	1.08		
Difficult to login with the authentication certificate	Users	41	2.49	1.31	-3.240	.002*
	Nonusers	44	3.34	1.12		
Difficult to check lectures available in mobile LMS	Users	41	2.63	1.28	-1.244	.217
	Nonusers	44	2.95	1.08		
Difficult to use mobile LMS interface	Users	41	2.66	1.06	-1.033	.305
	Nonusers	44	2.89	.97		

* $p < .05$

Also, regarding Resistance, an independent samples t-test was performed to further investigate what kinds of psychological resistance nonusers perceived more than users did. There was a general tendency for nonusers to perceive more resistance, which means they were more worried about payments, getting interrupted, battery usage, and network conditions; preferred other technologies, such as a PC or laptop, to mobile phones for learning; were unaccustomed to mobile learning; and felt they were not being in the learning with mobile phones (Table 7). In particular, nonusers perceived more resistance to payments, battery usage, and the network condition; the levels were statistically significant at t = -2.913 (p< .005), t = 2.576 (p< .012), and t = 2.779 (p< .007), respectively.

Table 7

Mean, Standard Deviation, and T-Test Results for Resistance

		N	M	SD	t	sig.
Feeling worried about the payment	Users	41	2.59	1.38	-2.913	.005*
	Nonusers	44	3.43	1.30		
Preferring a PC or laptop to a mobile phone	Users	41	3.49	1.33	-1.330	.187
	Nonusers	44	3.84	1.12		
Feeling worried about getting interrupted (with calls or messages) while listening to lectures	Users	41	3.34	1.35	-1.433	.156
	Nonusers	44	3.73	1.11		
Feeling worried about battery usage	Users	41	3.24	1.43	-2.576	.012*
	Nonusers	44	3.95	1.08		
Feeling the network is reliable [a]	Users	41	3.54	1.10	2.779	.007*
	Nonusers	44	2.91	.98		
Not being accustomed to mobile learning	Users	41	2.73	1.07	-1.640	.105
	Nonusers	44	3.14	1.19		
Feeling of not being in the learning	Users	41	2.88	1.19	-.948	.346
	Nonusers	44	3.11	1.10		

* p< .05; [a] reverse-coded item

Discussion

The results of the descriptive statistics showed that mobile LMS nonusers' perception of Relative Advantage, Compatibility, and Observability was similar to or somewhat higher than that of traditional Web-based LMS users. This implies that mobile LMS nonusers also acknowledge the advantages and positive factors of using mobile LMS. However, they are still reluctant to adopt this new system, and the reason could be found in their perception of the challenges of using the system, such as Complexity and Resistance. One of the biggest challenges about the change is dealing with resistance. Hall and Hord (2006) addressed several reasons for resistance, two of which are closely related to the result of this study. The first reason for resistance works through the sense of loss of having to stop doing something that is familiar and comfortable. The second form of resistance is grounded in having serious questions about whether the innovation will really be an improvement, due to a limited understanding of the new technology. That is, even though nonusers appreciate the new opportunities that the mobile LMS can create, their perception of the system's complexity and their psychological resistance exceed their appreciation of it, which thus discourages them from adopting the mobile LMS.

Conversely, even though users perceive advantages less in the mobile LMS, they nevertheless use it because they are not deterred by resistance or its complexity. Therefore, to diffuse this new LMS throughout the campuses, universities not only advertise the advantages of using it but also focus on reducing the complexities and psychological resistance that hamper users. This result is consistent with previous research, which has determined that perceived ease of use and organizational support significantly affect the adoption of mobile devices in learning (Chang & Kim, 2011).

The unexpected result of mobile LMS users' low perception of the positive factors may be addressed by discussions on the future directions of mobile LMS design and development. It is possible that users' perception is lower because they found that the seemingly very advantageous factors were, in fact, not what they had expected. For example, users perceived that attending courses while on the move was a relative advantage, but they thought that participating in the course and checking academic schedules were not relatively more useful than the traditional Web-based LMS. In all likelihood, neither did they find the features related to academic and social interaction with professors and other students more useful than those of the Web-based LMS. This indicates that users opt for mobile LMS mainly to attend courses while they are on the move; they do not use it for the other purposes that were also considered possible positive factors for adopting mobile LMS. This tendency implies that the features implemented in mobile LMS in line with traditional Web-based LMS were not particularly useful for the students. In other words, current mobile LMS is a smaller version of the Web-based virtual classroom that provides similar features, but only in different mobile devices. It is thus not attractive to users other than for attending courses. With this in mind, we need to reconsider how we can design mobile LMS to reflect more advantages drawn from the devices' uniqueness. One example could be a mobile LMS designed to support self-directed learning (Chung, 2009). In Chung's study (2009), the mobile LMS supports students' metacognition, motivation, and behavioral monitoring through specific mobile functions, including goal setting, planning, monitoring, self-assessment, interaction and feedback, time management, academic planner, and question-and-answer with SMS. Other studies propose mobile assessment with SMS functions (Raid & El-Ghareeb, 2008) and a context-aware mobile LMS that incorporates mobile-specific context-aware mobile technologies (i.e., sensors and cameras) for detecting the context of the users' situation and providing the appropriate university services and information (Lehsten et al., 2010).

Conclusion

The result of the study yields timely information for further development and implementation of mobile LMS. Based on the comparison between users and nonusers of mobile LMS, this study provides implications on how the system can be further developed by adopting users' demands. For future development, as mentioned earlier, the mobile LMS should be grounded in the nature of mobile devices, and not just duplicate what the Web-based LMS currently provides for learning. Also, the mobile LMS should be adaptive to the developmental status of the mobile device, as well as the individual learner's needs.

This study also has several limitations that lead to future studies. Since this study was conducted in one cyber university in Korea during the beginning stages of the development of mobile LMS, the result of the study cannot be over-generalized to all kinds of mobile learning supported by different tools and technologies. In addition, from the methodological perspective, this study only adopted a quantitative approach and in-depth interviews with learners would provide more insights to identify their perception and beliefs regarding the innovation. Using mobile campus is personalized experience and situated in specific context, therefore understanding individual students' perception is useful to identify factors facilitating adoption of innovation. In this way, the results of this study will be reinforced with what makes learners adopt or resist the innovation. Finally, the instructors' perspective in using the mobile LMS should also be examined in future research. Recent studies on adoption of mobile learning have been limited on investigating students' perception (e.g., Bao, Xiong, Hu, & Kibelloh, 2013; Irby & Strong, 2013; Park, Nam, & Cha, 2012). However, university instructors are important users of mobile LMS and their perception and facilitation can affect students' use of mobile LMS (McLoughlin & Lee, 2010). Therefore, future research should examine what factors facilitate university instructors' adoption of mobile LMS.

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THE INTERNATIONAL REVIEW OF RESEARCH IN OPEN AND DISTANCE LEARNING

An Approach for Externalization of Expert Tacit Knowledge Using a Query Management System in an E-Learning Environment


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Abstract

E-learning or electronic learning platforms facilitate delivery of the knowledge spectrum to the learning community through information and communication technologies. The transfer of knowledge takes place from experts to learners, and externalization of the knowledge transfer is significant. In the e-learning environment, the learners seek subject expertise to clarify their subject queries, and a learner query can be routed to an expert for externalization of expert knowledge provided the learner knows the subject expert or the expertise group. However, learners new to e-learning systems are not aware of the expertise group to which the query should be sent, which results in time delays, non-response, inaccurate solutions and loss of knowledge capture. Several models have been proposed to resolve this task, but thus far, these efforts have focused completely on returning the most conversant people as experts on a particular topic to retrieve valuable knowledge. To address this problem, we propose an approach that externalizes the tacit knowledge of a subject expert by creating a dynamic query handling system that automatically transfers a user query to the best subject expert.

Keywords: E-learning system; expert finding; knowledge management; tacit knowledge; knowledge sharing; knowledge capture

Introduction

E-learning, or internet-enabled learning, uses internet technologies to deliver a broad array of solutions that enhance knowledge and performance. The Internet has begun to reshape education approaches with many versions of e-learning software used extensively at various levels of education, that is, universities, high schools, vocational schools, or junior levels. E-learning provides multiple benefits beyond conventional classroom-based learning (Manongga, Utomo, & Hendry, 2014).

The traditional context of learning is currently undergoing a drastic change. Many situations exist in which learners desire to study specific topics in which they are interested without the constraints of time and place. These needs require that learning be personalized, flexible, and available on-demand. In the corporate sector, a heavy focus is turned towards sharing of knowledge between experienced and inexperienced users or new employees. Institutions also focus to a greater extent on sharing of knowledge between experts and learners.

Advances in computer technology in the recent decades have significantly transformed modern teaching approaches. Systems providers have developed different types of e-learning tools that ease the learning process and improve outcomes. Higher education institutions are using the benefits of these e-learning tools to design and offer new opportunities for teaching and learning. To evaluate the success of one type of e-learning tool relative to another, we must understand whether a specific type of e-learning tool can effectively support the learning process. Therefore, it is important to determine whether the tools can provide feedback and continuously refine the learning process; contain individual characteristics, needs, learning styles, and learning pace; and deliver high-quality information through a suitable medium to create a sense of personal touch and support. E-learning tools can be considered as a digital medium that facilitates information transfer between knowledge sources (instructors) and knowledge seekers (students). To evaluate the proposed work, we examined two leading e-learning tools, namely, Blackboard and Moodle, in a comparison of communication aspects provided for the knowledge seeker and knowledge provider.

Table 1

Comparison between Blackboard and Moodle

Communication Tools	Blackboard	Moodle
Chat	Tool with an instant messaging option will send messages, provided the recipient is available online.	Instant messaging and chat option with online users. Offline messages enabled.
Email	Email can be sent to all students or to those in the subset workgroup.	Instant messaging tool can send messages to offline users, and messages can be read by logging into the Moodle account. Offline email to user is available.
Discussion Forum	Discussion forums can be created in a thread or blog.	Instructors and students are rated based on their posts in the Forum. User postings in the class Forum can be emailed automatically to the class participants. Because posting remains visible in the Forum, those who do not receive emails can check for unread postings. The user can create a Forum for each class workgroup and handle each separately.

The comparison of Moodle and Blackboard shows that the current e-learning systems use instant messages, emails and discussion forums as a knowledge transfer medium between knowledge seeker and knowledge provider. These communication systems just facilitate information transfer between knowledge seeker and knowledge provider. The communication modes used in Moodle and Blackboard have the provision to store the transferred knowledge but fail to quickly retrieve the required knowledge on demand by the knowledge seeker or knowledge provider. To solve this issue in e-learning environment, the researchers have developed a query management system for transferring knowledge between knowledge seeker and knowledge provider. The query management system has the capability to target experts and quickly retrieve the transferred knowledge on demand by the user or learner. The query routing mechanism used in the query management system contains clusters of expert groups on each topic or subject to which the query would be routed. The learners must select the appropriate expert group and route the query accordingly. The expert from the group must take charge of the assigned query and provide a solution to the query, and, in turn, the solution will be delivered to the user. This type of query routing mechanism fails if the user is new to the system and unaware of the query process, which may lead the user to receive an irrelevant or unworthy solution from the expert group because the expert who handled the query may be inexperienced or has less knowledge on the raised query topic, or the user may have routed the query to the wrong expert group due to human error.

To address these problems, we propose a dynamic query handling system that can receive the query from learners and automatically deliver it to the best subject expert available in the system. The user does not need to know the subject or expert group to which the query should be routed, and the experts in the dynamic query handling system are analyzed based on work performance and the solution delivery ratio that they uphold. The experts are ranked and re-ranked based on the performance that they maintain in the system, which retains the best performing expert as first priority on the topic or subject. The dynamic query handling system leads to a method for ranking experts, capturing expert knowledge, ensuring the best solutions for the query and providing a user-friendly environment to learners.

Related Works

Ahmad Kardan and Fatemeh Hendijanifard (2011) discussed the topic of finding subject experts for problem solving as an important issue in an e-learning environment. In an e-learning environment, there is no direct approach to finding the superior individuals. The current methods of analyzing the discussions or considering the learner requires a large amount of data and contains limitations. In this work, concept maps are used to define the experts in an e-learning environment.

E-learning focuses on the use of computer and network technologies to create and deliver a rich learning environment that includes a broad array of instruction, information resources and solutions with the goal of enhancing individual and organizational performance. However, in this work, the term e-learning is used to encompass computer-based learning, computer-based training, technology-enhanced learning, technology-mediated learning, web-based education, or virtual learning environment. This topic has attracted considerable interest by providing a variety of benefits to learners, educational institutions, and organizations by removing the barriers of time and space in the development of knowledge and skill; providing just-in-time learning, convenient access, and flexible learning processes; enabling real-time content updates while avoiding information overload; reducing travel, off-site training costs and time away from the job; and facilitating the interconnectivity of people for knowledge transfer (Ozdemir & Abrevaya, 2007).

Many schools have instituted course management software (e.g., Blackboard, WebCT, and Moodle) to complement traditional classroom-based instruction. Many empirical studies have been conducted to demonstrate how IT supports learning, improves student learning outcomes, enhances student information literacy, and increases the effectiveness of education management. Despite the variation in research findings, there is a consensus that substantial gains in student attainment are achievable if the use of IT in schools is planned, structured, and integrated effectively. However, to improve existing e-learning applications, smart learning environments must provide personal services to assist a learner in using, managing, and interacting with the learning system. A number of studies have investigated the use of intelligent tutoring techniques, that is, personalized learning interfaces and adaptive learning. These efforts generally emphasize technology development but exhibit little concern for effective instruction or pedagogy to enhance learning performance (Wang,Vogel, & Ran, 2011).

Rajalakshmi and Wahidabanu (2011) proposed a model known as Info-Ca-Sh, a contributed knowledge portal of dynamic web content activities. The design flow serves as an exchange of knowledge among users by providing the users with a range of open-source tools. The tacit and explicit knowledge of the users are captured and externalized as a knowledge repository. The learning mechanism in higher education must be customized in accordance with the new requirements and current shifts in users, the culture and the economy. This effort requires new models for management of logical capital. Knowledge management can facilitate universities to find the appropriate people at the right time to make the best decisions using knowledge management systems. The knowledge management system refers to a system for customizing knowledge in organizations in terms of capture, storage information and broadcasting of knowledge. An approach based on e-learning and its mechanism (Lloyd, 2003) is used to set up an organizational memory of the scientific, technical and administrative assets of the university and those interested in the construction of a warehouse of resources deliberately intended for training and for research.

The corporate sectors utilize the knowledge management techniques for sharing, capturing and storing of knowledge for effective usability. Koskinen (2003) discussed the introduction of a new model in which the business management can evaluate the type of role that tacit knowledge plays in their organizations. The model structure is discussed with four different systems, that is, memory, communication, motivational, and situational systems, and includes numerous factors that affect tacit knowledge utilization in organizations.

Senthil kumaran, Sankar, and Kiruthikaa (2014) discussed that the success of any e-learning system depends on the quality and quantity of assistance provided to its students in the learning process. Hence, it is essential to analyze a student's academic skills to personalize the education that is provided both vertically and horizontally.

The major component of the learning process is the result of the learner's collaborations and communications with subject experts. The collaborations in online group-based learning provide better opportunities to develop skills and knowledge compared with individual courses (Tahereh, Mahmood, Ahmad, & Neda, 2011). The learning collaborations and communications with subject experts are highly practiced in corporate sectors by maintaining a knowledge portal for the stake holders.

A knowledge portal acts as an access tool for other information sources to provide internal and external information beyond the organization's own resources that can be made available to its staff. The portal also serves as a communication tool to enable individuals, teams and communities of practice to share and discuss ideas and knowledge (Venkata Subramanian, 2013). With the rapid development of globalization and technology, the importance of knowledge has also gradually increased. Whether enterprises can effectively create, accumulate, utilize and manage knowledge and convert knowledge into a competitive weapon has become a key to sustainable operation of modern enterprises (Chen, Lan, Lan, & Hsu, 2014).

To combine the knowledge management concepts on e-learning environment, it is required that the e-learning system must contain a communication process integrated with knowledge clusters. To create a collaborative knowledge network, it is necessary to build a cluster of knowledge providers in the e-learning system. Fuzzy c-means algorithm is highly suggested to create clusters. In faster fuzzy clustering (also referred to as soft clustering), data elements can belong to more than one cluster, and a set of membership levels is associated with each element. These clusters indicate the strength of the association between that data element and a particular cluster. Fuzzy clustering is a process of assigning these membership levels and using them to assign data elements to one or more clusters. In many situations, fuzzy clustering is more natural than hard clustering. Objects on the boundaries between several classes are not forced to fully belong to one of the classes but rather are assigned membership degrees between 0 and 1 that indicate their partial membership. The fuzzy c-means algorithm (FCM) is used in computational geometry, data compression and vector quantization, pattern recognition and pattern classification. Fuzzy c-means (FCM) is an unsupervised clustering algorithm that has been applied to a wide range of problems involving feature analysis, clustering and classifier design. The FCM clustering, which constitutes the oldest component of software computing, is quite suitable for handling issues related to understanding patterns, incomplete/noisy data, mixed media information, and human interactions, and it can provide approximate solutions (Yogeshwari & Balamurugan, 2014).

Methodology

The externalization of tacit knowledge in an e-learning environment takes place using the mechanism of capturing and sharing of knowledge with the right person at the right time. An e-learning system consists of learning contents in terms of documents, Power Point slides, videos, and so on. A well-defined e-learning system provides communication between learners (knowledge seekers) and subject expertise (knowledge providers). The knowledge transferred between knowledge providers and knowledge seekers is considerably significant to maintain references for other learners. In addition, the significant queries raised by the knowledge seekers and directed to the knowledge providers will become key references for future learners.

Streamlining the process of knowledge transfer between knowledge seekers and knowledge providers requires a mechanism or knowledge management process for capturing, sharing and maintaining knowledge. E-learning is considered as an effective and well-utilized system that provides a well-defined and simple method of capturing the knowledge from experts and delivering to or sharing the captured knowledge with the relevant knowledge seekers. The query management systems used in an e-learning environment usually require categorized expert groups to facilitate the learners in posting queries to the relevant expertise group and receiving solutions. This process can be considered useful if the learner is highly familiar with the e-learning query management mechanism that routes their queries to the targeted expertise group.

The problem identified in this process is that the learner may not be able to find the targeted expertise group for the query if the learner is new to the e-learning query management system or unaware of the selective process. The learner may receive a non-valuable solution for the raised query due to the incorrect routing of the query to the irrelevant expertise group or if the expert to whom the query has been assigned does not have updated knowledge on the particular topic. To address these issues, we propose a query management system known as the dynamic query handling system, which automatically takes the query from the learner to the targeted or relevant expertise and captures and shares the transferred knowledge among all learners.

In this paper, we propose an approach for externalization of expert tacit knowledge using a dynamic query handling system in an e-learning environment. In this approach, the knowledge seeker can raise a query to an expert; the user who raises the query does not require any type of prerequisite knowledge (i.e., the knowledge of to which expert group or individual expert the query must be routed or transferred). The knowledge seeker only needs to post the query, the query goes into an automatic processing flow mechanism that processes and routes the query to the most relevant expert in the system. The queries raised by users are also stored in the internal database and made searchable to other users.

The diagram in Figure 1 shows the framework of the dynamic query handling system (DQHS) in an e-learning environment for automatic transfer of the query to the most relevant subject expertise rather than manual selection of an expertise group for routing the query. This mechanism uses two different paths of entry points into the system for users:

- knowledge provider or expert,
- knowledge seeker or learner.

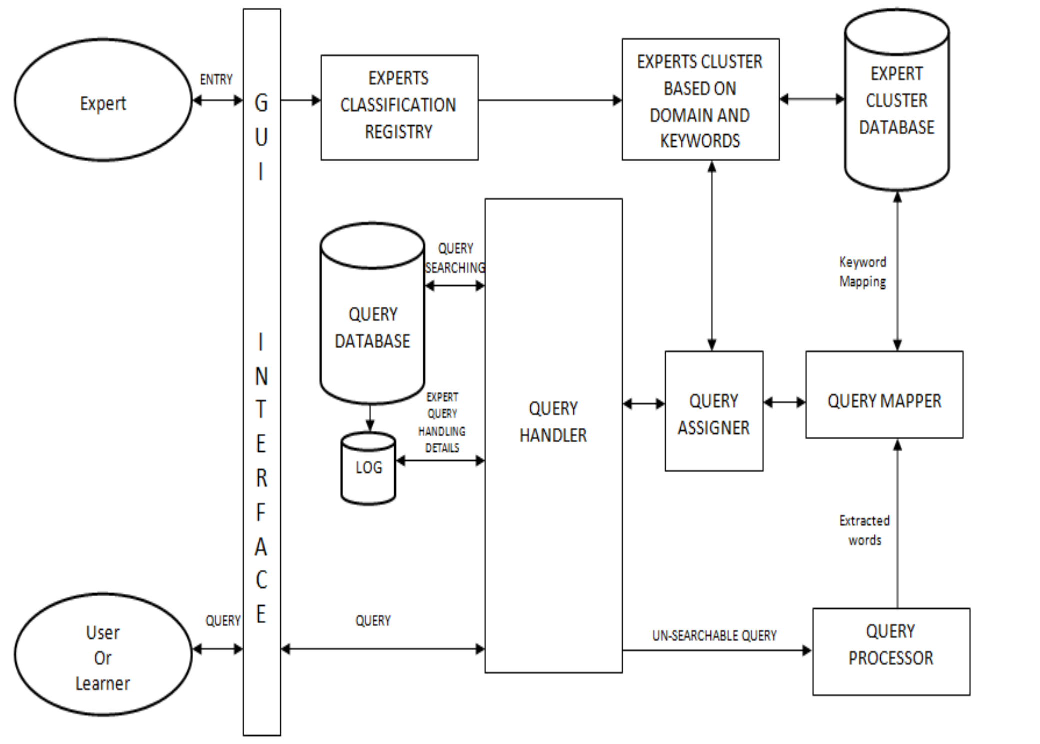


Figure 1. Dynamic query handling system.

The knowledge provider enters the system as a subject expert by providing specialized main keywords or main tags considered as the subject domain and sub-keywords or sub-tags considered as the specialized skill set in the appropriate domain. The subject experts are grouped by their main tags into three categories, that is, 1) expert, 2) moderately skilled expert, and 3) beginner, based on the skill level provided at the time of entry.

Each subject expert or knowledge provider is assigned a query bucket as a threshold for the maximum query limit. This query bucket is checked by the system before passing the query to the expert. If the query bucket reaches its threshold, the query will not be assigned to that particular expert, and instead, the system will look to the next level of expert in that particular domain for query assignment. The query is first routed to the expert level of subject expertise for query resolution. If all expert-level subject experts are engaged with existing queries and have reached their maximum levels of query assignment, then the query will be auto-redirected to the moderate level of subject experts and subsequently to the beginner level of subject experts in accordance with the query bucket thresholds. The dynamic query handling system consists of the following components for query processes:

- expert classification registry,
- expert cluster based on domain keywords,
- query handler,
- query processor,
- query mapper,
- query assigner.

Expert Classification Registry (ECR)

The expert enters the dynamic query handling system using the ECR process. The ECR process asks the expert to provide their specialized main keywords or main tags (considered as the subject domain) and sub-keywords or sub-tags (considered as the specialized skill set in the appropriate domain). The ECR process also requires the expert to enter a skill level in the domain, that is, expert, moderately skilled expert, beginner. These expertise levels are used by the dynamic query handling system for query transfer to the best expert in the domain. The ECR process also requires the experts to enter their expertise levels for their sub-keywords or sub-tags. This information is also used to map the most knowledgeable expert in the domain for user-raised queries. This process also asks the expert to provide a query threshold limit for query assignment.

Expert Cluster Based on Domain Keywords (ECDK)

The ECDK mechanism uses the outcomes of ECR to create clusters of experts based on their domains and sub-domains. If the domain cluster already exists, the expert is added into the existing clusters, and the sub-keywords or sub-tags are merged into the expert specialization list.

Query Handler

The query handler is the main component and is interlinked with other components in the dynamic query handling system. The raised query from the learner or user enters the query handler, and the query handler checks the query within the query database and if a pre-existing query with solution is not available in the database, it transfers the query to the query processor component. Thus, the query handler operates as a search mechanism and gives the results to the user or learner.

Query Processor

The query processor component delivers the raised query to the natural language processing parser, where the query is filtered by removing the stop-words. As a result, the extracted words are obtained. These extracted words are transferred to the query mapper.

Query Mapper

The extracted words are entered into the process of word mapping using the query mapper and the fuzzy c-mean genetic algorithm process checks the higher feasibility of mapping the words with expertise keywords. Once a higher match is found, the query will be mapped to the concerned expertise group to route or transfer the query to the particular expert.

Query Assigner

Once a subject expertise group is mapped, the query assigner checks the meta-data generated from the query database and validates it based on the number of queries handled by the expert and the number of users who accepted the query solution provided by the expert. Next, the processed validation data are used by the ranking algorithm to re-rank the experts based on the performance in the system. The query assigner uses the result of the re-ranked expert list and finds the high performing expert for the particular query, and the user query is transferred to that particular expert. On the other hand, the query assigner component also checks the query bucket threshold limit before assigning the query to the target expert, and if the particular expert query bucket has reached the threshold limit, the query will go to the next best expert in that particular domain. The dynamic query handling system frequently assesses the performance of the experts using the number of queries handled by the expert, the number of solutions accepted by the user and the user ratings for the expert. These constraints are applied to auto re-rank the experts in their subject domains.

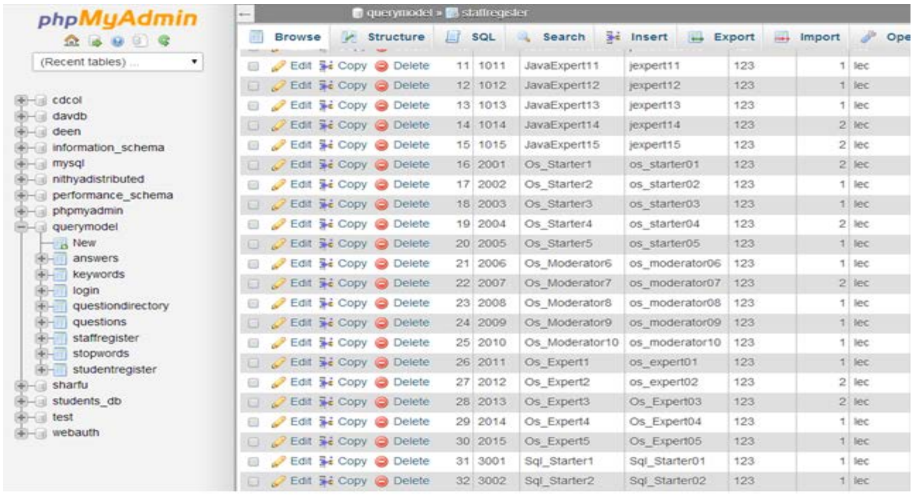
Implementation

The implementation of the dynamic query handling system (Figure 1) is distributed into three combinations of processes:

- expert enrolment,
- expert segregation,

- user query mapping.

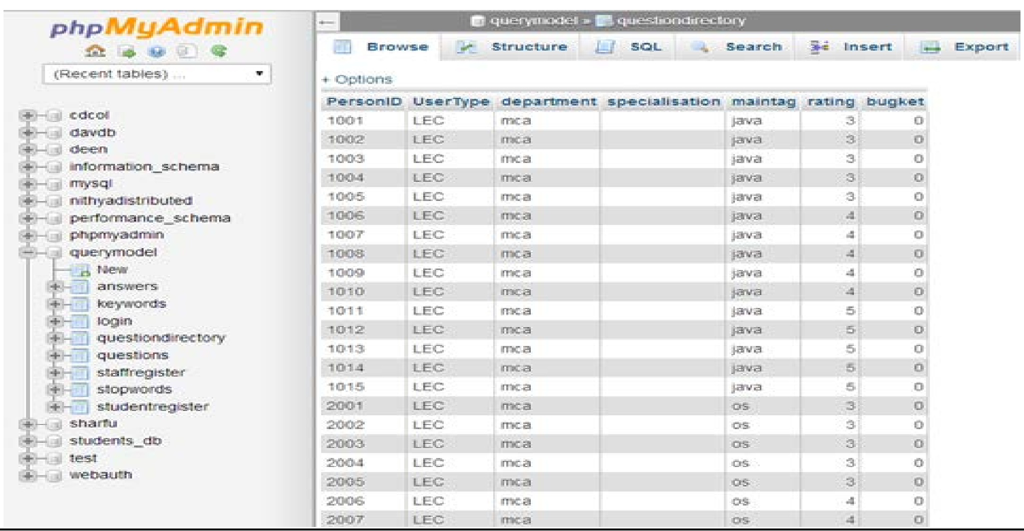
Expert enrolment is a feed process used by the dynamic query handling system to collect the information from the expert and store it in the database.



11	1011	JavaExpert11	jexpert11	123	1	lec
12	1012	JavaExpert12	jexpert12	123	1	lec
13	1013	JavaExpert13	jexpert13	123	1	lec
14	1014	JavaExpert14	jexpert14	123	2	lec
15	1015	JavaExpert15	jexpert15	123	2	lec
16	2001	Os_Starter1	os_starter01	123	2	lec
17	2002	Os_Starter2	os_starter02	123	1	lec
18	2003	Os_Starter3	os_starter03	123	1	lec
19	2004	Os_Starter4	os_starter04	123	2	lec
20	2005	Os_Starter5	os_starter05	123	1	lec
21	2006	Os_Moderator6	os_moderator06	123	1	lec
22	2007	Os_Moderator7	os_moderator07	123	2	lec
23	2008	Os_Moderator8	os_moderator08	123	1	lec
24	2009	Os_Moderator9	os_moderator09	123	1	lec
25	2010	Os_Moderator10	os_moderator10	123	1	lec
26	2011	Os_Expert1	os_expert01	123	1	lec
27	2012	Os_Expert2	os_expert02	123	2	lec
28	2013	Os_Expert3	Os_Expert03	123	2	lec
29	2014	Os_Expert4	Os_Expert04	123	1	lec
30	2015	Os_Expert5	Os_Expert05	123	1	lec
31	3001	Sql_Starter1	Sql_Starter01	123	1	lec
32	3002	Sql_Starter2	Sql_Starter02	123	1	lec

Figure 2. Screenshot of expert registry.

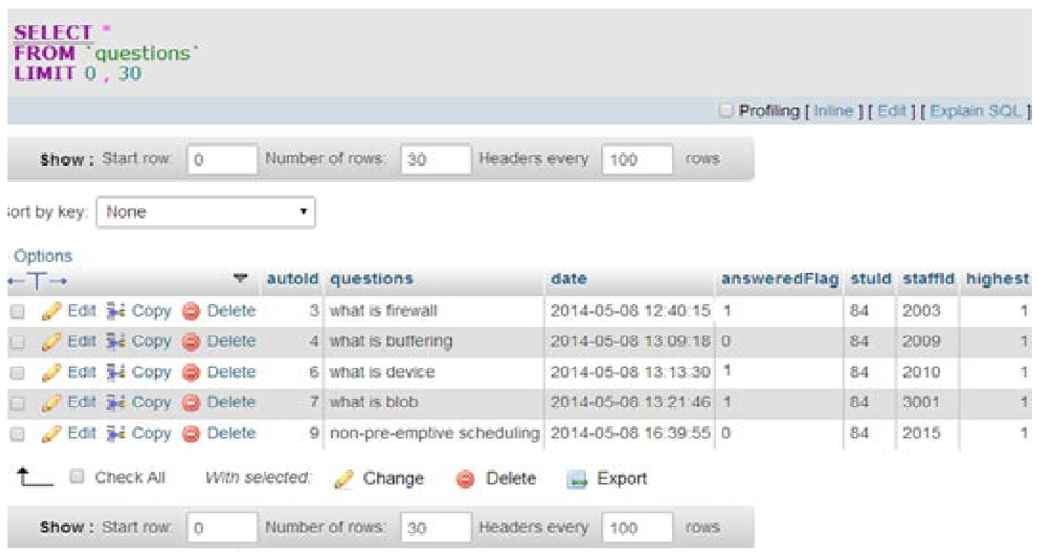
The staff registry (Figure 2) displays the expert enrolled information stored in the internal database. This registry contains unique information, including the expert user ID, expertise level (i.e., expert in topic, moderate in topic, and beginner in topic), expert email ID, and so on. These enrolled data are used at the time of query transfer confirmation.



PersonID	UserType	department	specialisation	maintag	rating	bugket
1001	LEC	mca		java	3	0
1002	LEC	mca		java	3	0
1003	LEC	mca		java	3	0
1004	LEC	mca		java	3	0
1005	LEC	mca		java	3	0
1006	LEC	mca		java	4	0
1007	LEC	mca		java	4	0
1008	LEC	mca		java	4	0
1009	LEC	mca		java	4	0
1010	LEC	mca		java	4	0
1011	LEC	mca		java	5	0
1012	LEC	mca		java	5	0
1013	LEC	mca		java	5	0
1014	LEC	mca		java	5	0
1015	LEC	mca		java	5	0
2001	LEC	mca		os	3	0
2002	LEC	mca		os	3	0
2003	LEC	mca		os	3	0
2004	LEC	mca		os	3	0
2005	LEC	mca		os	3	0
2006	LEC	mca		os	4	0
2007	LEC	mca		os	4	0

Figure 3. Expert domain directory screenshot.

The expert segregation process uses the expert domain directory (Figure 3) contains the expert ids, expert domains or main-tags, expert ratings and expert bucket threshold limits. The expert id field in the database is used to determine the unique identity of the expert, the expert domains or main-tags field is used to choose the expert specialization domain or subject area, and the expert rating field is the value for expert level of specialization (expert on subject topic, moderate knowledge of subject topic and beginner in subject topic). These field values are used by the dynamic query handling system to make a decision for transfer of a query to the expert. The system also checks the expert rating field to pick the best expert for the query assignment. The expert bucket field value is checked by the system before query assignment to an expert. If the query bucket of an expert is full or reaches the threshold limit, then the system will check for the next best expert for the query assignment.



	autoId	questions	date	answeredFlag	stuId	staffId	highest
Edit Copy Delete	3	what is firewall	2014-05-08 12:40:15	1	84	2003	1
Edit Copy Delete	4	what is buffering	2014-05-08 13:09:18	0	84	2009	1
Edit Copy Delete	6	what is device	2014-05-08 13:13:30	1	84	2010	1
Edit Copy Delete	7	what is blob	2014-05-08 13:21:46	1	84	3001	1
Edit Copy Delete	9	non-pre-emptive scheduling	2014-05-08 16:39:55	0	84	2015	1

Figure 4. Question directory screenshot.

The question directory screen shot (Figure 4) shows the user query mapping done by the system. The answer flag field shows the number of answers given by the experts and also the staff ID of the person to whom the questions are mapped and assigned.

The mathematical measurements derived for the query transformation are given below.

$$Qt= \left\{ ((ky \cap ed) \text{ and } (sw \cap sd)) \rightarrow xp((er>oxp) \text{ and } (bc<th)) \right.$$

Qt= Query Transformation

Ky= Keywords

ed= Expert Domain

sw= Sub-keywords

xp= Expert

er= Expert Rating

oxp= Other Expert in the same domain

bc= Query bucket

th= Query bucket threshold

The query (Qt) is transferred to the expert (xp), and the keywords (ky) extracted from the query using the NLP parser are used to map or match with the expert domain list (ed), that is, the intersection of the keywords and expert domain list (ed) contains a common word, and the sub-keywords (sw) for the query also are mapped on the sub-domain list (sd). The resultant expert's rating (er) must be greater than those of other experts (oxp), and the query bucket (bc) must be less than the threshold limits (th).

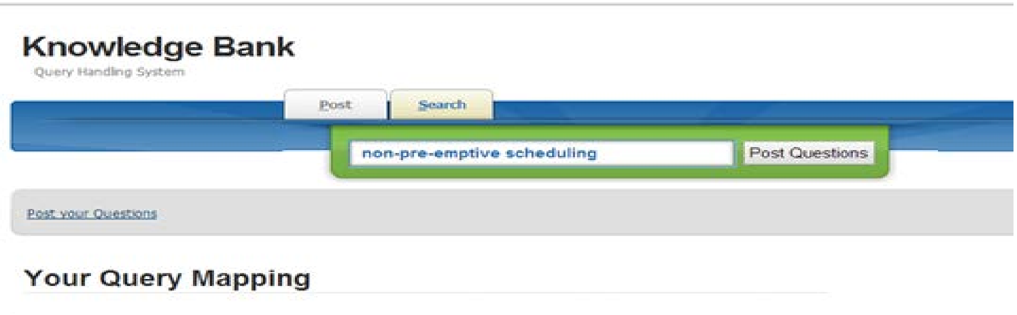


Figure 5. Query posting screen shot.

The user query posting screen shot (Figure 5) shows that the system presents a user-friendly GUI for ease of use so that posters can send the query to the expert without checking expert lists or expert groups to which the query is more suitable for transfer.

The algorithm generated for the query transformation is described below:

Step 1: User raises query.

Step 2: Query is processed using the NLP parser (Lucene). This process removes stop-words and yields informative words or extracted words.

Step 3: The extracted words (EW) are compared with expert stored main-tags (MT) and sub-tags (ST), i.e., EW==MT or ST

Step 4: Once a match is found between the extracted words and the expert keywords, the user query is mapped with the expert and expert domain.

Step 5: Once a query is mapped with expert i,

```
i= 1......n,

j= 1......n,

If (query → expert)

{

For (i=1;i<=n;i++);

{

If (expert (i) query bucket capacity count < bucket threshold (i)), then

Query moved to expert (i)

}

else

for (j=1;j<=n;j++);

{

If(expert j query count< expert j+1 query count)

move query to j

else

move query to j+1

}
```

Step 6: If (query< > experts (keywords), then

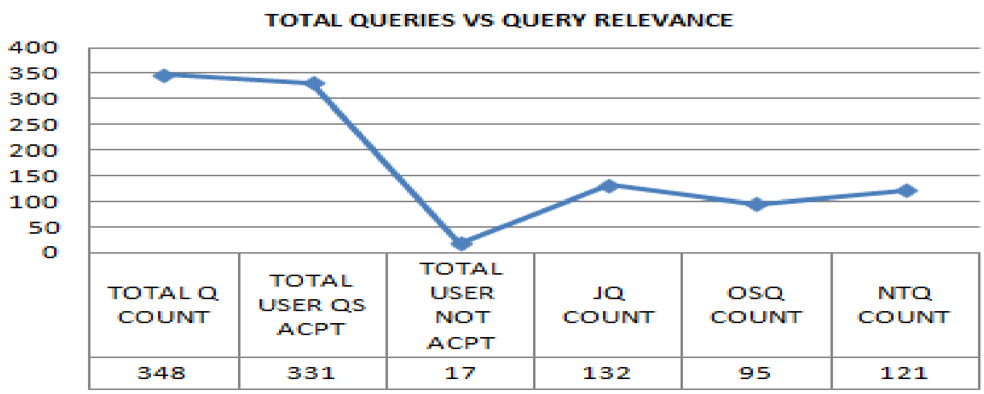
Move query to dispatcher.

The algorithm generated for query transformation indicates that user queries are passed through the NLP parser to remove stop words and obtain extracted words, which in turn are compared with the expert stored keywords for the mapping processes, and the mapped expert's query bucket threshold limit is checked before transmitting the query to the concerned expert. If the expert's query bucket is full or the threshold has been reached, then the query will be redirected to the next expert. If the query is not matched with any of the expert keywords, then the query will be moved to the dispatcher. The dispatcher or the administrator will divert the query to an expert by manually finding the expert or the query will be forwarded to the appropriate knowledge management team to address the issue and resolve it.

A functionality audit of the system was carried out with 100 users using three subjects, namely, operating system, Java and networks.

Table 2

Total Queries With Query Relevance



Q→ Query, QS→ Query Solution, ACPT→ Accepted, JQ→ Java Query, OSQ→ Operating System Query, NTQ→ Network Query.

The results shown in the above graph indicate that the total number of queries raised by 100 users is 348 for which 331 solutions were provided by the experts and accepted by the users as worthy, and 17 solutions were rejected or unaccepted by users. The total Java-related queries raised by users was 132, the total number of queries for the operating system was 95 and that of networks was 121. The result shows that all queries are assigned properly to the experts out of which 17 queries are marked unworthy.

Conclusion and Future Direction

The externalization of tacit knowledge in an e-learning environment takes place using the mechanism of capturing and sharing of knowledge with the right person at the right time. The framework of a dynamic query handling system has the significance of taking a query from a user to an appropriate expert automatically, without the use of manual routing parameters such as subject expert IDs or expert group IDs, and so on. The results reveal that the queries raised by users are transferred to the appropriate experts automatically using the main-tag and sub-tag entries provided by the expert. The system also checks the expert query bucket threshold before placing a query in the expert queue to maintain the correct expert workload. These mechanisms offer a path to reaching a potential expert for solution of a problem and the opportunity to collect valuable knowledge from the expert and store it in the knowledge repository. The stored knowledge in the knowledge repository is searchable by users to find relevant answers for the issue or problem before querying an expert. We claim that this approach can satisfy most of the needs of knowledge seekers by directly connecting to domain expertise for collection of tacit knowledge and transforming it into externalized knowledge. The proposed query management system can be limited to query mapping with experts based on keyword matching or can be improvised to handle queries by extracting the meaning of the query and subsequently mapping it to the appropriate expert based on the query meaning. Future work could include connecting the dynamic query handling system with search engines and adding agent-based search services to use the knowledgeable experts available on the internet for query resolution or knowledge transfer. Search engine connectivity will extend this query management system into the cloud computing environment, which will pose challenges related to higher storage, 24 X 7 system up-time, large numbers of open sessions, archive backups, and compatibility with various open source software and licensed software.

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An Analysis of ODL Student Perception and Adoption Behavior using the Technology Acceptance Model

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Abstract

This paper presents an empirical study aiming on investigating ODL students' perception and adoption of SCORM Compliant Learning Object (SCLO). With the increasing use of SCLO in recent years, a better understanding and implementation of effective instructional resources is necessary to meet the diverse needs of ODL students and enhance their learning performance. The eventual usage of relevant stakeholders determines the success of a system. The system is useless if it is not used in the expected way by the potential users even though it is a good system. Therefore, the aim of this research is to examine if ODL students will eventually use SCLO for their learning. The study used TAM as a basis to investigate the relationship of external and internal variables. A survey instrument eliciting responses on a series of Likert-type questions was given to selected ODL undergraduate students. The results of this study confirm that users' perception has significant effect on the acceptance and adoption of SCLO. The study provides a better understanding of students' behavior on SCLO and the acceptance model.

Keywords: SCORM; learning object; content quality; cognitive absorption; intrinsic motivation; perceived ease of use; perceived usefulness; attitude towards using; intention to use

Introduction

Sharable Content Object Reference Model (SCORM) has become one of the important specifications of content packaging and platform development in open and distance learning (ODL). SCORM is created primarily for vendors and designers who build LMS and learning content authoring tools so that they conform to SCORM technically and the courseware content is designed to run on any SCORM-compliant LMSs. Standards such as SCORM allow reusable learning objects (RLOs) to be created and shared across the e-learning community.

SCLO is learning objects that have been meta-tagged for SCORM compliance. SCLO can be easily interoperated among different learning management systems (LMS) without being tied to a single content provider or authoring tool. The use of SCLO is increasingly prevalent in many e-Learning systems and higher educational institutions. This allows reuse of learning objects and helps with cost and time reduction. The same set of learning objects allows for different instructional design with individual learning objectives.

With the potential benefits of SCLO, there are questions raised on whether students will eventually adopt it for their learning. It is vital to understand the factors of information technology system usage in order to evaluate the effectiveness of system and develop solutions for user acceptance (Knight & Pearson, 2005). In this regard, this research aims to understand and determine students' behavioural intentions to use SCLO using the technology acceptance model (TAM).

With the new delivery methods of e-learning systems, TAM can be used in predicting students' acceptance of IT or IS system. It has been found to be a generous and vigorous model in many e-learning studies (Cheung & Huang, 2005; Drennan, Kennedy & Pisarki, 2005; Liaw & Huang, 2003).

Literature Review and Research Model

Learning Objects

There has been an increased usage of learning objects (LOs) in instructional technology (Anderson, 2003). Wiley (2000) defined LOs as any digital resource that can be reused to support learning. In other words, LOs are a self-contained and re-usable digital resource.

Several studies revealed good impact of learning objects for the effectiveness and efficiency of instructional design strategies. A study conducted by Van Zele et al. (2003)

showed that students perceived to have learned more by using learning objects. Findings from a study conducted by Boyle (2003) also showed that there is positive acceptance of the learning object design. The finding of Cochrane's (2005) study also showed the learning objects have the potential to enhance learning for audio engineering. In addition, Bradley and Boyle's (2004) study found that learning objects have a significant impact in improving the teaching and learning process.

LOs have been integrated into several SCORM-compliant learning management systems (Moodle, Claroline, ATutor, and Docebo) due to their potential benefits.

SCORM-compliant learning object.

SCLO are learning objects that are able to communicate with a learning management system to record user scores, times, and progress (ADL, 2002). These are the most portable and reusable of learning objects as they will work with any SCORM-compliant learning management system. To ensure that the objects themselves are even more portable, SCORM recommends that several other rules be followed when developing the learning objects. Each learning object is a standalone entity. It does not rely on other learning objects to function, and does not specifically refer to other learning objects.

SCLO can be delivered in a runtime SCORM environment and meta-tagged to be stored in and retrieved from a knowledgebase according to different selection criteria. According to Carnegie Mellon (2004), the use of metadata allows identification and location of instructional material in a data repository.

Behavioral Model

The theory of reasoned action (TRA), the theory of planned behaviour (TPB), and the technology acceptance model (TAM) are the three intention based models that focus on the identification of determinants of intentions and the relationships of constructs and variables on innovation usage.

The theory of reasoned action.

TRA was developed by Fishbein and Ajzen (1975) to predict and investigate behavioural belief. As shown in Figure 1, the two psychological determinants, 'attitude towards behaviour' and 'subjective norm', determine intention, which in turn determine behavioural belief.

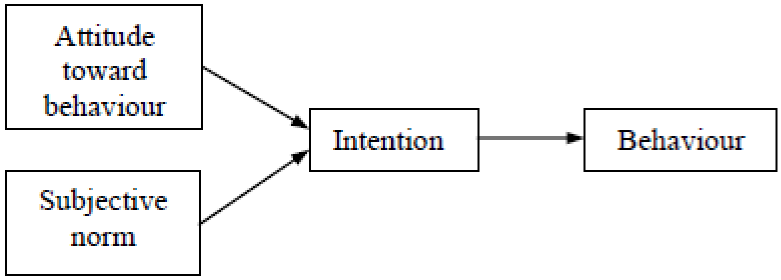


Figure 1. The theory of reasoned action (Fishbein & Ajzen. 1975)

Fishbein and Ajzen (1975) defined attitude as an individual's degrees of evaluative effect towards a target behaviour. On the other hand, subjective norm means a person's beliefs that others think he or she should or should not perform the behaviour underlying normative belief (Ajzen & Fishbein, 1980). Behavioural intention is defined as an individual's subjective probability that he or she will perform a specified behaviour (Fishbein & Ajzen, 1975).

The theory of planned behavior.

TPB is an extension of TRA by adding a construct called perceived behavioural control. TPB proposes that three beliefs influence behavioural intentions, which influence behaviour.

As shown in Figure 2, individual behaviour is determined by behavioural intention, which is then determined by three psychological determinants. The three psychological determinants are 'Attitude towards Behaviour', 'Subjective Norm' and 'Perceived Behavioural Control'.

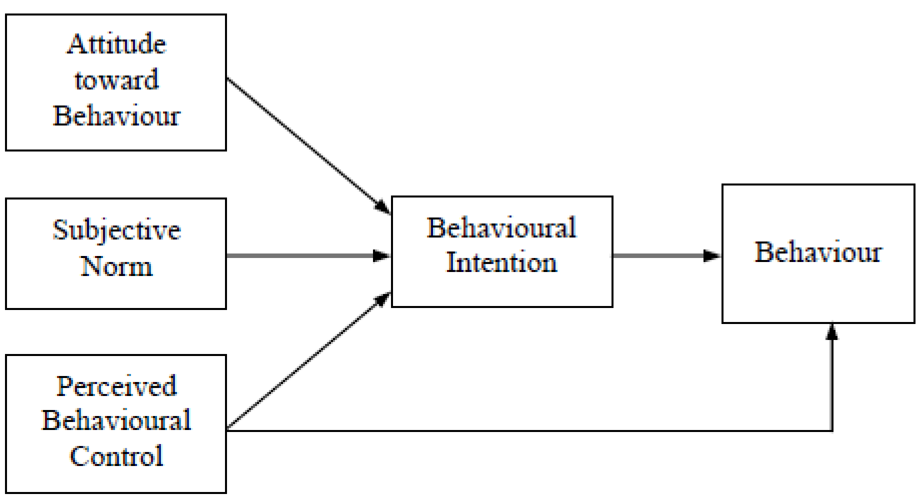


Figure 1. The theory of planned behavior (Ajzen, 1991).

Technology acceptance model.

TAM was developed by Davis (1989) to investigate the reasons why people accept or reject an information technology. The TAM model was developed and derived based on TRA model. Figure 3 illustrates the TAM model as proposed by Davis (1989). Davis indicated that 'perceived ease of use' and 'perceived usefulness' are the two most important belief constructs of using information technology. These two beliefs lead to behaviour intention and actual behaviour

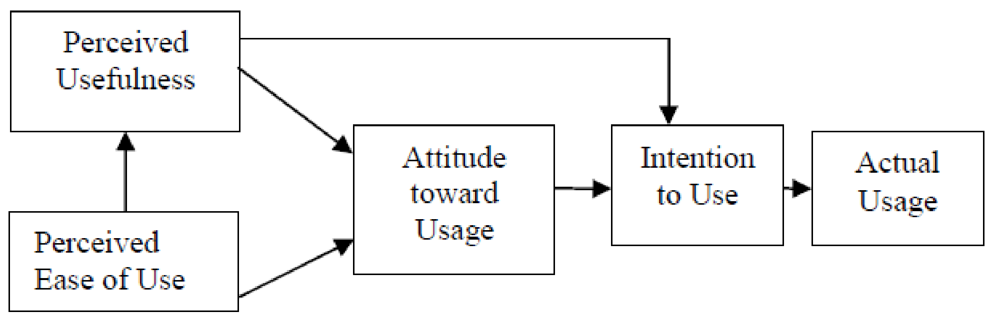


Figure 2. The technology acceptance model (Davis, 1989).

Based on relevant literature, the researcher decided to use an extended version of Davis's (1989) TAM as the survey instrument. The TAM is considered salient to the attitudes and behaviors studied. The TAM is also used because of its tested validity and reliability in measuring and predicting attitudes, technology acceptance, and use. On top of this, numerous studies have also included external variables to extend TAM in order to improve understanding ways individuals adopt information systems.

Research Variables

The three external variables (content quality, cognitive absorption, and intrinsic motivation) have been added to Davis's extended TAM model in this research study.

Content quality (CQ) can be defined as veracity, accuracy, balanced presentation of ideas, and appropriate level of detail (Nesbit, Belfer, & Leacock, 2003). The construct is vital for the evaluation of digital content resources as suggested by previous studies (CLOE Peer Review, 2004; DLNET Guidelines, 2004; Wisc-Online Quality Standards, 2004).

Cognitive absorption (CA) is the antecedent of two key determinants in TAM, PU and PEOU. Agarwal and Karahanna (2000) argued that cognitive absorption is an underlying determinant of PEOU and PU.

Deci (1972) defined intrinsic motivation (IM) as the internal rewards which refer to the pleasure a person has while performing an activity. Lee, Cheung, and Chen (2005) suggested adding IM constructs to better explain IT adoption when they reviewed TAM.

Research Model and Hypotheses

Figure 4 illustrates the research model used in this study.

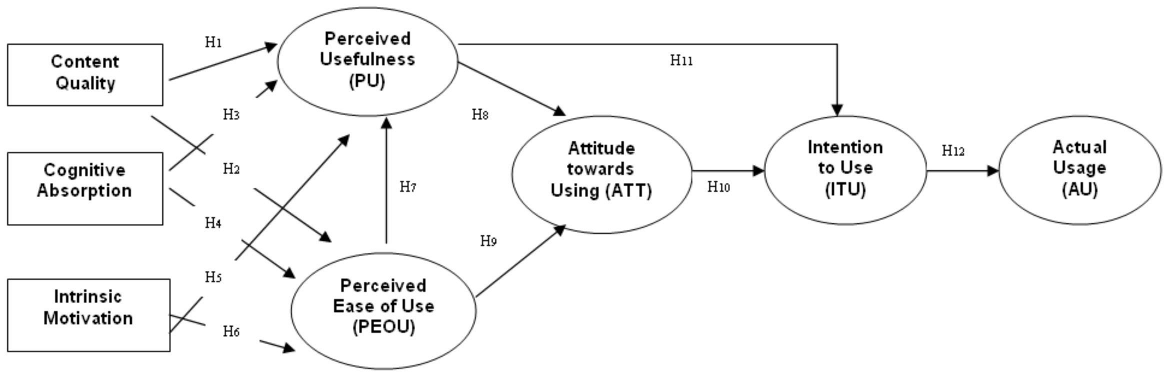


Figure 3. SCORM-compliant learning object acceptance model (SCLOAM).

The following hypotheses were proposed in this study:

H1: Content quality has significant effect on perceived usefulness.

H2: Content quality has significant effect on perceived ease of use.

H3: Cognitive absorption has significant effect on perceived usefulness.

H4: Cognitive absorption has significant effect on perceived ease of use.

H5: Intrinsic motivation has significant effect on perceived usefulness.

H6: Intrinsic motivation has significant effect on perceived ease of use.

H7: Perceived ease of use has significant effect on perceived usefulness.

H8: Perceived usefulness has significant effect on attitude towards using.

H9: Perceived ease of use has significant effect on attitude towards using.

H10: Attitude towards using has significant effect on intention to use.

H11: Perceived usefulness has significant effect on intention to use.

H12: Intention to use has significant effect on actual usage.

Research Methodology

The participants were recruited from ODL students who enrolled in the Structured Programming course offered by Wawasan Open University (WOU) in Jan 2014 semester. Students were introduced to SCLO at the beginning of the semester. Training was provided to the students on the hands-on direct experience of using SCLO through LMS for additional learning support.

Students were then invited to participate in the online survey on a voluntary basis at the 14th week of the semester for a period of two months. An email was sent to remind the participants one week before the closing of the survey.

The questionnaire included three items for content quality (CQ1-3), three items for cognitive absorption (CA1-3), three items for intrinsic motivation (IM1-3), four items for perceived ease of use (PEOU1-4), four items for perceived usefulness (PU1-4), three items for attitude (ATT1-3), three items for intention (ITU1-3), and three items for actual use (AU1-3). All items are measured five-point Likert scales anchored between “strongly disagree” and “strongly agree”. Respondents were asked to provide basic demographic information and answer one open-ended question too.

Data processing was performed using the SPSS program, version 21. Description and inferential statistics were used to conduct the analysis. A series of regression analyses were conducted to observe the relationship between the constructs.

Data Analysis and Results

Out of 90 questionnaires collected, 12 cases were removed due to incomplete information. The response rate was 87%.

The SPSS program was used to conduct statistical tests to evaluate reliability and validity of the instrument. Instrument validation involves processes used to assess instrument reliability and validity. Reliability addresses the degree to which instruments measure consistently on different occasions, and, as Fiske (1971) describes, are free of variable error, and where measurement techniques are accurate and dependable (Cronbach, 1951). Validity addresses the degree of truthfulness and the extent of how generalizations are made.

All the constructs were assessed for reliability using Cronbach’s coefficient alpha. The coefficient for all of the measures exhibited strong reliability, ranging from .848 to .976. Table 1 summarizes the result of reliability testing of each construct.

Table 1

Reliability Coefficient for Individual Variables

Construct	Items	Alpha
Content quality (CQ)	3	.950
Cognitive absorption (CA)	3	.874
Intrinsic motivation (IM)	3	.903
Perceived ease of use (PEOU)	4	.959
Perceived usefulness (PU)	4	.976
Attitude towards using (ATT)	3	.848
Intention to use (ITU)	3	.933
Actual usage (AU)	3	.925

To get satisfactory discriminant validity, the square root of average variance extracted (AVE) for each construct should be greater than the correlation between the construct and the other constructs. Table 2 shows acceptable discriminant validity between each pair of constructs, with all AVE square roots greater than the correlation between the constructs.

Table 2

AVE Square Roots and Inter-Correlation

Construct	CQ	CA	IM	PEOU	PU	ATT	ITU	AU
CQ	1.000							
CA	.827**	1.000						
IM	.971**	.880**	1.000					
PEOU	.960**	.825**	.950**	1.000				
PU	.952**	.800**	.914**	.947**	1.000			
ATT	.896**	.791**	.872**	.885**	.868**	1.000		
ITU	.913**	.844**	.906**	.914**	.924**	.870**	1.000	
AU	.959**	.827**	.932**	.981**	.964**	.873**	.934**	1.000

**Correlation is significant at the .01 level (2-tailed)

In this study, mean and standard deviation are used to describe the statistics. As observed from Table 3, all the mean values fall above the midpoint. The standard deviations range from .678 to 1.021. This indicates that most of the respondents are between "agree" to "strongly agree" on the items tested.

Table 3

Mean and Standard Deviation of Each Variable

Construct	MEAN	SD
CQ	3.501	.973
CA	3.857	.678
IM	3.563	.799
PEOU	3.490	.990
PU	3.540	1.021
ATT	3.870	.749
ITU	3.547	.928
AU	3.530	.968

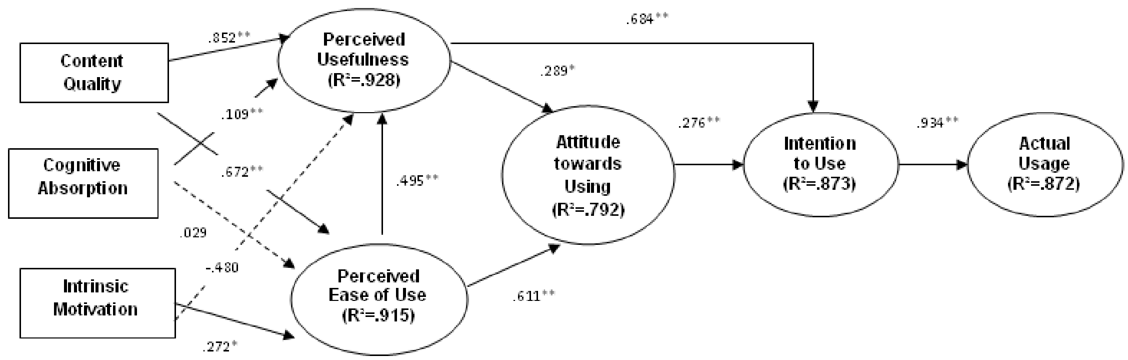
Table 4 summarizes the results from the regression analysis. The analyses of the regression equations revealed that the R^2 and β can be used to predict the values of the dependent variable based on the values of the independent variable. Both R^2 and β values show how well the data support the hypothesised model. From the findings, it shows that demographic variables had no significant effect on dependent variables.

Table 4

Regression Analysis Result Summary

Dependent variables	R^2	Independent variables	β	Standard error of β	t	P
PEOU	.915	CQ	.672	.149	6.119	<.001
		CA	.029	.107	.519	>.05
		IM	.272	.215	2.098	<.05
PU	.928	CQ	.852	.178	6.770	<.001
		CA	.109	.111	1.961	<.001
		IM	-.480	.226	-3.618	>.05
		PEOU	.495	.098	5.212	<.001
ATT	.792	PEOU	.611	.076	4.549	<.001
		PU	.289	.074	2.152	<.05
ITU	.873	PU	.684	.046	10.083	<.001
		ATT	.276	.084	4.075	<.001
AU	.872	ITU	.934	.035	27.749	<.001

The resulting path diagram is presented in Figure 5. Overall, the whole model was able to account for 87.2% of variance in the construct of AU. CQ, CA and IM had significant direct and indirect positive effect on PEOU and PU. PEOU had significant direct positive effect on PU. PU had significant direct positive effect on ATT and ITU. ITU had significant effect on AU. The results show most of the proposed hypotheses were supported (Table 5).



**p<.001, *p<.05

Figure 4. Final conceptual research model.

Table 5

Hypothesis Testing Results

Hypothesis	Result
H1: Content quality has significant effect on perceived usefulness.	Supported
H2: Content quality has significant effect on perceived ease of use.	Supported
H3: Cognitive absorption has significant effect on perceived usefulness.	Supported
H4: Cognitive absorption has significant effect on perceived ease of use.	Not Supported
H5: Intrinsic motivation has significant effect on perceived usefulness.	Not Supported
H6: Intrinsic motivation has significant effect on perceived ease of use.	Supported
H7: Perceived ease of use has significant effect on perceived usefulness.	Supported
H8: Perceived usefulness has significant effect on attitude towards using.	Supported
H9: Perceived ease of use has significant effect on attitude towards using.	Supported
H10: Attitude towards using has significant effect on intention to use.	Supported
H11: Perceived usefulness has significant effect on intention to use.	Supported
H12: Intention to use has significant effect on actual usage.	Supported

Table 6 shows the samples of qualitative data collected from the open-ended question. The open-ended question basically asked the respondents what they thought about SCLO. It was an optional question.

Table 6

Students' Response to Open-Ended Questions

#	Examples of students' open-ended question responses
6	"It is a great learning support definitely"
19	"It takes some time to load some of SCLO which have heavy multimedia elements"
27	"I will continue to adopt SCLO in my studies"
31	"easy to use, I am able to use without additional training"
37	"I can easily move to other topics and go backward with SCLO "
43	"some content are too lengthy, point form would be good"
57	"I used SCLO for my revision"
64	"It would be good if there is audio feature"
73	"need higher bandwidth to ease the access"
78	"I have no problem to use SCLO"
83	"The learning activities are very useful and helpful for me"
90	"SCLO really helps me to understand the content better"
94	"I personally feel this learning aid is better than the others"

Conclusions

The purpose of this research paper was to understand and predict ODL students' acceptance of SCLO by hypothesising the relationships between variables that affect students' adoption behavior. Results of the regression analyses show that the true usage an individual makes of a system is driven by the ITU, which in turn is determined by ATT, PU, PEOU, CQ, CA, and IM. This study demonstrated that the constructs of SCLOAM are viable resources for analyzing ODL students' perceptions towards the use of SCLO for their learning. This research also provides new insight on the evaluation and prediction of technology acceptability. The findings help relevant stakeholders to enhance their existing learning systems by integrating appropriate learning theories. The findings can be referenced as guidelines to increase the use of particular systems. In addition, they can widen the applicability of TAM in the education field, especially in the context of SCLO. There are other variables that could be studied in this study. Therefore, further exploration of other possible constructs like computer self-efficacy is suggested.

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Sense of Community in a Blended Technology Integration Course: A Design-Based Research Study


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Abstract

This design-based research study explored whether *sense of community* was maintained while flexibility in the course was increased through an adoption of a unique blended learning model. Data collected in this study show a significant drop in the sense of connectedness score from a mean of 50.8 out of 66 to a mean of 39.68 in the first iteration. The score then began to gradually increase, reaching 50.65 in the third iteration. Results indicate that transitioning to a blended learning environment may be a suitable option to increase flexibility while maintaining a sense of community in a project-based course. Future research into specific aspects of course design such as maturity of design, age-level of participants, and context would further develop understanding in this area.

Keywords: Blended learning; sense of community; design-based research; connectedness

Introduction

In recent years, blended learning adoption has increased rapidly (Graham, Woodfield & Harrison, 2013). Commonly defined as "learning experiences that combine face-to-face and online instruction" (Graham, 2012, p. 7), blended learning is adopted primarily for three reasons: (a) improved pedagogy, (b) increased access/flexibility, and (c) increased cost effectiveness (Bonk & Graham, 2006). The access that blended learning provides goes beyond physical distance, also allowing for greater flexibility in the time both the student and instructor engage in a course (Picciano, 2006). This increased flexibility can provide instructors with more individualized time to spend with those struggling in a course; however, though blended learning offers solutions to rigid course structure, the introduction of online instruction may bring potential challenges of its own.

One concern in moving to a blended environment is that a lack of in-person experience could diminish the students' overall *sense of community* (SOC) and social presence in the class. Aragon (2003) defined social presence as salient interaction with a "real person" (p. 60) and extolled its importance to SOC, stating that "social presence is one of the most significant factors in improving instructional effectiveness and building a sense of community" (p. 57). Diminished SOC was seen by Stodel, Thompson, and MacDonald (2006) while researching social presence in their online course. They observed that "although there were indicators of social presence" it appeared "that [social presence was] still what the learners missed most when learning online" (p. 8). Rovai (2001) supported the necessity of social presence in building a strong sense of community by imploring that "instructors must deliberately structure interactions to overcome the potential lack of social presence" (p. 290) in an online course. Rovai argued that as social presence goes down, so does SOC. This, in turn, can affect student learning as Wegerif (1998) found in his study in a class for professional educators on teaching and learning online that "individual success or failure on the course depended upon the extent to which students were able to cross a threshold from feeling like outsiders to feeling like insiders" (p. 34). Rovai later (2002c) found a significant relationship to exist between students' perceptions about their sense of community and their cognitive learning. Given the importance of a strong SOC, it is necessary to understand the impact on this psychological construct in transitioning a course to a blended format.

Literature Review

In order to understand issues surrounding sense of community and how it can relate to online learning, we will first review the literature regarding social interactions in distance education in general and how these interactions are part of establishing a SOC among students. Second, we will review the literature regarding the importance of SOC.

Interactions in Distance Education

Rovai (2001) claimed that Moore's (1991) theory of transactional distance was especially helpful in understanding online learners' SOC. In Moore's theory, he stated that special considerations should be taken regarding dialogue and structure in order to mitigate the negative impact of distance education. Moore determined that "the success of distance teaching is the extent to which the institution and the individual instructor are able to provide the appropriate opportunity for, and quality of, dialogue between teacher and learner, as well as appropriately structured learning materials" (p. 5). Similarly Rovai (2001) offered two considerations on structure and dialogue with regard to SOC. First, Rovai argued that since additional structure tends to increase psychological distance, SOC in turn decreases. Second, by utilizing communications media appropriately, dialogue could be increased and transactional distance reduced, which would theoretically increase SOC (p. 289). To better understand these considerations, each of Moore's (1989) three elements of interaction are discussed in turn, along with a fourth element added by Bouhnik and Marcus (2006). This fourth element is similar to the learner-interface element discussed by Hillman, Willis, and Gunawardena (1994). These aspects of learning interactions include (a) interaction with content; (b) interaction with the instructor; (c) interaction with the students; and (d) interaction with the system.

Interaction with content.

Interaction with content occurs as the learner is exposed to new information and attempts to integrate this new content with the learner's previous knowledge on the subject. In today's technological landscape, this interaction could take place online or face-to-face, individually or collectively, alone, with peers, or with a teacher. Moore (1989) argued that interaction with content is the "defining characteristic of education" since without it there could be no education (p. 1). According to Moore, it is the process of "interacting with content that results in changes in the learner's understanding."

Interaction with the instructor.

When discussing transactional distance, Moore (1989) warned that physical distance between the learner and the teacher may result in a psychological and communication gap between them. Moore discussed how a teacher could provide effective support, motivation, clarity, and experience with the material and concluded that interaction with the instructor is most valuable during testing and feedback. This interaction leads to better application of new knowledge by the learner.

Hara and Kling (2001) found that students were more likely to feel frustration, anxiety, and confusion when taking an online class if they encountered communication problems. In particular, during an ethnographic study of a small, graduate-level online distance education course, they found that lack of communication with the teacher produced stress in students. They stated "students reported confusion, anxiety, and frustration due to the perceived lack of prompt or clear feedback from the instructor, and from ambiguous instructions" (p. 68).

From a voluntary survey of 699 undergraduate and graduate online students at a mid-sized regional university, Baker (2010) recorded that instructor presence had a statistically significant positive impact on effective learning, cognition, and motivation. Here, instructor presence was described as being actively engaged in an online discussion, providing quick and personal feedback to assignments, or being available frequently throughout the course (p. 6).

Interaction among students.

Moore (1989) was also concerned with the transactional distance between the students themselves. Moore posited that inter-learner interaction could become an "extremely valuable resource for learning" (p. 2). Although important, Moore observed that inter-learner interaction was most impactful among younger learners. It was not as important for most adult and advanced learners who are more self-motivated. That may be one reason as to why Baker (2010) found that instructor presence had a greater influence on reducing frustration and increasing social presence than peer presence (p. 23).

Interaction with the system.

Bouhnik and Marcus (2006) added to Moore's (1989) original three interactions by including the interaction students have with the system itself. They posited, "there is a need to make sure that the technology itself will remain transparent and will not create a psychological or functional barrier" (p. 303). If interaction with the system produced conflicts that were not resolved quickly, a student's level of satisfaction and ability to accomplish learning outcomes could be negatively impacted. Specifically, when designing a technological system, Bouhnik and Marcus stressed the need for "building a support system, with maximum accessibility" (p. 303).

Importance of Sense of Community

Building such a support system as Bohnik and Marcus discussed can enable these four varying kinds of learner interactions to occur more easily. This, in turn, can increase a student's sense of community (SOC). Sarason (1974), when coining the term, defined SOC as "the perception of similarity to others, an acknowledged interdependence with others, a willingness to maintain this interdependence by giving to or doing for others what one expects from them, and the feeling that one is part of a larger dependable and stable structure" (p. 157). Though Sarason coined the term SOC, it has been the subject of much research, either directly or indirectly, over the last century (Glynn, 1981, p. 791). Due to its broad nature, research on SOC can be found in many fields of study. McMillan and George (1986) stressed the need for more research and understanding on the SOC in order to better inform public policy and "strengthen the social fabric" (p. 16) with more concrete solutions on how to increase community in a variety of settings. Their hope was that research into the SOC would foster open, accepting communities built on understanding and cooperation.

The concept of SOC is not new to distance education. While developing an instrument for measuring SOC in distance education, Rovai (2002a) defined SOC in education as something that occurs when "members of strong classroom communities have feelings of connectedness" (p. 198). He went on to mention that members "must have a motivated and responsible sense of belonging and believe that active participation in the community" (p. 199) could satisfy their needs.

In his review of the SOC research, Rovai (2002b) concluded that classroom community "can be constitutively defined in terms of four dimensions: spirit, trust, interaction, and commonality of expectation and goals" (p. 2). In regards to interaction, Rovai noted that if interaction could not occur in abundance, then the focus should be on the quality of interaction. The instructor controls these interactions, and care should be taken to mitigate negative interactions while strengthening SOC. Interactions with the instructor should include both feedback as well as more personable information (Rovai, 2002b).

Shea, Swan, and Pickett (2005) determined through regression analysis that SOC was also influenced by effective directed facilitation, instructional design, and student gender. Their survey of 2,036 students measured students' perceptions of teaching presence and learning community. The more engaged an instructor seemed in the course, the stronger sense of community and belonging students felt (p. 71). Garrison (2007) cited similar issues when reviewing research on teaching presence in an online community of inquiry. He stated "that teaching presence is a significant determinate of student satisfaction, perceived learning, and sense of community" (p. 67). Baker (2010) stressed the need for further research into the impact of teacher presence in an online environment on the sense of community (p. 23).

However, in order to address this need for research on online sense of community, instruments and methods are needed to detect SOC. One of the first instruments to objectively measure sense of community was developed by Glynn (1981) for face to face settings. Glynn argued that SOC could be identified through context-specific attitudes and behaviors. Glynn uncovered 178 attitude and opinion statements that might be associated with SOC. Examples included whether a community member felt that, in an emergency, they would have support or whether they felt SOC is context-specific and research should focus on the community level.

Rovai and Jordan (2004) have more recently conducted research on blended environments and SOC. Their study involved a comparative analysis between traditional, online, and blended graduate courses. The traditional course covered educational collaboration and consultation. Online technologies were not used in this course, instead relying on textbook activities, lectures, some group work, and authentic assessments for individual students. The blended course focused on legal and ethical issues with teaching disabled students. Both face-to-face and asynchronous online components were used. The blended course began with a face-to-face session with two more sessions spaced throughout the semester. The online course covered curriculum and instructional design, relying heavily on the institution's learning management system to provide content and communication. Rovai and Jordan's analysis consisted of a 20-point Likert scale survey with items such as "I feel isolated in this course" and "I feel that this course is like a family." Each item was self-reported by the participants consisting of 68 graduate students each enrolled in a graduate-level education course. All participants were full-time K-12 teachers seeking a master's degree in education. Their findings suggested that the SOC was strongest in the blended course, with traditional courses having the next strongest community.

Though Rovai and Jordan's results were promising, they are not easily applied to all contexts. In this study, the courses were independent from one another. The traditional, blended, and online courses each focused on different subjects and were established in their respective educational modes, leaving the possibility open that differences in the data could have been due to the type of course the students participated in. Another possible difference in the data could come from where the students resided related to one another. In both the traditional and blended courses students resided in the same geographic area, while the online course had a student population dispersed throughout the country. Finally, Rovai and Jordan's work was published nearly a decade ago, and many technologies (such as video-based technologies and course management systems) have emerged and evolved to provide powerful new ways of supporting human interactions in blended learning environments. Thus, it is important to update the work of these scholars and understand the nature of supporting students' SOC in today's learning environments.

In particular, there is very little literature available that explains the nature of transitioning a course from traditional to blended learning, and how this transition affects students' feelings of being connected to their instructors and peers in the various iterations of the course. This is an important issue, because as online learning grows, more instructors and instructional institutions are transitioning courses to online and blended settings. More research using approaches such as design-based research is needed to understand the iterative effects of these transitions. Design-based research (DBR) is a method of inquiry that is especially suited to this type of project because DBR strives to improve practice through designed interventions while increasing local and generalizable theory (Barab & Squire, 2004).

Research Questions

Thus, the purpose of this study was to carry out a design-based research agenda of producing an improved course for teaching preservice teachers technology integration skills in a blended learning environment while simultaneously seeking to understand the impact on SOC and student satisfaction. In line with design-based research, we began our study with loosely formed research questions supported by clear pedagogical expectations (Edelson, 2002, p. 106). Thus, our primary research question was how we could design the course so it would

- allow for more student flexibility in their learning;
- devote more class time for working with struggling students;
- provide ample support and resources to more advanced students;
- not negatively impact students' sense of connectedness and SOC to each other; and
- not negatively impact student satisfaction with the course as represented in the student ratings.

Method

Design-Based Research

Design-based research (DBR) is concerned with three areas of a learning environment: inputs of the system, outputs of the system, and the contribution of theory to the system (Brown, 1992). Literature has shown that DBR studies often have the following characteristics (The Design-Based Research Collective, 2003).

1. The central goals of designing learning environments and developing theories of learning are intertwined. Edelson (2002) supports this by adding that design researchers should start with a hypothesis; however, it should be less detailed and allow for adjustment while designing and developing learning environments.

2. Development and research take place through continuous iterations of design, enactment, analysis, and redesign. Cobb et al. (2003) described DBR as highly interventionist in nature.

3. Research on designs must lead to sharable theories and interventions that help communicate relevant implications to practitioners and other educational designers.

4. Research must account for how designs function in authentic settings. This account must be detailed.

5. Development of such accounts relies on methods that can document and connect processes of enactment to outcomes of interest.

These characteristics informed our DBR study's design and documentation by providing a framework to follow. In addition, Graham, Henrie, and Gibbons (2013) described various approaches to conducting research in blended learning that can attempt to create new knowledge by either exploring, explaining, or designing interventions. Our study fell in the paradigm of design, and thus Graham et al.'s suggested model for studying design iterations was helpful. In their model, the authors argued that a study of each iteration should include a discussion of the core attributes affected by an intervention and a measurement of the outcome. This model represented well the nature of our project because we analyzed outcomes after each iteration and sought over time to develop a course that would be more effective. Figure 1 is a representation of this study in the context of their model.

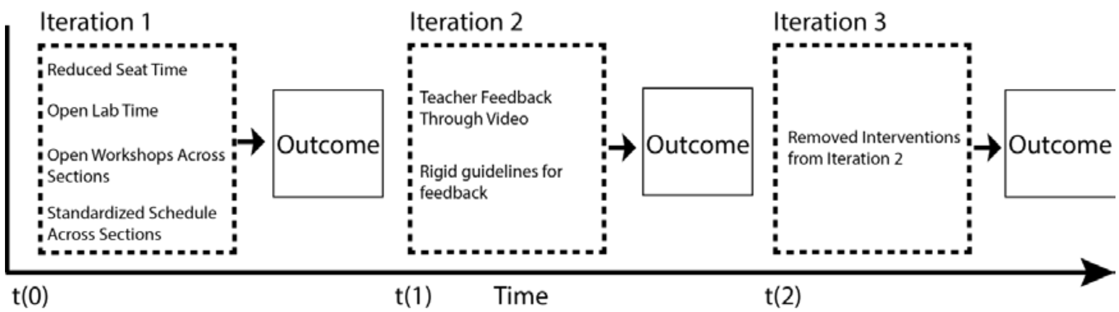

Figure 1. Visual representation of design research comparing iterations over time.

In following this model, we engaged in the following design iterations. These interventions are more fully explained in a subsequent section.

Iteration 1.

Interventions to the course in this iteration included the following:

- Implemented a unique blended learning model in order to mitigate the traditional time and space limitations of the course while hopefully maintaining SOC and the overall student experience.
- Standardized scheduling across multiple sections, in order to augment the students' support system.

Iteration 2.

Interventions to the course in this iteration included the following:

- Formalized greater instructor/student interactions using assignment feedback, in order to increase SOC in the course.

Iteration 3.

Interventions to the course in this iteration included the following:

- Removed Iteration 2's intervention in order to determine whether the change in SOC was due to the intervention or the maturity of the new blended course.

Participants and Course Design

Participants consisted of 247 preservice secondary education teachers enrolled in a technology integration course. This course teaches basic educational technology skills and practices to nearly all secondary education majors on campus. However, the class is limited because it is only 1 credit, forcing instructors to be as efficient as possible in their instruction. In addition, students enter the class with various technological abilities, with some needing much scaffolding and others more able and desirous to work at their own pace to complete the course. In the course, students complete 3 major units: Internet Communications (where they typically create class websites), Multimedia (where they typically create instructional videos), and Personal Technology Projects (where they select a technology specifically useful to their discipline). In addition, they complete smaller units related to copyright/Creative Commons, internet safety, and mobile learning. Students taking the course are in various stages of their academic careers, with many taking the course their first semester as education majors, while others complete the course nearer to graduation.

A breakdown of the participants is shown in Table 1. Two limitations in the data need clarification. Sense of community data was not collected for the winter 2012 semester, as there was no major intervention at that time and we had sufficient baseline data. Once the decision to move to a blended format was made, data collection continued. Also, responses for Iteration 2 and Iteration 3 were unusually low, though the enrollments in the course were on par with other semesters. We are not sure of the direct cause of this low response rate, although it is likely that the instructors for these iterations did not incentivize participation in the survey like previous instructors did. In each semester, four sections of the course participated in the study. The baseline consisted of participants' data collected from four semesters, totaling 16 sections. Each iteration consisted of participants' data collected from only one semester, totaling four sections each.

Table 1

Breakdown of Participants by Iteration

	# of participants	Semester
Baseline	161	W2010-F2011
Iteration 1	44	Fall 2012
Iteration 2	22	Winter 2013
Iteration 3	20	Fall 2013

Students were placed into different sections of the course based on their major field of study. These fields of study included physical and biological science, social science, physical education, family and consumer education, and language arts. This way, each student shared with peers their ideas for using technologies specifically for the context of their field of study.

A faculty member trained in educational technology along with his mentored graduate students taught the course. The faculty member taught two sections each semester resulting in the majority of students being taught by him. With input from the faculty member, the graduate students were given some autonomy to design and teach their section. Graduate students typically taught for two semesters only, rotating in new graduate students every semester.

Baseline Course Description

Participants in the traditional face-to-face course were required to attend one hour each week. In order to complete their projects, they were expected to devote an additional two hours or more per week to their coursework. The course was divided into multiple units, one for each project or technological concept. Each unit typically consisted of an introductory class period with demonstration of the technology and discussion. Subsequent class sessions would be in a required lab setting where students could work on their projects and the class would have additional demonstrations in a workshop style. Some of the smaller units or units not specifically tied to learning a technology were only one week long, omitting the lab.

For example, the first unit was to learn an Internet communications technology. The first week of this unit was devoted to a teacher-led demonstration of a website-creation program followed by discussion on where and how it could be used in the classroom.

The next week was devoted to students working on a project that would provide hands-on application of the program. If needed, the teacher would demonstrate additional features of the program to help better student understanding. The following week would be devoted to a new unit and the previous assignment involving the website program would be due. For units involving educational concepts such as Internet safety, where new technologies did not need to be learned, one week was taken to provide resources on the topic and discussion with the assignment for that unit being due the following week.

Measurement Instrument

For this study we chose to adapt the Classroom Community Scale (CCS), developed by Rovai, in order to collect the necessary SOC data. The original scale from Rovai consisted of 20 items split equally into two subscales: the connectedness subscale and the learning subscale (Rovai, 2002b). A factor analysis of this scale performed by Rovai confirmed that the overall results of using the scale reflected the classroom community construct.

In order to better fit our specific objectives on measuring connections and trust, and to avoid student survey fatigue, we only used the connectedness subscale, and altered some of the items to better reflect the context of our course. For example, the item “I feel uncertain about others in this course” was too broad and vague for our context. It was altered to “I could share ideas on projects with others without being criticized” in order to measure a specific example of trust and connectedness with others. A seven-point response scale was used to allow for greater variance and to match other formative evaluation items asked of the students, instead of the five-point scale originally proposed by Rovai. One item was added to the survey that directly addressed the learner’s opinion on how important SOC is in the class. This item was not designed to measure the participants’ sense of connectedness and is thus not included in our connectedness score; however, responses to this item are included below to provide additional context within each iteration. These modifications were made prior to collecting data and were consistent throughout this study. Our adapted CCS is found in Table 2.

Table 2

Adapted and Original Connectedness Subscale Comparison

Adapted Connectedness Subscale	Original Connectedness Subscale
1. We cared about each other	I feel that students in this course care about each other
2. I felt connected to the other class members	I feel connected to others in this course
3. There was a feeling of trust	I trust others in this course
4. I felt that this course was like a family or community	I feel that this course is like a family
5. I could share ideas on projects with others without being criticized	I feel uncertain about others in this course
6. I was confident that my class members would support or assist me	I feel confident that others will support me
7. I had a sense of belonging	I do not feel a spirit of community
8. My class members could depend on me	I feel that members of this course depend on me
9. I felt isolated	I feel isolated in this course
10. I had friends that I could talk to outside of class	I feel like I could rely on others in this course
11. I received timely feedback from others	I feel that I receive timely feedback (originally from the learning subscale)
12. The "sense of community" we felt was important	(Not Included)

Data Collection and Analysis

Participants in each iteration completed the adapted CCS as part of an end-of-course online survey each semester. Responses were then compiled, and missing values were removed from the data. If one participant submitted two surveys accidentally, the most recent survey was kept while the other was discarded. Only responses in which the participant provided permission for inclusion in the research study were used.

To obtain the connectedness score, the weights of each item were added. Total scores ranged from a maximum of 66 to a minimum of 0. For all items except No. 9, the following scoring scale was used: strongly agree = 6, agree = 5, somewhat agree = 4, neutral = 3, somewhat disagree = 2, disagree = 1, strongly disagree = 0. For item No. 9, “I felt isolated,” the scoring scale was reversed to ensure the most favorable choice was assigned the higher value in order to be similar to the other items: strongly agree = 0, agree = 1, somewhat agree = 2, neutral = 3, somewhat disagree = 4, disagree = 5, strongly disagree = 6.

Similarly, we obtained student ratings through a separate end-of-course survey provided by the institution. Students were asked to rate their experience in the course. The following scoring scale was used: Exceptionally Good = 7, Very Good = 6, Good = 5, Somewhat Good = 4, Somewhat Poor = 3, Poor = 2, Very Poor = 1, Exceptionally Poor = 0.

Once SOC data were collected, Levene’s test of homogeneity of variances was used to assess homogeneity. To determine whether the data were normally distributed, a Shapiro-Wilk test was performed. Finally a one-way ANOVA followed by Tukey post-hoc analysis was performed on the connectedness scores to look for SOC differences between iterations. Since we were comparing data across multiple iterations, a one-way ANOVA was required as opposed to a t-test.

In order to determine differences in student ratings a one-way ANOVA was again used due to the multiple iterations. An independent-sample t-test was used to uncover any differences in the perceived SOC importance among participants. An independent-sample t-test was chosen as opposed to a one-way ANOVA since we were only comparing two groups: those who agree that SOC is important and those who do not.

Iterative Findings

In order to understand the findings in this study, we will begin by thoroughly explaining the different design iterations of the course, followed by the findings related to the sense of connectedness felt by students in each iteration. We will then discuss overall findings.

Baseline SOC Findings

The mean and standard deviation for the baseline version of the course, for both the connectedness score and perception of SOC importance, are reported in Table 3. The connectedness score mean was 50.80 out of a possible 66. The SOC importance mean was 4.12 out of a possible 6. The student ratings mean was 6.60 out of a possible 8.

Table 3

Descriptive Statistics for the Baseline

	n	Min	Max	*Mean*	*SD*
Connectedness Score	161	25	66	50.80	9.433
SOC Importance	161	0	6	4.12	1.341
Student Ratings	215	0	7	6.60	1.186

Iteration 1 Findings

Several challenges were present in the traditional face-to-face model of this course, particularly related to time and space restrictions. The course was allotted only one credit hour, which left little time for demonstration, discussion, and application of the technologies students would most likely encounter in the classroom. Students' technical abilities also varied greatly, which made it more difficult to pace the course according to need. With limited time and resources, instructors were typically forced to pace the class in line with the average technical ability. In order to address these challenges, we designed a blended model specifically for our needs. Our design removed the requirement for students to come to each class period, opting instead to require only introductory days for new units. This meant that roughly 60% of the class time became optional for students. For the required in-class days, instructors typically utilized that time for discussion on the impact of technology or technology-related concepts. Demonstrations of the specific technologies were moved online in the form of video tutorials.

Our design also consisted of turning the remaining class periods into labs that were open to all sections of the course. That increased the possibility for students to come and receive help every day that class was offered. Since it was optional, we only encouraged or required the lab days for students who were struggling in the course. Instructors were then able to devote more of their time in assisting these students while the more capable students did their work off-campus.

The final design consideration affected the last few weeks of class when students worked on their personal technology projects—an activity where they selected a technology specific to their subject domain to learn. Instead of demonstrating one technology each week for students in our individual sections, which limited the technological options for student projects, we developed open workshops that any student from any section could attend. We required that each student attend at least two of these workshops. Now, instead of only 3-5 technology workshops available to any one student, they would have 12-15. These interventions increased flexibility in time and space for our students, as well as in choice. In order for this design to work, we standardized the schedule across all six sections so class time and instructors could be shared across sections.

The mean and standard deviation of the connectedness score and perception of SOC importance for Iteration 1 are reported in Table 4. The student ratings mean was 6.53 out of a possible 8.

Table 4

Descriptive Statistics for Iteration 1

	n	Min	Max	*M*	*SD*
Connectedness	44	15	63	39.68	11.334
SOC importance	44	0	6	3.09	1.378
Student ratings	39	0	7	6.53	1.446

Iteration 2 Findings

One intervention was added in the second iteration of the course. As instructors, we felt less connected with our students and worried students might feel the same, so we increased our usage of video recordings for assignment feedback (our assumption was that the use of video might improve perceptions of instructor social presence) along with an increased emphasis on developing a stronger relationship with each student. Specifically, each instructor followed the guidelines below when providing both video and text feedback for the three major assignments:

- Address the student by name;
- Identify things in common that you have with the student (only for the first assignment);
- Welcome the student into the class when giving feedback on the first assignment, e.g., “Glad to have you in class” (only for the first assignment);
- Offer help, “Let me know if there is anything that I can do to help you”;
- Look in the webcam if you are giving video feedback;
- All feedback should be timely—within a week of the due date; and
- Send an email to the class reminding them to view their feedback.

The mean and standard deviation of the connectedness score and perception of SOC importance are reported in Table 5. The student ratings mean was 6.58 out of a possible 8.

Table 5

Descriptive Statistics for Iteration 2

	n	Min	Max	*Mean*	*SD*
Connectedness	22	32	58	42.95	7.718
SOC importance	22	1	5	3.18	1.053
Student ratings	43	4	7	6.58	0.983

Iteration 3 Findings

Though our increased attentiveness when providing feedback in order to establish personal connections with students in prompt and positive ways, and our introduction of video feedback may have had a positive impact on SOC, the improvement shown did not seem to justify the increased time and effort required to provide that type of feedback. At the same time, our blended learning model had matured, which we felt may be a cause of the improved SOC, as we felt we were better teachers than we had been at the beginning of the blended learning intervention. Thus, for this third iteration, we removed the requirement for instructors to follow the rigid guidelines for providing feedback, as described in Iteration 2. No other interventions were purposefully made to the course. There were minor changes to instructors and updates to course content; however, these changes are common in this course in each previous iteration.

The mean and standard deviation of the connectedness score and perception of SOC importance are reported in Table 6. The student ratings mean was 6.08 out of a possible 8.

Table 6

Descriptive Statistics for Iteration 3

	n	Min	Max	*M*	*SD*
Connectedness	20	33	68	50.65	9.422
SOC importance	20	2	6	3.90	1.210
Student ratings	41	2	7	6.08	1.120

Overall SOC Findings

The data were not normally distributed for the Baseline, while the three iterations had normally distributed data, as assessed by Shapiro-Wilk test ($p > .05$), reported in Table 7. There was homogeneity of variances, as assessed by Levene's test of homogeneity of variances ($p = .336$) reported in Table 8.

Table 7

Shapiro-Wilk Test of Normality

	Statistic	df	Sig.
Baseline	.965	161	.000
Iteration 1	.982	44	.708
Iteration 2	.938	22	.177
Iteration 3	.978	20	.909

Table 8

Levene's Test for Homogeneity of Variances

Statistic	df1	df2	*p*
1.133	3	243	.336

Overall the SOC (connectedness score) decreased from the Baseline (M = 50.80, SD = 9.4), to Iteration 1 (M = 39.68, SD = 11.3), with a slight increase in Iteration 2 (M = 42.95, SD = 7.7). From Iteration 2 to Iteration 3, there was a larger increase in SOC (M = 50.65, SD = 9.4) as reported in Table 9.

Table 9

Descriptive Statistics for SOC in Each Iteration

	N	*M*	*SD*	*SE*	95% CI		Min	Max
					Lower	Upper		
Baseline	161	50.80	9.433	.743	49.33	52.26	25	66
Iteration 1	44	39.68	11.334	1.709	36.24	43.13	15	63
Iteration 2	22	42.95	7.718	1.646	39.53	46.38	32	58
Iteration 3	20	50.65	9.422	2.107	46.24	55.06	33	68
Total	227	47.88	10.699	.710	46.48	49.28	15	66

Since the connectedness score was not normally distributed for all iterations, both a one-way ANOVA and a Kruskal-Wallis test were conducted. Results from the Kruskal-Wallis test led to the same conclusion as the one-way ANOVA. Therefore, only the analysis of the one-way ANOVA between iterations is provided. There was a statistically significant difference among the iterations, $F(2,224) = 25.9$, $p < .001$.

Table 10

One-way Analysis of Variance for SOC

	Sum of squares	Df	Mean square	F	P
Between groups	4999.977	3	1666.659	17.843	< .001
Within groups	22697.286	243	93.404		
Total	27697.263	246			

Tukey post-hoc analysis revealed that the mean decrease from the Baseline to Iteration 1 (11.1, 95% CI [6.9, 15.4]) was statistically significant ($p < .001$) while the mean increase from Iteration 1 to Iteration 2 (-3.3, 95% CI [-9.8, 3.3]) was not significant ($p = .566$). The mean increase from Iteration 2 to Iteration 3 (7.7, 95% CI [-15.42, .03]) was not significant, though just barely ($p = .051$). Also, the mean increase from Baseline to Iteration 3 (.1, 95% CI [-5.8, 6.1]) was not statistically significant ($p = 1.000$).

Table 11

Tukey Post-Hoc Analysis of SOC in Each Iteration

		Mean difference	*SE*	*p*	95% CI Lower	Upper
Baseline	Iteration 1	11.1	1.6	< .001	6.86	15.37
Iteration 1	Iteration 2	-3.3	2.5	.566	-9.80	3.26
Iteration 2	Iteration 3	7.7	3.0	.051	-15.42	.03
Iteration 1	Iteration 3	-11.0	2.6	< .001	-17.71	-4.23
Baseline	Iteration 3	.1	2.3	1.000	-5.78	6.07

Report of Student Ratings

A one-way ANOVA indicated that there was a statistically significant decline from Iteration 2 and Iteration 3 in student ratings (0.6, 95% CI [-.01, 1.3], p = .054). No significant difference was found between the Baseline, Iteration 1, and Iteration 2. The Baseline showed the highest mean rating of 6.60 followed by Iteration 2 at 6.58, Iteration 1 at 6.53, and finally Iteration 3 at 6.08.

Report of SOC Importance

An independent-sample t-test was run to determine if there was a connection between participants' view on the importance of SOC and the SOC score they provided, based on a question asked in the end-of-course survey about this. The scale used for this data was the same as other SOC items on the survey. Participants were divided into two groups. Group A consisted of participants who agreed that SOC was important and scored that item with a 4 or higher. Group B consisted of participants who disagreed that SOC was important and scored that item with a 2 or lower. Those participants who chose to remain neutral were not included in the comparison.

There were 131 participants in Group A and 30 participants in Group B. Those in Group A had a higher SOC score (M = 54.99, SD = 6.73) than those in Group B (M = 35.40, SD = 10.34). The difference between the two groups was statistically significant, M = 19.59, 95% CI [15.58 to 23.61], $t(34.82) = 9.91$, $p < .001$.

Discussion

By moving to a blended environment, we were able to increase flexibility in the course for both students and instructors without negatively impacting student ratings in the first two iterations. However, impact was seen in the final iteration with a significant decrease in student ratings between Iteration 2 (M = 6.58) and Iteration 3 (M = 6.08). Overall, the average course rating across all iterations was "Good" which shows promise that the transition was successful. Additional research is required to determine whether the decrease was caused by our removal of rigid feedback guidelines for instructors or if there was some other factor that contributed.

Transitioning to a blended environment no longer required students to attend each week, giving them more flexibility in the time and space where they would complete their schoolwork. Also, by opening up our lab days to every section, the students were able to choose which day of the week they could attend lab for support. Instructors also had more flexibility. Instead of teaching to the middle demographics, those students with average technical abilities, instructors were able to devote more of their time on lab days to only the students who came in for help, typically those struggling in the course. By sharing resources between sections, instructors could now offer multiple technologies and projects that they individually couldn't support. Instructors were no longer limited to the technologies that they personally knew. Students benefited from this sharing of resources with a much larger selection of technologies to select from for projects.

SOC, however, was more volatile. Though we saw a significant drop in students' sense of connectedness to each other from our baseline to our first iteration, there was no significant difference between our baseline (M = 50.80) and our final iteration (M = 50.65). The students' opinion of the importance of SOC seemed to also follow this trend, dropping in the first iteration then gradually rising. These results make our findings on the rigorous and personalized feedback that was the main intervention in Iteration 2 inconclusive. We cannot know for sure whether the feedback was the cause for the rise of SOC in Iteration 2 or whether the increase was due to the maturity of our blended learning model.

Thus, our main conclusions from this design-based study is that it seems that SOC can decrease when moving to a blended environment; however, in this case, it rebounded with the continued evolution of skills and materials used to teach the course. This leads us to conclude and recommend that blended learning can be a suitable option for project-based technology courses such as this one as a good compromise between the flexibility of online learning and the sense of connection and community that students need to feel in order to have a satisfactory learning experience. However, in making this transition, instructors and institutions should be patient, as initial effects on students might be negative, but could improve as the course and the instructors mature with this new pedagogy.

Limitations and Future Research

In order to identify the specific cause of the decrease in SOC from the Baseline to Iteration 1, further research should be done regarding the maturation of the model.

Some of the adjustments to the course that occurred in each iteration over time included the following:

- content updates and additions;
- turnover rate of graduate student instructors;
- introduction of new technologies;
- minor tweaks to scheduling;
- better grasp of the structure of the course; and
- maturity of materials used in the course.

Research into these aspects could provide more insight into what specifically caused the drop and subsequent rise in SOC across the iterations.

Further research is also needed in determining how the importance of SOC to participants affects the SOC felt in a course. Our findings indicate that there might be a connection between participants' perception of SOC importance and the overall SOC felt, as those who agreed SOC was important gave a higher SOC score than those who disagreed. Research into whether this perception influences or is influenced by SOC in a classroom could provide additional insight into course design.

Age of participants is another factor that requires further research. Moore (1989) mentioned that the interaction between students was more important for younger learners. Since the learners in our study were adult learners and more self-motivated, a study of SOC at different age levels would provide insight into what designs prove best for transitioning to a blended format for younger students.

Finally, as with all research into SOC, further research is required in different contexts. SOC may not have been as important in our course due to its design, which emphasized more individual projects and that required technical skills and not necessarily collaborative and discursive ones. Other blended courses that require more interaction among peers and the instructor may provide additional insights into context-specific blended design pedagogies.

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THE INTERNATIONAL REVIEW OF RESEARCH IN OPEN AND DISTANCE LEARNING

The Search for Meaningful e-Learning at Canadian Universities: A Multi-Institutional Research Study

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Abstract

While e-learning is now characterized by a past and trends within that past, there continues to be uncertainty about how e-learning is defined and conceptualized, whether or not we like e-learning, and whether or not it is as meaningful to us as face to face learning. The purpose of this study was to document the e-learning perceptions of students at three Canadian post-secondary institutions. Key components of e-learning courses including ease of navigation, course design, resource availability, and adequacy of e-learning supports and their impact on the student learning experience were also evaluated.

Based on a survey of students (n = 1,377) as well as their participation in focus groups, the following are presented as important findings: the majority of students studying in e-learning courses at the three institutions represented in the study were women; ease of navigation, course design, and previous experience with e-learning consistently demonstrated a statistically significant predictive capacity for positive e-learning experiences; and students expressed less preference for e-learning instructional strategies than their faculty.

Study findings hold implications for e-learning faculty, instructional designers, and administrators at institutions of higher education in Canada and elsewhere where e-learning is part of the institutional mandate. Additionally, further research into student perceptions of and experiences with e-learning is recommended.

Keywords: e-learning; mixed methods; navigation; design; infrastructure support; flexible learning

Introduction

Among the many reasons that increasing numbers of first degree university students and returning adult learners are turning to e-learning, two in particular stand out. The first is student demand for flexibility in where and how they learn (Ali, 2012; Bichsel, 2013; Burge, 2011; Carter & Salyers, 2013; Carter, Salyers, Page, Williams, Hofsink, & Albl, 2012; Elliott, 2011; Hammersley, Tallantyre & Le Cornu, 2013; Hanover, 2011; Higher Education Academy, 2013; Johnson, Smith, Willis, Levine & Haywood, 2011; McLinden, 2013; Oye, Salleh & Iahad, 2011; Salyers, Carter, Barrett & Williams, 2010). The second is that, as never before, university students may be technologically sophisticated and looking for ways to better integrate technology with their learning lives (Bichsel, 2013; Dahlstrom, Walker & Dziuban, 2013; Johnson, Smith, Willis, Levine & Haywood, 2011; Tapscott, 2008).

As support of the second reason, university students have, in large measure, grown up with technology; they socialize, book vacations, bank, and shop through the web. There is also growing recognition of the personal savings of studying in ways that fit complex professional and family lives (Dahlstrom, Walker & Dziuban, 2013; ITC, 2013). At the same time, controversy exists about whether those who use technology in other aspects of their lives also wish to use it for learning where the engagement is complex and the role of learner is significantly different than in other technology-supported situations (Cleveland-Innes, Garrison, & Kilsen, 2008). While students may prefer to utilize technology to connect, communicate, and manage their lives, they may or may not have the requisite skills for success in technology-mediated and e-learning environments (Bolinger & Inan, 2012; Dahlstrom, Walker & Dziuban, 2013; Johnson, Adams-Becker, Cummins, Estrada, Freeman & Ludgate, 2013; Means, Toyama, Murphy, Bakia & Jones, 2010; Yukawa, Kawano, Suzuki, Suriyon, & Fukumura, 2008). Also of importance is that research demonstrates there are no differences between net generation and non-net generation students' use of technology, their preferences for it, and their behavioral characteristics (Bullen, Morgan & Qayyum, 2011; Margaryan, Littlejohn & Vojt, 2011; Palfrey, Gasser, Simun & Barnes, 2009; Selway, 2009).

Although the intention of those who champion e-learning is to provide students access to superior educational experiences characterized by flexibility not possible 20 years ago, there continues to be uncertainty about how e-learning is defined and conceptualized, how best to integrate e-learning strategies into curricula, and whether or not e-learning is as meaningful to us as face to face learning. In order to assess the Canadian e-learning landscape, a research team representing three undergraduate universities undertook a multi-site mixed methods study to determine the perceptions of faculty and students in relation to e-learning as a meaningful experience. Because of the magnitude of data collected, quantitative and qualitative results based on student and faculty responses are reported separately. This paper reports the student-based quantitative findings.

Review of the Literature

E-Learning Defined

The words innovation and novelty derive from the same Latin root meaning something new and, ideally, improved. In an early definition of the verb to innovate, the desire to innovate is reported to "moveth all troublesome men" (Ellis, 2005, p. 13). Stated in more modern terms, the act of innovation can stir strong emotions. There is little doubt that the innovative nature of e-learning has generated strong feelings and opinions across the educational community as well as in our homes when we discuss education and in the corporate training sector where training has assumed new formats. Innovation is not something new to education. As societal needs, demands, and expectations change, so too must education, and such has been the case throughout history.

Reflecting on educational innovation in North America over the last twenty years, a number of concepts and practices come to mind: distance and online education, blended education, technology-supported education, and e-learning. While the first three of these can be considered in their own right, each is a subset of item four: e-learning. The language of e-learning has generated a unique quagmire with no consistent definition of e-learning in sight (Carter & Salyers, 2013; Lowenthal & Wilson, 2010; Moore, Dickson-Deane & Galyen, 2011; Sangra, Vlachopoulos & Cabrera, 2012). Equally problematic are pedagogies that affect how teachers teach and students learn and the heightened role of technologies in what is otherwise a human exchange.

In this study, e-learning refers to an integration of pedagogy, content, and technologies within a teaching and learning context. E-learning can, therefore, include face-to-face (f2f) classrooms in which information technologies (e.g., learning management systems, video-conferencing and web-conferencing, mobile devices, multimedia and simulation, and so forth) are used; blended and web-enhanced learning environments also known as flipped or hybrid classrooms; and fully online learning environments. E-learning is also an experience that can occur synchronously, asynchronously, or as a combination of the two (Carter & Salyers, 2013).

Characteristics of Effective E-Learning Environments

Higher education has become a competitive market grounded in flexible, accessible, user-centric learning experiences (Buzducea, 2010; Carter, Salyers, Page, Williams, Hofsink, & Albl, 2012). In other words, students want to be able to access education in convenient environments where they are supported but also free to engage with materials in different ways. Flexibility includes how institutions think about time, place, instructional pace, delivery methods, and learner entry (Ahmed, 2010; Bichsel, 2013; Carter, Salyers, Page, Williams, Hofsink, & Albl, 2012; Fisher, 2009; Hanover, 2011; ITC, 2013; Johnson, Smith, Willis, Levine & Haywood, 2011; McLinden, 2013; Salyers, Carter, Barrett, & Williams, 2010). How we teach and learn using e-learning strategies, though, is different from teaching and learning in a classroom where technology is not used. Pedagogically, the e-learning landscape requires a renewed commitment to the design of instruction that is student-centered and that incorporates effective teaching and learning principles in technology-mediated environments.

It is generally agreed that, in order to design effective e-learning environments, a number of stakeholder groups including subject matter experts, instructional designers, information technologists, and educational technologists should be engaged (Herrington, Reeves & Oliver, 2010; Kanuka, 2006; Siragusa, Dixon & Dixon, 2007; Steen, 2008). Moreover, a number of elements must be well-integrated into e-learning environments to ensure that they are effective. Quality e-learning environments should: 1) address the needs of diverse learners, 2) apply effective pedagogical strategies, 3) incorporate state of the art instructional design principles, 4) support multiple technologies, and 5) provide for flexible and interactive learning opportunities (Buzzetto-More, 2007; Hussin, Bunyarit & Hussein, 2009; Moore, Dixon-Deane & Galyen, 2011; Oblinger & Oblinger, 2005; Orellana, Hudgins & Simonson, 2009; Sun, Tsai, Finger, Chen & Yeh, 2007).

Student Perceptions of E-Learning

Much of the current research related to student perceptions of e-learning has focused on student satisfaction, achievement, flexibility, motivation, and retention based on a particular delivery format such as blended, fully online, and so forth (Abrami, Bernard, Wade, Schmid, Borokhovski, Tamim, Surkes, Lowerison, Zhang, Nicolaidou, Newman, Wozney & Peretiatkowicz, 2006; Bekele, 2010; Bekele & Menchaca, 2008; Bernard, Abrami & Wade, 2007; Zuvic-Butorac, Roncevic, Nemcanin, & Nebic, 2011; Fetaji, 2007; Sun, Tsai, Finger, Chen & Yeh, 2008). Many of these studies report variables such as satisfaction at the end of the course rather than prior to taking an e-learning course (Ahmed, 2010; Albert & Johnson, 2011; Eom, Wen, & Ashill, 2006). Student perceptions of e-learning are higher when elements such as accessibility, design, organization, interactivity, and supports for e-learning are fully integrated into the course experience (Allen & Seaman, 2013; Bentley, Selassie, & Shegunshi, 2011; Brown & Voltz, 2005; Siragusa, Dixon & Dixon, 2007; Steen, 2008; Tseng, Lin & Chen, 2011; Wang, 2006; Zuvic-Butorac, Roncevic, Nemcanin & Nebic, 2011).

Designing effective e-learning environments poses a number of challenges, none the least of which include diversity of student learners, adequate institutional supports, faculty and student perceptions of e-learning strategies, and engagement in non-face to face (f2f) learning environments (Allen & Seaman, 2006; Bolliger & Wasilik, 2009; Cook, Ley, Crawford & Warner, 2009; Georgina & Olson, 2008; Kennedy, Jones, Chambers & Peacock, 2011; Panda & Mishra, 2007; Ward, Peters & Shelley, 2010). Whether we consider e-learning to be a philosophy or method or niche experience, it does represent a commitment to meet the learning needs of today's students (Bates, 2005; Fisher, 2009). Despite differing views and understandings of e-learning, institutions are challenged to be committed and forward thinking in terms of how to meet the diverse and changing needs and expectations of all learner groups. In order to begin to address the changing e-learning needs of students, faculty, and post-secondary institutions and in light of rapidly changing e-learning landscape, the authors of this paper have explored the e-learning perceptions of students in three post-secondary institutions in Canada.

Question for Investigation

Repeated research evidence seems to suggest that students may continue to lack the knowledge, skills, and/or time they require to experience e-learning in meaningful ways. Additionally, they may have different opinions of and experiences with e-learning. As a response to this situation, the purpose of this study was to evaluate key components of e-learning courses and environments including ease of navigation, course design, resource availability, technical ability, and adequacy of e-learning supports and their impact on the student e-learning experience. Results of this study will be used to inform decisions at Canadian universities in the pursuit of excellence in e-learning. The specific question explored in the study was the following:

> How predictive are the key components of e-learning as reflected in the literature for the enhancement of learning, active participation, comfort with e-learning technologies, adequacy of e-learning skills, enjoyment of e-learning, preference for e-learning over face to face classes, and the development of e-learning skills of students enrolled in e-learning courses?

Theoretical Orientation

The theoretical orientation that guided the research is based on Khan's (2010) global e-learning framework. The framework was developed as a means for guiding the planning, design, development, and evaluation of e-learning environments based on eight dimensions. Table 1 summarizes the focus and key activities of each dimension.

Table 1

E-Learning Framework Summarized by Aguti, Walters & Wills (2013)

Dimension	Focus on e-learning environment	Specific components
Pedagogical	Teaching and learning	• Analysis of content, audiences, goals, media, • Organization and layout of e-learning systems, • Design strategies, methods and approaches.
Technological	Technology infrastructure	• Infrastructure planning, • Hardware and software.
Interface Design	Aesthetics and design	• Page, site, and content design, • Navigation, accessibility, • Usability testing.
Evaluation	Assessment of learning and environment	• Assessment of learners, • Evaluation of instruction, • Evaluation of learning environment, • Evaluation of content development processes, • Evaluation of individuals involved in content development, • Evaluation of institutional e-learning program.
Management	Maintenance of learning environment	• Managing information distribution, • Managing e-learning content development, • Managing e-learning environment.
Resource Support	Technical and human resource support	• Online support, • Teaching and learning support, • Technical support, • Online and offline resources.
Ethical	Social, cultural, digital	• Social and political influences, • Cultural diversity, • Learner diversity, digital divide, • Legal issues.
Institutional	Administration, academic affairs and student services	• Admissions, finances, payments, • Information technology services, policies • Graduation and grades.

The researchers were particularly interested in the pedagogical, technological, interface design, evaluation, and resource support dimensions and their impact on student e-learning perceptions. Based on Khan's framework, an e-learning skills inventory (ESI) was developed and administered as part of the study. It is described later in this paper.

Study Design and Methods

Participating Institutions

As previously noted, the study involved three post-secondary institutions. The lead university has an enrollment of nearly 12,000 credit students who take a variety of programs and courses leading to bachelor's degrees, applied degrees, university transfer courses, diplomas, and certificates. The second institution provides post-secondary technical education and skills training, and is recognized nationally and internationally for its educational innovation. This institution serves 26,000 distinct students with programs that touch every sector of the economy and provides a number of courses and programs through distance education. The third university enrolls nearly 6,500 full and part-time students. The majority of programs are at the undergraduate level although a growing number of graduate programs are offered by this university.

Study Design

This two-year three-phase project used a descriptive mixed-methods design. In Phase I of the project, the team developed a definition of e-learning, determined roles and tasks (e.g., PI, Co-PI, collaborators), discussed knowledge dissemination activities and issues of authorship, developed research instruments, and reviewed ethics approval processes at the three institutions. Ethics approval was sought and received from all three institutions. Phase II involved data collection and analysis as well as triangulation of qualitative and quantitative findings. Analysis occurred from December 15, 2012 to April 30, 2013. Phase III began in April 30, 2013 and was completed in January 31, 2014. Development of recommendations, including possible interventions and dissemination of knowledge, were part of the work of Phase III.

This mixed method study used a concurrent triangulation design to guide and facilitate data collection. In this approach, quantitative and qualitative data are collected at designated points and triangulated (Creswell, 2009; Creswell, Plano Clark, Gutmann, & Hanson, 2003). Data are then compared in order to identify similarities, differences, gaps, and unanswered questions. Figure 1 provides a visual representation of the research design. Because this specific paper focuses exclusively on the quantitative findings of the study based on student responses, evaluation of the triangulation design by the reader is not possible.

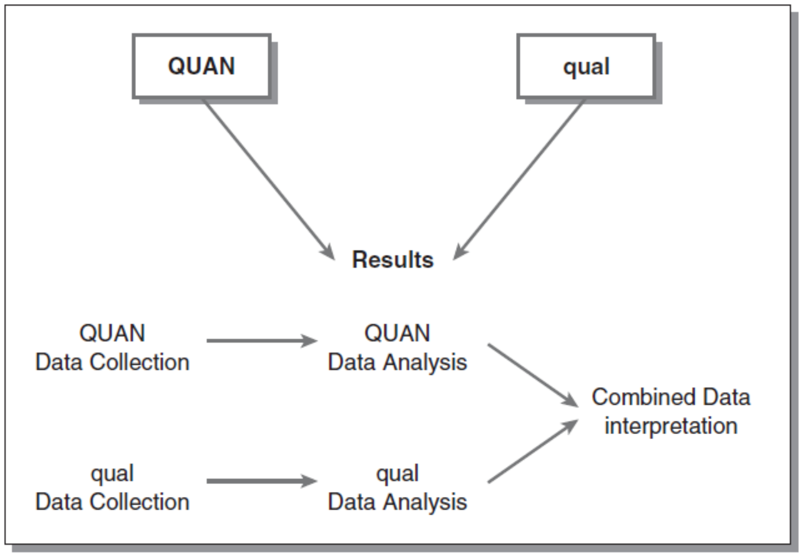

Figure 1. Concurrent triangulation design by Creswell, Plano Clark, Gutmann, & Hanson (2003).

Data Gathering

The collection of quantitative data from students occurred concurrently from January 1, 2012 to December 15, 2012. Quantitative data were generated through online surveys. The participating sample was convenience based. Each institutional lead sought permission to invite undergraduate students from all faculties and schools to complete the survey made available through a live online link distributed through the university's email system.

The online survey distributed to students was developed by the research team who had consulted the literature and reviewed existing tools. The survey included 34 items that used a 5-point scale (1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree; and 5 = not applicable) and functioned as an e-learning skills inventory (ESI). Areas covered in the survey included the following: level of knowledge regarding e-learning, prior experience using e-learning, access to e-learning and other resources, and general technology usage. Scale reliability for the student survey was calculated based on rank transformations. The internal consistency for the student ESI was α=.71. This alpha coefficient is satisfactory based on using Nunnally's (1978) criterion of .70 as a cut-off point. Basic demographic information was also collected from students.

Data Analysis

All data were aggregated. Demographic profiles of the student participant groups were developed while descriptive and inferential statistics using SPSS 19.0 were generated based on the survey responses. Multiple regression analyses were conducted to evaluate the effectiveness of the independent variables–ease of navigation in the e-learning course, previous experience with an e-learning course, e-learning course design, technical ability, availability of e-learning course support, and adequacy of resources—to predict seven dependent variables which were enhanced student learning, active student participation, comfort with the e-learning environment, adequacy of e-learning skills, enjoyment of e-learning, preference for taking e-learning courses, and the development of e-learning skills. Assumptions of independence, normality, homoscedasticity, and linearity were addressed. There were two instances where data were found to be outside the limits of skewness or kurtosis. They, however, were corrected for through rank transformations. Probability-probability (P-P) plots were generated for each multiple regression carried out and were linear in all instances, suggesting that the data were normally distributed.

Findings

Demographic Profiles

The study included a total of 1,377 student-participants across the three Canadian post-secondary institutions; the vast majority of the student-participants (76.7%) were female. The two age categories most represented were 20-22 (27.1%) and 17-19 (23.2%). Asked about their levels of experience with e-learning, 33.0% reported 2-4 years of experience taking courses that use e-learning strategies; 30.7% of students reported 0-2 years of experience with courses that use e-learning strategies. Table 2 summarizes student characteristics across the three institutions.

Table 2

Demographic Profile of Survey Participants

Total sample size	n =1346
Gender *	
Male	310 (22.9%)
Female	1039 (76.7%)
Other	6 (0.4%)
Age *	
17 – 19	316 (23.2%)
20 – 22	369 (27.1%)
23 – 25	215 (15.8%)
26 – 28	118 (8.7%)
29 – 35	133 (9.8%)
35 – 64	208 (15.3%)
> 64	2 (0.1%)
Years taking courses using e-learning strategies *	
0 – 2	397 (30.7%)
2 – 4	426 (33.0%)
4 – 6	280 (21.7%)
6 – 8	103 (8.0%)
8 – 10	34 (2.6%)
10 – 12	35 (2.7%)
>12	17 (1.3%)
Current institution	
Post-secondary A	816 (59.3%)
Post-secondary B	456 (33.1%)
Post-secondary C	104 (7.6%)

*This category had missing data (e.g., students did not complete this question). Percentages are calculated based on responses received.

General Perceptions of E-Learning

Student responses demonstrated consistent strong agreement or agreement on a cross-section of items. In general, the student data were positive with respect to e-learning: 80% of students strongly agreed or agreed that “e-learning technologies enhance my learning” while 84% strongly agreed or agreed with the statement that “overall, I have adequate e-learning skills to take courses using e-learning technologies.”

Of the student-participants, 85% indicated that they had been comfortable using computers and software applications before they took an e-learning course. Just over half (51%) of students indicated agreement to strong agreement with the item that “e-learning encourages me to participate more actively (in my learning).” Less than half (43%) of students agreed or strongly agreed with the item “I prefer courses using e-learning technologies more than traditional courses.”

Participants (97%) believed that students in post-secondary institutions should be able to navigate in e-learning course environments. Students (84%) strongly agreed or agreed that "students attending post-secondary institutions should have moderate to high e-learning skills." Moreover, students (85%) agreed or strongly agreed that "the design of courses using e-learning strategies is important."

Question One: E-Learning Components and Predictive Capacities

Ease of navigation, course design, adequacy of e-learning supports, and previous experience with e-learning consistently emerged as having a statistically significant predictive capacity for each dependent variable. Statistically significant results and cumulative student r-square values for each regression analysis are provided in Tables 3-9.

Table 3

Regression Analysis – Dependent Variable: Enhanced Student Learning

Independent variable	Parameter estimate	Standard error	Standardized coefficients Beta	T for Ho: Parameter=0	Prob>|T|
Students					
Ease of navigation in e-learning courses	.392	.036	.365	10.922	.000***
Design of e-learning courses	.173	.033	.161	5.211	.000***
Adequacy of e-learning supports	.112	.036	.108	3.070	.002**

R^2 (Students) = .31; R^2 (Faculty) = .23

Note. *p < .05, **p < .01, ***p < .001

Table 4

Regression Analysis – Dependent Variable: Active Participation

Independent variable	Parameter estimate	Standard error	Standardized coefficients Beta	T for Ho: Parameter=0	Prob>|T|
Students					
Ease of navigation in e-learning courses	.389	.051	.278	7.593	.000***
Previous experience with e-learning	.098	.044	.077	2.215	.027*
Adequacy of e-learning supports	.140	.052	.103	2.685	.007**

R^2 (Students) = .18; R^2 (Faculty) = .24

Note. *p < .05, **p < .01, ***p < .001

Table 5

Regression Analysis – Dependent Variable: Comfort with E-Learning Technologies

Independent variable	Parameter estimate	Standard error	Standardized coefficients Beta	T for Ho: Parameter=0	Prob>|T|
Students					
Ease of navigation in e-learning courses	.461	.036	.392	12.690	.000***
Previous experience with e-learning	.153	.031	.143	4.855	.000***
Design of e-learning courses	.206	.034	.174	6.058	.000***
Adequacy of e-learning supports	.138	.038	.120	3.665	.000***

R^2 (Students) = .18; R^2 (Faculty) = .39

Note. *p < .05, **p < .01, ***p < .001

Table 6

Regression Analysis – Dependent Variable: Adequacy of E-learning Skills

Independent variable	Parameter estimate	Standard error	Standardized coefficients Beta	T for Ho: Parameter=0	Prob>|T|
<u>Students</u>					
Ease of navigation in e-learning courses	.206	.025	.215	8.117	.000***
Previous experience with e-learning	.422	.022	.487	19.255	.000***
Adequacy of e-learning supports	.061	.026	.066	2.354	.019*
Design of e-learning courses	.196	.024	.203	8.256	.000***

R^2 (Students) = .39; R^2 (Faculty) = .51

Note. *p < .05, **p < .01, ***p < .001

Table 7

Regression Analysis – Dependent Variable: Enjoyment with Using E-Learning

Independent variable	Parameter estimate	Standard error	Standardized coefficients Beta	T for ho: Parameter=0	Prob>|T|
<u>Students</u>					
Ease of navigation in e-learning courses	.399	.038	.330	10.642	.000***
Previous experience with e-learning	.099	.033	.090	3.052	.002**
Adequacy of e-learning supports	.244	.038	.207	6.382	.000***
Design of e-learning Courses	.186	.035	.153	5.335	.000***

R^2 (Students) = .55; R^2 (Faculty) = .40

Note. *p < .05, **p < .01, ***p < .001

Table 8

Regression Analysis – Dependent Variable: Preference for E-Learning over Traditional Formats

Independent variable	Parameter estimate	Standard error	Standardized coefficients Beta	T for ho: Parameter=0	Prob>|T|
Students					
Ease of navigation in e-learning courses	.461	.053	.316	8.772	.000***
Previous experience with e-learning	.102	.045	.077	2.266	.024**
Adequacy of e-learning supports	.185	.053	.131	3.468	.001**

R^2 (Students) = .41; R^2 (Faculty) = .25

Note. *p < .05, **p < .01, ***p < .001

Table 9

Regression Analysis – Dependent Variable: Development of E-Learning Skills

Independent variable	Parameter estimate	Standard error	Standardized coefficients beta	T for ho: parameter=0	Prob>|T|
Students					
Ease of navigation in e-learning courses	.136	.031	.157	4.393	.000***
Previous experience with e-learning	.056	.027	.072	2.079	.038*
Design of e-learning courses	.179	.029	.208	6.236	.000***

R^2 (Students) = .21; R^2 (Faculty) = .29

Note. *p < .05, **p < .01, ***p < .001

Discussion

Demographic Observations

More female than male students participated in the study. This occurrence may be explained by the gender composition of the institutions involved in the study: in all three institutions, there are a number of professional programs (e.g., education, nursing, and so forth) in which there are more female students than male students. Alternately, this demographic may be reflective of those who take courses with e-learning components more generally or the fact that the majority of university students in undergraduate programs in Canada are female (Canadian University Survey Consortium, 2013).

The need to understand the prevalence of females in this study as well as their e-learning preferences goes beyond the first degree female student. In two of the universities, e-based programs are offered to working professionals. According to the literature, there are more females than men returning to university to upgrade their professional and employment skills (Carter & Salyers, 2013; Salyers, Carter, Cairns & Durrer, 2014). These students typically require the flexibility that e-based courses and programs can provide because they are the primary caregivers in families and have less time to attend face-to-face classes. Research is required into the concept of gender-specific attitudes and skills in relation to computer use and computer-assisted learning.

It is also worth reflecting on the idea that, while post-secondary students use technology widely in their lives, they seem to use technology when there is a convenience or gain such as online banking and /or for managing their lives. However, when it comes to matters such as learning in the context of a learning management system, it may be a different story. In many regards, these are platforms created to meet institutional needs.

Predictors in E-learning

As the regression analyses revealed, each of ease of navigation, course design, adequacy of e-learning supports, and previous experience with e-learning demonstrated a statistically significant predictive capacity for a positive e-learning experience. Two of these three items—ease of navigation and course design—underscore the criticality of instructional design in e-learning. While these ideas can be found in earlier e-learning literature (Zellweger, 2007, 2004), the study offers further evidence that instructional design expertise is vital to successful e-learning. As Laurillard (2013) comments, teaching today is nothing short of a design science and the need for excellence in instructional design has never been greater.

In virtually every context relevant to e-learning, the tasks of teaching (e.g., knowledge dissemination, skill development) and learning (e.g., acquiring new knowledge and skills, finding or making meaning) need to be combined with the technological aspects of delivery (e.g., use of a learning management system). This intersection requires ongoing assessment of the needs of the faculty and the student so that appropriate supports are developed and extended (Diaz, Garrett, Kinley, Moore, Schwartz & Kohrman, 2009; Fang, 2007; Shepherd, Alpert & Koeller, 2007; Taylor & McQuiggan, 2008; Thompson, 2006). Immediacy and social presence are important characteristics of these supports. Just in time technical support delivered in user friendly ways rather than workshops and training sessions are essential in e-learning (Berge & Kendrick, 2005).

The final predictor found to be statistically significant ties to previous experience with e-learning. This finding, in many regards, aligns with the responses to the first question. E-learning experience and e-skills play an important role in effective and positive experiences.

Emerging Recommendations and Areas for Future Research

While one could be inclined to place responsibility on the student for e-learning success, this would be short sighted. Both faculty members and the institution have responsibilities to carry out as well. Faculty, like students, need to have skills and experience levels equal to or greater than their students. Moreover, they need to recognize that e-teaching is different from teaching in other contexts and requires careful design and preparation carried out, ideally, with one or more colleagues with design expertise. Finally, e-learning requires ongoing support and this is where the university itself comes in. Institutional support for the vision of e-learning as well as just in time pedagogical and technical services sit at the heart of effectiveness in e-learning. Based on findings from this study, the following recommendations are offered:

1. Involve interprofessional teams of instructional designers, faculty, and individuals who support information technology in the development of e-learning courses to increase the likelihood of success. While this may seem like an intuitive strategy, many universities may not have invested adequate institutional resources to support e-learning initiatives.
2. Evaluate the technical abilities, preferences, and experiences of students in order to design effective e-learning opportunities for them. Assumptions regarding the technical skills and savvy of today's university students need to be challenged. One means for doing so is through a fulsome assessment of the learners' abilities, skills, preferences, and experiences.
3. Establish design, navigation, pedagogy, and resources standards so that students develop comfort with e-learning environments and adequate e-learning skills for success.
4. Develop and align e-learning strategies with academic and institutional strategic plans so that high quality e-learning courses are being delivered. Further, individuals responsible for academic planning and oversight should be involved in leading e-learning initiatives in order to acquire deep understanding of the complexity of e-learning.

Looking forward, the researchers would argue that results of this study should be shared nationally and internationally: significantly, e-learning crosses borders and is proving to be a way of bringing education to those who previously may not have been able to access education. Steps are also needed to further understand faculty and student needs and to design interventions that respond to them. Replication of this study in other Canadian institutions and a non-Canadian context will uncover whether the trends in three Canadian institutions are reflective of e-learning as a broader phenomenon and how persons from different cultures approach e-learning. There is likewise a need to continue to engage e-learners and faculty in this dialogue and to investigate opportunities to work as co-researchers in e-learning.

In closing, given the uptake of e-learning at Canadian post-secondary institutions, the findings of this study are important and timely. Moreover, the findings point to areas in which additional and new research are required. Specifically, more research is required in the design, development, and delivery of exceptional e-learning experiences within institutional contexts and the human connection as supported by e-learning environments.

Limitations

There are a number of limitations in this study. First, data collected from the surveys were self-reported and may have been subject to bias although a number of steps were taken to mitigate bias including the anonymous nature of the survey. Second, because standardized instruments were not used to collect data, reliability of the results may have been affected; however, alpha reliabilities were moderately high for the student survey. To minimize the limitations of response analysis used in this study, the researchers employed descriptive statistics and triangulation to maximize the reliability and validity of the findings. Regardless of these limitations, results from this study provide additional knowledge regarding e-learning from the student perspective.

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