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Dear TOJDE Readers,

Welcome to Volume 18, Number 2 of TOJDE,

There are 14 articles and 2 book reviews in April 2017 issue. 30 authors write these articles from 9 different countries. These countries are Australia, Brazil, Colombia, Greece, Nigeria, South Africa, Thailand, Turkey and USA.

CURRICULUM DESIGN FOR DISTANCE EDUCATION IN THE TERTIARY SECTOR is the 1st article and Ritesh CHUGH, Shirley LEDGER and Rebecca SHIELDS are the authors of this article. The study highlights a narrative and integrative approach to advance the understanding of curriculum design practices of distance education. In order to effectively design curriculum, this paper views the role of the educator as a conductor, technician and choreographer. In the article, pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices.

The 2nd article is written by Eyup YUNKUL and Serkan CANKAYA. The title of this article is STUDENTS' ATTITUDES TOWARDS EDMODO, A SOCIAL LEARNING NETWORK: A SCALE DEVELOPMENT STUDY. The purpose of this article is to develop a scale to determine students' attitudes towards Edmodo, a Social Learning Network (Edmodo Attitude Scale, EAS). There is a scale in the study, developed in Turkish and applied online. At the end of the research process, a scale made up of 18 items and 4 factors is developed. This article indicates that the scale could be said to be a valid and reliable attitude scale that used in learning environments which involves the use of a Social Learning Networks.

Olalere A. ABASS, Samuel A. OLAJIDE and Babafemi O. SAMUEL are the writers of the 3rd article. DEVELOPMENT OF WEB-BASED EXAMINATION SYSTEM USING OPEN SOURCE PROGRAMMING MODEL is the title of the article. According to the article Web-based Examination System (WES) can serve as an effective solution for mass education evaluation and offers many novel features that cannot be implemented in paper-based systems, such as real time data collection, management and analysis, distributed and interactive assessment towards promoting distance education.

The 4th article is titled AN EVALUATIVE STUDY OF AN ICT MODULE FOR A SCHOOL LEADERSHIP AND MANAGEMENT PREPARATION PROGRAM. The writers are Sarietjie MUSGRAVE and Corene DE WET. This study reports on findings of an evaluative study on the effectiveness of an Information and Communication Technology (ICT) module that forms part of the Advanced Certificate in Education: School Leadership and Management program as mentioned in the title.

MOOCs 2.0: THE SOCIAL ERA OF EDUCATION is the 5th article. This article is written by Arda SOYLEV. In this study, the writer reviews the problems and the current solutions associated with MOOC 1.0 era. After this step, the writer analyzes the MOOC 2.0 era and discusses its present and possible future affects to our lives as distance learners.

Marites Piguing HILAO and Saovapa WICHADEE are the writers of the 6th article, titled GENDER DIFFERENCES IN MOBILE PHONE USAGE FOR LANGUAGE LEARNING, ATTITUDE, AND PERFORMANCE. The research in the article compares how male and female students perceive mobile phones as a language learning tool, use mobile phones to learn English and develop their learning performance. A five-point rating scale questionnaire is used to collect data from 122 students, comprising 65 females and 57 males. The findings demonstrate that male and female students do not differ in their usage, attitudes toward mobile phone uses for language learning as well as their learning performance at a significance level.

The 7th article is titled ANALYZING THE EFFICACY OF THE TESTING EFFECT USING KAHOOT™ ON STUDENT PERFORMANCE, and written by Dr. Darren H. IWAMOTO, Dr. Jace HARGIS, Erik Jon TAITANO and Ky VUONG. This research focuses on an alternate approach that will assist students in preparing for high-stakes examinations. Kahoot™, game show-like user interface, is used in this research. The results of this study suggest that creating a fun and an engaging environment support improved academic performance among distance learners.

E-LEARNING AS A TRAINING TOOL FOR CIVIL SERVANTS: A CASE IN THE STATE OF PARANA – BRAZIL is the 8th article. Adriano STADLER, Rosi Teresinha Munaretti de CAMARGO and Marcos Rogerio MAIOLI are the writers. This article aims to answer the main question: What is the perception of Parana civil servants, which undertake the distance e-learning methodology post-graduate programs in relation to the use of technologies and materials? The main results show that there is high familiarity and acceptance to e-learning. On the other hand, the use of teaching materials evidenced conservatism and attachment to printed learning materials, highlighting the printed book as a key to distance learning.

Dr. Olanike Sharon NICHOLAS-OMOREGBE, Dr. Ambrose Agbon AZETA, Dr. Idowu Aigbovo CHIAZOR and Dr. Nicholas OMOREGBE are the writers of the 9th article. The title is PREDICTING THE ADOPTION OF E-LEARNING MANAGEMENT SYSTEM: A CASE OF SELECTED PRIVATE UNIVERSITIES IN NIGERIA. This study aims to investigate the factors that could influence e-learning management system (eLMS) adoption in higher education. The results of this study will provide theoretical information on the intention to adopt eLMS and should be of interest to both researchers and education administrators in terms of planning and decision making.

The 10th article title is STUDENT TEACHERS' EXPERIENCES OF TEACHING PRACTICE AT OPEN AND DISTANCE LEARNING INSTITUTION IN SOUTH AFRICA. Dr. Sello MOKOENA is the writer of this article. This study focuses on the experiences of student teachers towards teaching practice in an open and distance learning (ODL) institution in South Africa. The sample consists of 65 fourth year students enrolled for Bachelor of Education, specialising in secondary school teaching. The mixed-method research design is used in research. The study reveals that student teachers experience challenges with regard to on-time placement in schools, supervision and mentoring.

A COMPOUND LAMS-MOODLE ENVIRONMENT TO SUPPORT COLLABORATIVE PROJECT-BASED LEARNING: A CASE STUDY WITH THE GROUP INVESTIGATION METHOD is the 11th article. Giorgos PASCHALIS is the writer. In this paper, the writer proposes the design of a collaboration script, following the "Group Investigation method", to support the tutors and students of a collaborative project-based course on 'DataBases'. The evaluation of the students' projects and the comparison with the corresponding projects of the previous academic year show a better level of collaboration and performance of the students but also prove that the learning environment offers the tutors a more efficient way to guide their students in Collaborative Project-Based Learning.

The 12th article is written by Dr. Emrah EKMEKCI. THE FLIPPED WRITING CLASSROOM IN TURKISH EFL CONTEXT: A COMPARATIVE STUDY ON A NEW MODEL is the title of the article. Flipped learning transforms classrooms into interactive and dynamic places where the teacher guides the students and facilitates their learning. The study explores the impact of flipped instruction on students' foreign language writing skill which is often perceived as boring, complex and difficult by English as a Foreign Language (EFL) learners.

Oluwole Caleb FALODE and Amosa Isiaka GAMBARI are the writers the 13th article and the title of this article is EVALUATION OF VIRTUAL LABORATORY PACKAGE ON NIGERIAN SECONDARY SCHOOL PHYSICS CONCEPTS. The study evaluates accessibility, flexibility, cost and learning effectiveness of researchers-developed virtual laboratory package for Nigerian secondary school physics.

ASSESSMENT OF STUDENT LEARNING IN VIRTUAL SPACES, USING ORDERS OF COMPLEXITY IN LEVELS OF THINKING is 14th article. Dr. Jose CAPACHO is the writer of this article. This study aims at showing a new methodology to assess student learning in virtual spaces supported by Information and Communications Technology (ICT). The methodology is based on the Conceptual Pedagogy Theory, and is supported both on knowledge instruments (KI) and intellectual operations (IO).

There are two book reviews in this issue. **STUDENT-TEACHER INTERACTION IN ONLINE LEARNING ENVIRONMENTS** is the title of the 1st book. This is an editorial book and the editor is Robert D. WRIGHT. The reviewer is Dr. Harun SERPIL.

Other book's title is **OPEN EDUCATION: FROM OERs to MOOCs.** This book is also an editorial book and the editors are Mohamed JEMNI, KINSHUK & Mohamed Koutheair KHRIBI. Nil GOKSEL CANBEK is the reviewer of this book.

Hope to meet you in the next issue of TOJDE.
Cordially,

Dr. T. Volkan YUZER
Editor-in-Chief

CURRICULUM DESIGN FOR DISTANCE EDUCATION IN THE TERTIARY SECTOR

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ABSTRACT

A growing number of students globally are enrolling in distance education programs and it is becoming important now, more than ever before, to design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. In doing so, it is vital to design contemporary curriculum that ensures these outcomes are attained. This paper adopts a narrative and integrative approach to advance the understanding of curriculum design practices, with particular relevance to distance education. In order to effectively design curriculum, this paper views the role of the educator as a conductor, technician and choreographer. Finally, a triad has been proposed comprising of pedagogy, technology and an engaged community of learners as a basis for ensuring curriculum meets contemporary practices.

Keywords: Distance education, curriculum, curriculum design, online learning, tertiary.

INTRODUCTION

Higher education is an important part of educational systems worldwide. Enrolments in the tertiary sector globally reached 170 million, indicating a growth of 160% since 1990 (Sharma, 2012). In Australia, 1.3 million domestic and international students enrolled at higher education institutions in 2013 demonstrating an increase of 4.5 per cent over 2012 (Australian Government, 2014). In 2011, the gross enrolment ratio in the Australian tertiary education sector was one of the highest in the world (Organization for Economic Co-operation and Development, 2012).

A growing trend amongst students these days is to enroll in multi-modal programs i.e. delivered on-campus and through distance education. In 2010, 7% of higher education students in Australia were studying in multi-modal programs (Australian Bureau of Statistics, 2012). Thirty-two percent of higher education students in America enrolled in at least one course online (Allen & Seaman, 2013).

As a large number of students are taking courses online through technologically mediated distance education, it becomes important to understand their needs and design curriculum that reflects educational principles, represents elements of engagement and pedagogy and meets institutional and industry requirements. Simonson, Smaldino, Albright, and Zvacek (2009) have suggested that distance education courses should be carefully designed. Designing curriculum, especially one, that caters for traditional and distance education is a

complex process (Passerini & Granger, 2000). Effective curriculum design plays an important role in any educational system and is important in ensuring the learning journey of students is a successful one. Any changes to curriculum design must make it more responsive to market needs and should enable in achieving skills required by graduates in the 21st century. As distance education has become a vital alternative to face-to-face delivery, it is increasingly important curriculum design not only caters for the needs of face-to-face students but also for distance learners. Distance education provides various advantages in the form of flexibility for learners (Moore & Kearsley, 1996), multiple online support mechanisms (Mohakud, Mohapatra & Mandira, 2012), overcoming distance and time barriers (Berge, 2013) and making education accessible for everyone (Carr, 2012). There is contradiction about the use of the terms distance education and distance learning interchangeably (Moore, Dickson-Deane & Galyen, 2010) with little clear consensus emerging; however, for the purposes of this paper these terms have been used interchangeably (Passerini & Granger, 2000).

Whilst there have been reviews of literature (Zawacki-Richter, Bäcker & Vogt, 2009; Anderson & Dron, 2011) on distance education, yet these reviews have not specifically related curriculum design to higher education nor provided a focus on curriculum design for distance education in particular. It is crucial to overcome the shortage of writing on this subject (Hicks, 2007) hence, this paper attempts to plug in the gaps by providing a cohesive view. This integrative review paper lends transparency to the extant literature in curriculum design, and constitutes an important step in expanding and drawing upon past work, as well as more adequately provides a new birds-eye view of this landscape with combined insights and a comprehensive perspective.

This paper intends to be a useful source of information for curriculum developers and academic staff who need a general overview into rudiments of curriculum design. The paper's contribution is manifold as it endeavors to holistically provide an insight into key elements of curriculum design for distance learning in higher education. Firstly, this paper offers definitions of curriculum design and explores the distinction between curriculum design and instructional design, if any. Then, it explores the meaning of curriculum design specifically in the context of distance learning. Thirdly and very importantly, it provides an insight into practices that educators can adopt to design a contemporary curriculum for distance education that enhances learning and engagement. It also proposes a responsive approach to teaching in distance education environments that sees the educator as a conductor, technician and choreographer. It ends with a brief discussion of a proposed framework comprising of a triad of pedagogy, technology and an engaged community of learners to produce a contemporary curriculum design for distance education. Finally, in the conclusion section, the key points of the paper have been summarized and limitations are explicitly stated with avenues for future research.

RESEARCH METHOD

This review has undertaken a narrative and integrative approach by summarizing primary research and literature (Green, Johnson & Adams, 2006; Whittemore & Knafl, 2005). Integrative reviews accomplish an assortment of purposes such as defining concepts, reviewing evidence and theories and analyzing methodological issues of a topic (Broome, 1993), with an aim to comprehensively understand concepts, theories and specific phenomenon (Whittemore & Knafl, 2005). The aim of such reviews is to present a qualitative blend of data (Polkinghorne, 1995). A narrative review is deemed to be important when linking together multiple studies for the purposes of reinterpretation or interconnection (Baumeister & Leary, 1997). As such, this paper involves an interpretation of the extant literature in this field and then making propositions based on it. The following sections now offer our synthesis and interpretation of the curriculum design literature with particular relevance to distance education.

Key Elements of Curriculum Design

When examining curriculum design, there are inconsistencies in definitions, as well as multiple ideas around what curriculum design is or how it should be done. Looking at the individual terms, curriculum and design, will help better define what curriculum design collectively is. The International Education Association of Australia (2013, p. 3) state that, 'Curriculum is defined in the widest sense to include everything that shapes the student's learning experience.' McKimm (2007) relates with this description, going further to highlight that curriculum is often misconstrued as syllabus whereas content is the syllabus. The University of Manchester (2014) claims curriculum is a planned sequence of learning experiences and assert that 'In designing a curriculum, whether for a whole degree program or for a particular unit, you are planning an intellectual 'journey' for your students – a series of experiences that will result in them learning what you intend them to learn' (p.1). Toombs & Tierney (1993) highlight the vast differences of meanings of what curriculum is, from the narrow view of what is taught, to the broad view of everything that the student experiences. It is clear from the many different interpretations of what a curriculum is, that there is no absolute meaning or clear consensus, rather it is a fitness for purpose. For the purposes of this paper, curriculum refers to the overall learning experiences of the student, encompassing everything from the syllabus (content), right through to the general learning experiences of the student through interactions with the course content, instructors and other students.

When looking at curricula, there are intended curricula, and informal or hidden curricula (Kommalage, 2011). Intended curricula or a formal curriculum is what was organized or intended for the student to experience and go through, often externally accredited (outcomes, course content and assessment). The hidden curriculum are all the other non-intended but cultural experiences that the student would experience. So, although there can be design around the curriculum, as in, formal opportunities for the students to learn, there are also hidden or informal opportunities in curriculum that need to be considered in the design process (Kommalage, 2011).

What is design in relation to curriculum? The Oxford Dictionaries defines design as the 'purpose or planning that exists behind an action, fact, or object' (2014, p. 1 of 1). Toombes & Tierney (1993) take the idea of purpose or planning further by highlighting that '… design defines a problem and formulates a solution' (p. 181). Herrick (1950) cited in Short (1986) observes the function of design was to '… help select and organize learning experiences and to indicate the role of teachers and pupils in curriculum planning and development' (p. 3). The University of Manchester (2014) delves deeper into this explanation of curriculum design addressing the idea that, 'Curriculum design includes consideration of aims, intended learning outcomes, syllabus, learning and teaching methods, and assessment' (p.1). When considering all the meanings behind the two words, curriculum and design; curriculum design could then be described as a structure in which planning, problem and solution finding occurs and leads to the aims, intended learning outcomes, syllabus, learning and teaching methods and assessment, as well as other non-intended learning experiences of the learner.

An ongoing discussion is the distinction between curriculum design and instructional design. Petrina (2007) argues there is no distinction, that curriculum design and instructional design are one and the same while Kanuka (2006) argues that the two have similar purposes but are quite different in their approach. The distinction between the two terms is that curriculum design focuses on "what" the learner will learn as opposed to the instructional design focusing on "how" they will learn it. Kanuka (2006) defines instructional design as 'the process of translating general principles of learning and instruction into plans for instructional materials and learning activities' (p. 3). When comparing this meaning of instructional design to the constructed meaning of curriculum

design, the two appear to have a large overlap. Hence, for the purposes of this paper, the two terms have been used interchangeably.

What Does Curriculum Design Mean for Distance Learning?

There is an ever increasing trend of students deciding to take up study via distance (Australian Bureau of Statistics, 2012; Allen & Seaman, 2013). For whatever reasons students may have behind choosing this type of study, the design approach to distance education needs to be carefully planned and thought out (Simonson et al. 2009). Designing curriculum and learning for distance education is different to designing learning for internal or face to face students. The needs of the learner in a distance education course or program are vastly different to the needs of learners choosing other modes of study. When designing any learning, the learner and their needs should be at the forefront of the design process (Smaldino & Simonson, 1999). Coupled with this, should be a sound understanding of the medium through which the instruction or learning experience occurs. Smaldino & Simonson (1999) place emphasis on a few elements that should be remembered when designing learning for distance education – 'the content, the learner, the strategies for teaching, and the means for assessing the learning experience' (p. 215). Failure to consider all of these elements when designing and planning learning for distance can mean that the intended learning experiences of the learners may not be achieved.

In order to understand what factors come into the forefront when designing curriculum for distance learning, first, the meaning of distance education or learning has been identified. Moore & Kearsley (1996, p.2) identify distance education as:

> *…planned learning that normally occurs in a different place from teaching and as a result requires special techniques of course design, special instructional techniques, special methods of communication by electronic and other technology, as well as organizational and administrative arrangements.*

It is vital to note that Moore & Kearsley (1996) highlight that different techniques of course design, instruction and communication are required for distance education. Smaldino and Simonson (1999) agree with this notion, arguing that when planning for teaching at a distance the course materials that were used for internal classes cannot just be reproduced for the online environment. Special consideration needs to be given to how the course content is going to be relayed to students who may access and interact with course materials in a synchronous or asynchronous manner, as there are different dynamics online than teaching face to face. As well as this, other media, visuals or more dynamic and interactive technology needs to be used in distance courses, to encourage interactivity. The effectiveness of learning and teaching technologies will always be challenging due to subjectiveness and imprecision of human decision making (Wibowo, Grandhi, & Chugh, 2014). Another facet to teaching at a distance is that there need to be activities that encourage interactivity, and students may have to be shown how to do this (Durrington, Berryhill & Swafford, 2006). In face to face classes, the use of visual cues helps the instructor to adjust teaching or materials. This is not feasible at a distance and other methods such as regular monitoring of online discussion forums need to be undertaken (Smaldino & Simonson, 1999). Lastly, technical issues are one of the biggest complaints of students who study and learn at a distance. There needs to be integration of training or information in the use of the technology that is to be used for the students as well as the staff. Technical issues need to be accounted for in the design (Moller, Foshay & Huett, 2008).

Good curriculum design, for distance education is imperative for success. Educators, instructors and curriculum developers need to take into account the differences between constructing courses or programs that work in a distance or online world and ones that work face to face. Without these considerations, the intended or mapped learning journey

of the student may not be reached. The next section now focusses on practices educators can adapt to design a contemporary curriculum for distance education.

Practices to Design a Contemporary Curriculum for Distance Education

Distance education is heavily shaped and constructed by the technology that assists and supports different models of learning, connecting and engaging. Technology assists by making learning accessible and portable. The classroom is wherever and whenever the student and educator choose as appropriate to their needs and lifestyle. In fact, the term 'distance education' could be considered a somewhat outdated construct, and equally as a paradox; that is 'distance' education, borne prior to the digital era (Santally, Rajabalee and Cooshna-Naik, 2012). With the post-industrial approach of 'on-line' learning having gained wide use and acceptability, the narrative for educators is thick with terms including student centered, transformative, systemic and collaborative learning spaces.

According to the 2014 NMC Technology Outlook on Australian Tertiary Education report, the 145 acknowledged experts in this area 'strongly agree that mobile learning and online learning, in some form, will likely tip into mainstream use within the next year — a trend that spans education across much of the world' (Johnson, Becker, Cummins, & Estrada, 2014, p.2). As a globally connected society, networked through many online environments, the focus is on the 'social' aspects of learning; that is 'learning with and from others by moving within one's culture, workplace and world' (Bozarth, 2012, p.66). This provides an abundance of opportunity for educators to embrace alternative methods of teaching and learning practices from each other and from the community of learners with whom we engage. Given this dynamic learning environment how can educator's design curriculum that plans for both the intellectual, technological and social journey for students whilst also mapping and ensuring the attainment of the learning outcomes intended?

In our attempt to answer this question, the creative interface between pedagogy and technology can be viewed somewhat theatrically, as 'the technology sets the beat and creates the music, while the pedagogy defines the moves' (Anderson & Dron, 2011, p. 81). In terms of teaching and design practices in this era, the 'moves' are likely to be the product of collaborative invention from the student experience and this section of the paper will propose a responsive approach to teaching and design of curriculum in distance education environments.

Drawing from this metaphor, the academic or educator must be all of these things in distance education; conductor, technician and choreographer. The conductor role (teaching and facilitation) in online or distance education contemporary curriculum development sits comfortably within an ecosystems perspective where an engaged and critically reflective community of learners are immersed in an environment where the technology supports and enables relationships of learning to flourish (Tucker, 2014). The technician role therefore encompasses the teaching dimensions and techniques utilized for effective learning, in combination with the learning management systems and tools and as such must be supported by an institutional structure that enables access and equity to the learning environment. The choreographer's role focusses on the educator being involved in the design of learning activities, which also includes regular improvisation of curriculum in order to stay innovative. The choreographer aka educator also ensures their tacit knowledge is transferred to students through 'show and tell' and practice activities. The educator in the choreographer's role is vital in the pedagogical positioning of the curriculum in distance education as it varies from instructivist information delivery approaches to constructivist relational and student led environments (Herie, 2005; Hiltz & Turoff, 2005). Student engagement remains a central driver for educators irrespective of pedagogy particularly in terms of the global integration of new technologies to higher education settings. Flipped classrooms, microcredits and social learning are just some of these emerging technology based approaches to teaching and learning. The Bring Your Own

Device (BYOD) movement in Australian universities has been developed, connecting student's mobiles or laptops and tablets to the corporate network for engaged learning.

The structure and design of curriculum, in this context, needs to intentionally and purposefully provide the opportunities for experimentation and new learning with carefully supported environments providing clear expectations of students and the educator at the beginning and throughout the course. Creative activities need to lead to learning the desired concepts and instructions around expectations of pace (self or group). In order to design the type of learning content that will encourage interaction and collaboration, the educator needs to consider both synchronous and asynchronous styles (Chugh, 2010). Providing clear instruction around whether activities are synchronous or asynchronous; sequential or clarified (Van Duzer 2002) is also recognized as important for effective curriculum design in distance education. This is largely due to the techniques utilized to engage and sustain the community of students shifting significantly from the traditional cognitive-behavioral model of distance education where educators attempted to 'transmit' knowledge and their personality through writing style alone (Anderson & Dron, 2011) to more synchronous interaction, the use of social media tools such as blogs, vodcasts, podcasts and virtual classroom spaces. However, asynchronous formats also allow for depth of processing and reflection as students are able to take more time to consider their responses (Wise, Perera, Hsiao, Speer, & Marbouti, 2012). Learner or student led activities can be successful in both asynchronous and synchronous learning environments although it seems that a greater degree of success occurs when a combination of different forms of synchronous and asynchronous online interactions, as well as face to face interactions are utilized, despite there being little evidence that one is superior to the other in terms of learning (Johnson, 2008). In this way, curriculum design practices should also consider student cognitive styles and learner expectations.

Curriculum design that solicits deeper reflection and engagement from students rests on the sociocultural learning theories such as constructivist learning approaches generating higher levels of student responsibility for learning, assisting them to be better prepared and display a heightened student agency (Wilson, 2001). With this and student engagement strategies in mind, student involvement in the design of discussion topics, assessment criteria, critique of major works, case studies and so forth may provide opportunities for higher order thinking skills to be demonstrated and counteract potential superficial learning. These practices acknowledge the risks that students may be rarely engaged in the knowledge negotiation, refinement or construction phases and therefore guidance or structures for participation should be targeted towards depth of processing. The promotion of interaction and communication needs to be similarly embedded into distance education curriculum through icebreakers, introductions, the educator modelling interaction approaches and providing prompts to those that are not engaging and importantly, provision of information about netiquette. Elements of authentic learning were applied in one study where higher education practitioners experienced online learning from a student perspective following authentic learning guidelines (Parker, Maor & Herrington, 2013). The use of reality projects, case studies, problem solving and simulated learning opportunities were supported within a protected environment of support, monitoring, discussion boards, feedback and critical reflection opportunities. The study indicated the higher order thinking skills such as critical thinking and problem solving were fostered in this course utilizing authentic learning principles.

A meta-analysis of experimental and quasi-experimental studies around online practices conducted by the United States Department of Education (2010) highlighted examples of regularly utilized activities, their influence on learning effectiveness and how they could form an important part of curriculum. This study indicated, for example video and online quizzes having limited influence in the amount or enhancement of learning for students and supported its use as an assessment tool only. While the technology allows for interactivity, this in itself is not particularly engaging or focused on the learning process. The study supported student led interaction with the media available online as enhancing

learning, while opportunities to trigger reflection and intrinsic motivation were particularly effective. Guidance or discussion with students would normally be managed by the educator in real time in a face-to-face environment (Brown & Voltz, 2005). In an online environment, the unpredictability of the student context and the mediated relationship with the student requires careful attention to details which might otherwise be managed by the educator at the time of instruction in a face-to-face environment. This aspect of feedback or guidance provided to students as part of their distance education learning experience is also critically important and therefore needs to be planned and designed. There are a range of feedback strategies that can be utilized to establish action-orientated dialogue with students from the individually based responses such as email, personal messages, to comments on group forums, to reflective responses to questions, stimuli or forums (Brown & Voltz, 2005). The notion of learning relationships is evident in contemporary engagement practices in distance education and online environments. Haley and Parise (2014) point out the value of the 'capital' derived from such practices in their study on the pedagogical capital associated with the human dynamics involved in the instructor-student relationship, as having significant value for student engagement.

Importantly, it may be that the community and relational aspect of teaching and learning synthesizes to produce a contemporary curriculum design for distance education in the form of a triad (as illustrated in figure 1) comprising pedagogy, technology and an engaged community of learners. In continuation of the theatrical metaphor; the fusion of pedagogy, technology and community of learners combine to create a symphony of learning. The facilitation of all three requires not only technical expertise in curriculum design practices, but an understanding and purposeful design approach to the socio-cultural elements of the community, including the netiquette required to communicate in online spaces and in roles that may emerge differently than in classroom-based education.
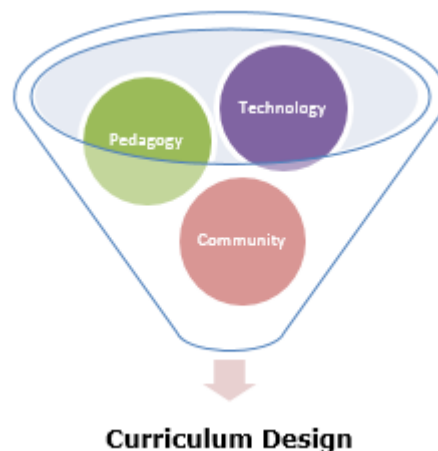
Figure 1. Triad for contemporary curriculum design

Educators may need to consider practices that not only support these elements in learning but identify and acknowledge their presence transparently. Educators are likely to be reflecting on and revising their own previously utilized didactic interaction style in light of this triad, engaging with students in a more personable and informal manner while also recognizing that this process will need to be repeated with each new community of learners. This aspect in itself may need to be considered a particularly important educational practice requiring further research; that is how does the educator facilitate and understand the forming, norming, storming, performing and adjourning phases (Tuckman & Jensen, 1977) in an online or distance education environment at the mezzo level while also understanding the cultural aspects of the macro online community of learners. The alignment of learner needs with pedagogy, technology and an engaged community of learners appears to provide the beginnings of a coherent framework for engaged learning to flourish.

CONCLUSION

This paper has reviewed the extant literature on curriculum design with a specific focus on distance education with the aim of proving a holistic view of this discipline. A common thread running through all the practices presented in this paper are about ensuring learning outcomes are delivered and contemporary educational practices are adopted in curriculum design. This paper has furthered understanding of curriculum design practices, with particular relevance to distance education.

We have provided a holistic definition of curriculum design with a specific focus on distance education. The paper will be a useful source of practices that educators can adapt to kick-start and/or improve curriculum design for distance education. In order to design a contemporary curriculum for distance education and for learning to be successful, we have argued that it is vital to incorporate a mixture of synchronous and asynchronous environments. Very importantly, we have proposed that the educator must be the conductor, technician and choreographer in the provision of distance education. The proposed triad comprising of pedagogy, technology and an engaged community of learners can be used as a basis for ensuring curriculum meets contemporary practices.

A knowledge of specific contexts and needs should be established before designing curriculum. The paper has not specifically focused on any particular discipline however it is unequivocal that there will be elements of curriculum design that will need to be tailored to meet discipline specific requirements. Nevertheless, it is also evident through the definitions of curriculum design that curricula should identify competencies that students will achieve and the content that will be delivered. Given the expansion of the distance education market, realistically it may not be possible to design curriculum to serve only one cohort of students, hence curriculum design should accommodate and serve the needs of both distance learners and learners in the traditional classroom environment. The proposed triad has not been tested and follow-up work can focus on examining it to see how it more closely meets the needs of curriculum designers. Hence, it is open to revision, refinement and reformulation.

Inevitably, there is compelling logic in adapting curriculum design practices that focus on learning, connecting and engaging. Carefully designed curriculum will go a long way in supporting the needs of distance education learners, demands of the workplace and educators alike.

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STUDENTS' ATTITUDES TOWARDS EDMODO,
A SOCIAL LEARNING NETWORK: A SCALE DEVELOPMENT STUDY

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ABSTRACT

Social Learning Networks (SLNs) are the developed forms of Social Network Sites (SNSs) adapted to educational environments, and they are used by quite a large population throughout the world. In addition, in related literature, there is no scale for the measurement of students' attitudes towards such sites. The purpose of this study was to develop a scale to determine students' attitudes towards Edmodo, a Social Learning Network (Edmodo Attitude Scale, EAS). The scale development process included reviewing the related literature, developing an item pool, asking for expert's views, developing a draft form, carrying out two different applications for exploratory and confirmatory factor analyses and conducting validity and reliability analyses. The scale was developed in Turkish and applied online. The participants of the study were selected among undergraduate students who experienced Edmodo in a university in Turkey. At the end of the research process, a scale made up of 18 items and 4 factors was developed. The factors were found to be collaboration, usefulness, instructor support and self-confidence. Consequently, the scale could be said to be a valid and reliable attitude scale that could be used in learning environments which involves the use of a SLN.

Keywords: Edmodo, Edmodo attitude scale, scale development, social learning network.

INTRODUCTION

Obviously, although a number of universities have a substructure allowing integration of Social Networking Sites (SNSs) into learning environments (Tess, 2013), they do not favor such integration at all since these environments are for personal use and for socialization (Hew, 2011). In addition, it is a well-known fact that students tend to consider social lives (pleasure) separate from learning (pain) (Jones, Blackey, Fitzgibbon, & Chew, 2010; Rambe, 2013). Also, there are studies demonstrating that both students and teachers might not feel content with being friends with each other on Facebook (Rambe, 2013; Warner & Esposito, 2009) and that they might develop anxiety regarding the issues of privacy and safety (Brady, Holcomb, & Smith, 2010). In this respect, it is seen that use of SNSs as an e-learning platform may not be a good idea (Balakrishnan, Kooi, & Pourgholaminejad, 2015).

On the other hand, it could be stated that students intensively use Social Network Sites (SNS) and that they are fairly knowledgeable about the use of these sites (Bosch, 2009; Feng & Xie, 2014; Kabilan, Ahmad, & Abidin, 2010; Odabasi et al., 2012; Selwyn, 2009; Tonta, 2009). Despite the negative aspects mentioned above, there are several studies pointing out that

SNSs could contribute positively to students' success when used in educational environments (Al-Rahmi & Othman, 2013; Ekici & Kiyici, 2012; Forkosh-Baruch & Hershkovitz, 2012; Grosseck, Bran, & Tiru, 2011; Hung & Yuen, 2010; Junco, Heiberger, & Loken, 2011; Kabilan et al., 2010; Lawson, Kleinholz, & Bodle, 2011; Mazer, Murphy, & Simonds, 2007, 2009; Wodzicki, Schwämmlein, & Moskaliuk, 2012). As a result, in order to make use of the potential of SNSs and to get rid of their negative aspects, websites which were specifically designed for educational environments and which function like SNSs were developed. It is seen in related literature that such websites are called Social Learning Networks (SLN) (Al-kathiri, 2015; Balasubramanian, Jaykumar, & Fukey, 2014; Bicen, 2015; Trust, 2012). The websites of Edmodo, Ning, Elgg and ValuePulse are those serving that purpose (Cankaya, Durak, & Yunkul, 2014). SLNs provide such educational advantages found in SNS as student-student and student-teacher interactions, writing skills, involvement in learning processes (Ajjan & Hartshorne, 2008; Kert & Kert, 2010) and developing the sense of community (Brady et al., 2010). In addition, SLNs do not include the negative aspects of SNSs mentioned above. On the contrary, SLNs have beneficial tools used for educational purposes and found in Learning Management Systems (LMS) (library, examination, assignments and so on) (Cankaya et al., 2014). Moreover, in a study, it was reported that most students were not satisfied with the e-learning platform, a kind of LMS, used in their schools and that the reason for this dissatisfaction was the lack of social interaction (Balakrishnan et al., 2015).

Today, Edmodo is the most common SLN. Edmodo, established in 2008, has currently reached more than 62 million users (https://www.edmodo.com/about). Among the factors influential of such spread of Edmodo is the fact that it is total free of charge; it provides an easy sign-up procedure for membership and supports multiple languages; that it includes a number of features expected from an SNS besides its educational features; that it has a design similar to SNSs in terms of use; and that students and teachers as well as parents can easily register to the system (Durak, Cankaya, & Yunkul, 2014). Edmodo allows using the power of social media in educational environment. For teachers and students, it creates a safe environment in terms of cooperation, feedback, customized learning and several other related respects. In terms of students, it provides independence of time and place and allows exchanging ideas and information.

In literature, there are several studies conducted on the use of Edmodo in educational environments (Cankaya et al., 2014; Kongchan, 2008; Sanders, 2012), and the number of these studies is gradually increasing in line with the rapid development of Edmodo. When the related literature is examined, it is seen that there are qualitative studies carried out with small samples to determine the participants' views about SLNs. However, in literature, there is no attitude scale developed to collect data regarding SLNs via a large research sample. Currently, there is a need for a scale to determine students' attitudes towards SLNs becoming increasingly common in today's world of education. The purpose of this study was to develop a scale (Edmodo Attitude Scale-EAS) so as to determine students' attitudes towards Edmodo, a Social Learning Network.

METHOD

In the present study, the survey model was used to develop a scale for determining undergraduate students' attitudes towards Edmodo. This part of the study presents the study group, the phases of development of the measurement tool, and the reliability and validity studies carried out during the analysis of the data.

Participants

The participants of the study were students attending Necatibey Education Faculty of Balıkesir University in the Spring Term of the academic year of 2014-2015. In the study, for the selection

of the participants, the convenient sampling method was used, and a total of 298 participants took part in the phase of exploratory factor analysis (Table 1). As for the confirmatory factor analysis conducted in the second phase of the process, a total of 169 students were reached who were all different from those in the previous research sample (

Table 2. Profile of the participants (II. Implementation). In the study, all the participants, who were from various departments, had used Edmodo, a SLN, at least in one of their courses.

Table 1. Profile of the participants (I. Implementation)

		Frequency	Percent (%)
Gender	Male	160	53,7
	Female	138	46,3

Table 2. Profile of the participants (II. Implementation)

		Frequency	Percent (%)
Gender	Male	82	48,5
	Female	87	51,5

Developmental Phases of the Measurement Tool
In studies conducted in the field of social sciences, a scale development process includes the following phases after the problem and the sub-problems have been defined (Buyukozturk, Kılıc Cakmak, Akgun, Karadeniz & Demirel, 2010):
- ➢ Developing the draft form by preparing the items,
- ➢ Developing the form for preliminary application in line with expert views,
- ➢ Conducting the preliminary application and finalizing the scale in line with the results of the analysis

Developing the draft form by preparing the items
Before preparing the draft form, the scales and studies related to SLNs reported in literature were examined. Although there were attitude scales regarding SNSs, it was seen that there was no study directly measuring attitudes towards SLNs. The items to be included in the scale were determined in line with the results of studies especially which aimed at determining students' views about SLNs (Cankaya et al., 2014; Sanders, 2012; Wolf, Wolf, Frawley, Torres, & Wolf, 2012). In addition, with the help of attitude scales developed for SNSs (Deniz, 2012), the attitude statements were formed. These attitude statements were prepared together with experts and faculty members who had experience in SLNs. While determining the items, the negative statements as well as positive ones were included. Also, the items found in the draft form were prepared in relation to each of the cognitive, affective and behavioral dimensions of attitude (Reid, 2006). Consequently, a 50-item pool was formed.

Developing the form for preliminary application in line with expert views
For content validity, five experts with experience in SLNs were requested to focus on each of the items and to state whether each item was necessary, appropriate in content and comprehensible as well as under which dimension each item should be evaluated. All the experts had a doctorate degree. One of them was an instructor, the other four were research assistants. In this phase, an evaluation form, which included a space under each item for the experts to take notes regarding their evaluations, was prepared. Regarding the appropriateness of the items, the experts were asked to rate each item as follows: (1) Item is appropriate, (2) Item should be revised, (3) Item should be attentively revised, and (4) Item is not appropriate. In addition, the experts were asked to select one of the options above for each item. Among the 50 items found in the pool, those reported by experts to measure the same attitude and those found inappropriate were excluded from the item pool. Eventually, the remaining number of items in the pool was found to be 37.

Conducting the preliminary application

The items in the draft form were put in random order and transformed into a five-point Likert-type scale form. The reason is that Likert-type scales are considered to be the most useful scales (Cetin, 2006). In this respect, the scale was rated as "I Completely Agree", "I Agree", "I am Neutral", "I Disagree" and "I Completely Disagree". The attitude statements in the pool were read by 15 students, and the necessary corrections were made on the items that were hard to understand.

Analysis of Data

Depending on the data collected via the preliminary application, the reliability and validity studies were conducted on the scale. In this respect, exploratory and confirmatory factor analyses were carried out.

FINDINGS

Exploratory Factor Analysis

In this phase of the study, Exploratory Factor Analysis (EFA) was conducted to determine the structures obtained via the investigation of the relationship between variables. In other words, the factors formed by the items looking similar due to the relationships in-between. For this purpose, depending on the data collected from 298 participants, principle component analysis was run, and the result of the KMO test was found to be 0.82. In the process of forming a good factor, it is important to reduce the number of items, to have a minimum correlation between factors, and to have meaningful factors (Buyukozturk, 2013). The factors obtained as a result of varimax rotation were interpreted and named. While forming the factors, the components with an Eigenvalue higher than 1, which is used for determining the number of factors, were selected. In addition, the items with a factor load lower than .50, which thus had a low level correlation with the factor, were excluded. As can be seen in Table 3, the factor loads of the items were higher than .50 meaning that the items measured the related factor well (Buyukozturk, 2013, p. 134). Table 3 demonstrates the items found in the scale and the factor loads for these items (Original scale is in Turkish and given in Appendix 1).

Table 3. Scale Items and Factor Loads for the Items

Factors and Items	Variance Explained	x	SD	Item Total Correlation (r)	Factor Load
Collaboration					
I1. I like sharing in courses executed via Edmodo.		3.81	.685	.462	.808
I2. I believe my sharings in Edmodo are beneficial for my friends.		4.03	.609	.423	.698
I3. I think Edmodo contributes to communication between students.		3.91	.808	.499	.660
I4. I think my group friends' sharings via Edmodo contribute to my learning.	%18.9	4.00	.771	.527	.569
I5. I like following the sharings in courses executed via Edmodo.		3.89	.689	.656	.544
I6. My friends and I can easily share with each other via Edmodo.		4.1	.601	.542	.543
I7. I think a course executed via Edmodo have negative influence on group work.		4.08	.653	.520	.532

Usefulness				
I8. I believe there is no need for Edmodo because there are such websites available as Facebook.		4.38	.692	.445	.758
I9. I think Edmodo involves innovative technologies beneficial for education.		4.21	.671	.441	.642
I10. I think following a course via Edmodo is boring.	%15	4.20	.664	.507	.600
I11. I think Edmodo does not distract attention as it does not include any irrelevant or unnecessary content just as Facebook does.		4.01	.657	.390	.539
I12. I believe Edmodo increases my motivation in the course.		3.74	.834	.507	.529
I13. I think Edmodo provides more opportunities to access sources and materials.		4.13	.764	.509	.528
Instructor Support				
I14. I think faculty members can provide students with faster feedback for their questions thanks to Edmodo.		3.58	.823	.354	.815
I15. I think I can easily communicate with faculty members in courses executed via Edmodo.	%13.35	3.77	.833	.516	.806
I16. I think Edmodo contributes to communication between students and teachers.		3.89	.855	.528	.612
Self-confidence				
I17. I think I participate more in courses if they are executed via Edmodo.	%9,86	3.57	.816	.505	.646
I18. I think I can express my thoughts more freely in courses executed via Edmodo.		3.66	.785	.413	.869

According to Table 3, a structure made up of four factors and 18 items which explained 57.1% of the total variance was obtained. These factors were *Cooperation* with seven items explaining 18.9% of the total variance, *Usefulness* with six items explaining 15% of the total variance, *Instructor Support* with three items explaining 13,35% of the total variance and lastly *Self-confidence* with two items explaining 9,86% of the total variance.

The Component Number and Eigenvalue presented in Figure 1 demonstrated that the Eigenvalue dramatically decreased after the first factor, and it could thus be stated that the scale had a general factor. In addition, the inclination observed to demonstrate a lower decrease when compared to the first factor constitute another set of data showing that the scale had a four-factor structure (Buyukozturk, 2013).
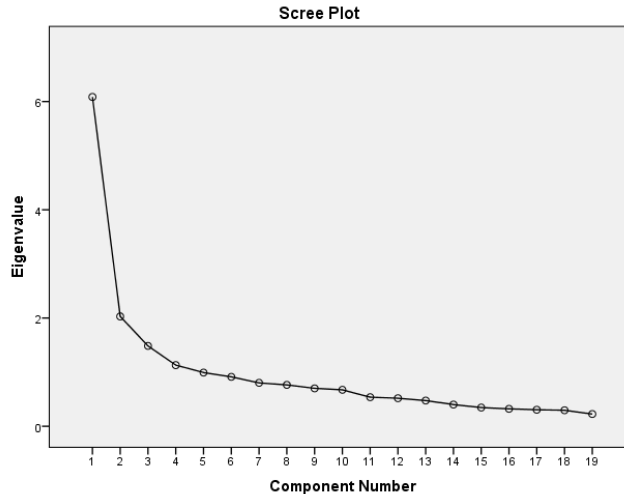
Figure 1. Eigenvalues

Confirmatory Factor Analysis

In the study, in order to determine whether the four-factor structure obtained as a result of EFA was acceptable or not, Confirmatory Factor Analysis (CFA) was conducted using the software of IBM AMOS 21. The KMO value was found to be 0.89, and this result demonstrated that the number of participants was enough.

The goodness of fit statistics used for the confirmatory factor analysis included the ratio of Chi-square (χ^2) and the degree of freedom (df2), Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residuals (SRMR), CFI (comparative fit index) and GFI (Goodness of Fit Index) values (Ilhan, Sekerci, & Yildirim, 2013; Simsek, 2007). Table 4 presents the goodness of fit values obtained as a result of confirmatory factor analysis.

Table 4. Goodness of Fit Values Obtained via CFA

	Criterion	Value	Reference
χ^2	$0 \leq \chi^2 \leq 2df$	160,63<360	(Yilmaz & Celik, 2009)
χ^2/df	$0 \leq \chi^2/df \leq 2$	1,265	(Tabachnick & Fidell, 2005)
P	$0 \leq p \leq 0,05$	0,023	(Joreskog & Sorbom, 1993)
RMSEA	0 ≤ RMSEA ≤ 0.08	0.04	(Steiger, 2007)
SRMR	0 ≤ S-RMR≤ 0.10	0.03	(Kline, 2015, p. 278)
CFI	0.95 ≤ CFI≤ 1.00	0.97	(Schermelleh-Engel, Moosbrugger, & Müller, 2003)
GFI	0.90 ≤ GFI≤ 1.00	0.91	(Schermelleh-Engel et al., 2003)

As can be seen in Table 4, χ^2 value was calculated as 160.63; χ^2/df as 1.265; RMSEA as 0.04; and RMR value was calculated as 0.03. The model obtained revealed that the factors were confirmed since the goodness of fit values were in acceptable ranges. Figure 2 presents factorial model for the scale and the values for the fit model.
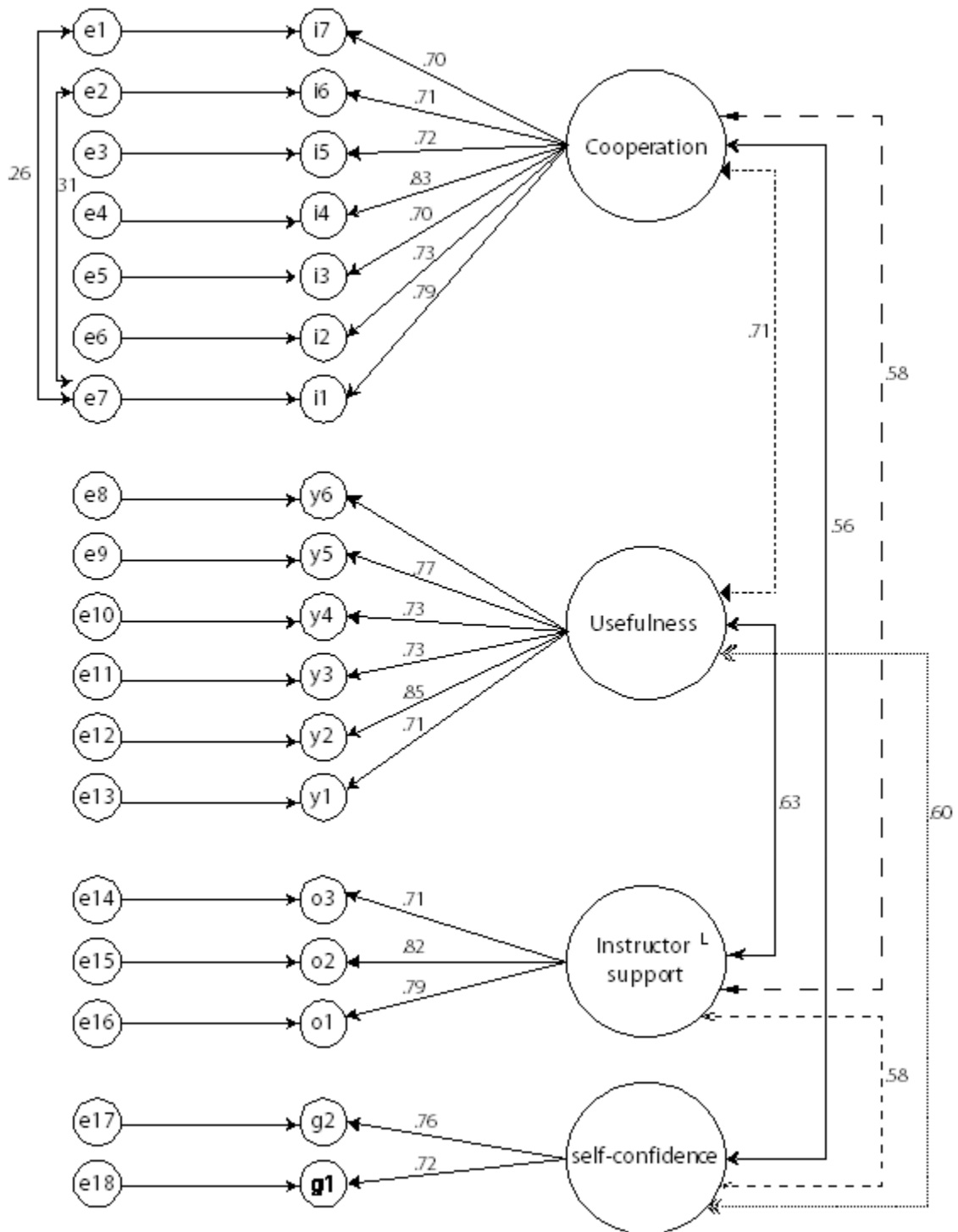
Figure 2. Standardized analysis values regarding the confirmatory factor analysis for EAS

In order to calculate the discrimination capacity of each item in the scale, the scores received by the bottom and top 27% groups were analyzed. Table 5 presents the findings obtained as a result of the t-test conducted.

Table 5. Item discrimination capacity (t values)

Cooperation		Usefulness		Instructor Support		Self-Confidence	
Item	t value	Item	t value	Item	t value	Item	t value
I1	4,705	I8	5,946	I14	4,243	I17	7,647
I2	4,372	I9	6,805	I15	7,092	I18	6,647
I3	6,113	I10	5,857	I16	6,650		
I4	6,838	I11	5,571				
I5	9,664	I12	5,233				
I6	6,069	I13	7,548				
I7	6,871						

*p<,001

When the results presented in Table 5 were examined, it was seen that the t values, which referred to the discrimination capacity of items obtained as a result of t-test ranged between 4,243 and 7,647, and these t values were found significant (p<.001). Accordingly, it could be stated that each item in the scale had a discrimination capacity and that the scale had a high level of validity.

In order to determine the internal consistency of the scale, split-half, Cronbach's Alpha and Spearman-Brown tests were conducted. Table 6 presents the results obtained via these tests.

Table 6. Reliability analyses regarding the scale and its sub-factors

	Cooperation	Usefulness	Instructor Support	Self-Confidence	Total
Cronbach's Alpha	,821	,732	,728	,639	,868
Spearman Brown	,817	,700	,749	,639	,859
Guttmann Split-Half	,788	,700	,695	,639	,859

According the results presented Table 6, the Cronbach's Alpha value was calculated as ,821; Spearman Brown value as ,817; Guttmann Split-Half value was calculated as ,788. Taking these results into consideration, it could be stated that the internal consistency of both the scale as a whole and its sub-factors was at an acceptable level.

In order to interpret the consistency of the scale, the test-retest method was applied. For this purpose, the scale was applied to the participants about three weeks after the first application to see the correlation between the scores obtained in the former and in the latter applications of the scale. The correlation between the two applications was calculated as ,892 (N=29, p<0,05). This value shows that the scale was consistent over time.

CONCLUSION, DISCUSSION AND SUGGESTIONS

In the present study, a scale was developed to determine students' attitudes towards Edmodo, a SLN, EAS was a five-point Likert-type scale made up of 4 factors and 18 items. Each item in the scale was rated as 1. I Completely Agree, 2. I Agree, 3. I am Neutral, 4. I Disagree and 5. I Completely Disagree. Using the data obtained via the draft form of the scale, the validity and reliability studies were conducted.

The results of the exploratory factor analysis conducted to determine the factors in the scale revealed that EAS included four. Taking the factor loads of the items in the factors of EAS, the eigenvalues of the factors, and the explained variance rates into account, the scale could be

said to have a valid structure. In the study, confirmatory factor analysis was conducted to confirm the factor structures of EAS, which was found to include four factors with the help of exploratory factor analysis. Depending on the goodness of fit values obtained via CFA, EAS could be regarded as a scale with four dimensions.

In the study, the item-total correlations were calculated, and the extent to which each item measures the related factor and the features. The results revealed that each item in EAS was able to measure the features intended to be measured. In addition, in the study, with the help of the bottom and top 27% group scores, the item discrimination index was calculated. Accordingly, it was found that each item in EAS satisfactorily had a discrimination capacity. Since there is no scale similar to EAS in terms of content or purpose in related literature, it was not possible to calculate the validity for similar scales. In this respect, the scale was concluded to be fairly reliable using the split-half, Cronbach's Alpha and Spearman-Brown tests.

Considering the increasing importance of cooperative learning in online learning environments (Durak, 2016) and the increasing number of users in social network platforms (Durak, 2016b; Çankaya, Durak & Yunkul, 2014), determining learners' attitudes towards Social Learning Networks (SLNs) is important for the success of instructional activities carried out in these environments. In experimental studies to be conducted via SLNs, use of the present scale will allow not only examining the attitudes but also investigating the relationships between success and attitude. In addition, EAS can also be used as a preattitude and postattitude tool in an experimental design. Consequently, EAS, which can be used in instructional and research activities to be carried out via Edmodo could be said to be a valid and reliable scale. In literature, there is no scale developed to determine learners' attitudes via SLNs. In this respect, EAS is thought to contribute to the field. In future studies to be conducted to investigate the influence of the scale on different groups, the related validity and reliability studies could be carried out.

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Faktör 1: İşbirliği
I1. Edmodo ile yürütülen derslerde paylaşımda bulunmaktan hoşlanırım.
I2. Edmodo ile yaptığım paylaşımların arkadaşlarıma faydalı olduğunu düşünüyorum.
I3. Edmodo'nun öğrenciler arası iletişime katkıda bulunduğunu düşünüyorum
I4. Edmodo üzerinden gruptaki arkadaşlarımın paylaşımlarının öğrenmeme katkıda bulunduğunu düşünüyorum.
I5. Edmodo ile yürütülen derslerde yapılan paylaşımları takip etmekten hoşlanırım.
I6. Edmodo üzerinden sınıf arkadaşlarımla kolaylıkla yardımlaşabilirim.
I7. Edmodo ile yürütülen bir dersin grup çalışmalarını olumsuz etkilediğini düşünüyorum.

Faktör2: İşe Yararlık
I8. Facebook gibi siteler varken Edmodo'ya gerek olmadığını düşünüyorum.
I9. Edmodo'nun eğitim için faydalı yenilikçi teknolojilerden olduğunu düşünüyorum.
I10. Dersi, Edmodo üzerinden takip etmenin sıkıcı olduğunu düşünüyorum.
I11. Edmodo'nun, Facebook'da olduğu gibi ilgisiz ve gereksiz içerik barındırmadığından dikkat dağıtıcı olmadığını düşünüyorum.
I12. Edmodo'nun derse olan güdülenmemi (motivasyonumu) arttırdığını düşünüyorum.
I13. Edmodo'nun kaynak ve materyallere erişim açısından zenginlik sağladığını düşünüyorum.

Faktör 3: Öğretici Desteği
I14. Edmodo ile yürütülen bir deste öğretim elemanının öğrencilerin sorularına daha hızlı dönüt verebileceğini düşünüyorum.
I15. Edmodo ile yürütülen bir derste öğretim elemanı ile rahatlıkla iletişim kurulabileceğini düşünüyorum.
I16. ESAS'ların öğrenciler ve öğretmen arasındaki iletişime katkıda bulunduğunu düşünüyorum.

Faktör 4: Özgüven
I17. Edmodo ile yürütülen bir derste daha katılımcı olduğumu hissederim.
I18. Edmodo ile yürütülen bir derste düşüncelerimi daha özgürce ifade edebildiğimi düşünüyorum

DEVELOPMENT OF WEB-BASED EXAMINATION SYSTEM USING OPEN SOURCE PROGRAMMING MODEL

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ABSTRACT

The traditional method of assessment (examination) is often characterized by examination questions leakages, human errors during marking of scripts and recording of scores. The technological advancement in the field of computer science has necessitated the need for computer usage in majorly all areas of human life and endeavors, education sector not excluded. This work, Web-based Examination System (WES) was, therefore, born out of the will to stymie the problems plaguing the conventional (paper-based) examination system by providing a campus-wide service for e-assessment devoid of irregularities and generally fair to examinees and equally enhances instant feedback. This system developed using combination of CSS, HTML, PHP SQL MySQL and Dreamweaver is capable of reducing proportion of workload on examination, grading and reviewing on the part of examiners. Thus, the system enables the release of examination results in record time and without error. WES can serve as an effective solution for mass education evaluation and offers many novel features that cannot be implemented in paper-based systems, such as real time data collection, management and analysis, distributed and interactive assessment towards promoting distance education.

Keywords: Web-based examination system, e-examination, computer-based test.

INTRODUCTION

The explosive growth of the Internet is making available radical new means of communication that affect life in diverse areas as business, entertainment and education. While older methods of accomplishing tasks continue to be used, the Internet offers unique advantages (Rahneva, 2004). One important area of application of the web technology is in the development of web-based testing and assessment (Iyilade & Adekunle, 2005). Before the massive influx of Information Technology (IT), students's academic performances were evaluated via paper-based system of assignments and tests. Since recent progress in state-of-the-art IT has advanced significantly, educational products are now available electronically (including the web technologies) and new methods of educational assessment have emerged.

The World Wide Web (WWW) has gained popularity within educational sector and become an inexpensive, easily accessible way to communicate, disseminate information, teach and examine courses and conduct researches. Consequently, there exists wide preference and adoption of web-based testing and assessment over the traditional paper-based method of assessment which has over decades been characterized by examination questions leakages, human errors during the marking and recording of scores. Web-based testing and assessment systems offer greater flexibility than the traditional approach because test could be offered at different times by students and in different locations (Akanbi & Adetunji, 2012). e-Examination system rides on the huge success of Information and Communication Technology (ICT) and its various features, security, reliability and consistency. The system simplifies the examination process by computer-aided control and automatic marking to reduce the complex paper work (Meng & Lu, 2011).

In this current adoption of ICT towards promoting distance education where distance between leaners and instructors is no longer a barrier, Web-based Examination System (WES) is an effective solution for mass education evaluation. The system is based on a Browser/Server framework which carries out the examination and auto-grading for objective questions. The system facilitates conducting examinations, collection of answers, auto marking the submissions and production of reports for the test. It will be used via Internet and is therefore suitable for both local and remote examination.

The system developed reduces the large proportion of workload on examination, grading and reviewing. It also has the potentials to reduce drastically examination malpractice as examinees are duly authenticated online in a real-time manner and their results are released some few minutes after the completion of the examination because where the lecturer would spend weeks marking scripts and grading manually, the computer would grade the students as soon as they finish their paper, get their already stored continuous assessment and produce their eventual result. It also enhances effective distance education as examinees can write examination in any part of the world and equally get their results instantly.

The remaining parts of the paper is organized as follows. Section 2 reviewed the related literatures. In Section 3, methodology and system design techniques are highlighted. The Section 4 focuses on the implementation of the design while Section 5 presents the conclusion and recommendations.

REVIEW OF RELATED LITERATURE

Traditional versus Electronic Tests

In educational institutions, tests are conducted to evaluate the academic progress of learners; review, compare and measure the effectiveness of methods of instruction; serve as basis of guidance and counselling to students, selection for prize award and employment and grading for the purpose of certification.

In the context of education system, one possible purpose of a test is to assess whether a learner has attained an educational goal. The outcome of such a test can help instructors analyze problems with his method(s) of instruction and to better understand the learner's strengths and weaknesses in a given subject. Test can be used to fine-tune the instruction environment or method based on the analytical results to improve the instructor's teaching performance (Chen, et. al., 2005). There are currently two methods for conducting tests: (i) The traditional method of using paper and pencil tests, including the creation of test items, the grading of students' test sheets, and the analysis of learner's responses for each test item, which is considered to be tedious; and (ii) Computer-Based Tests, an electronic examination, allows test activities to be carried out using different electronic platform/environment. Basically, the electronic examination (e-Examination) system involves the conduction of examinations using various electronic

devices (mobile phones, computers etc) connected to the testing system via the Internet or the Intranet. The process is predominantly automated, which means the administration, grading, reviewing of the examination is of little effort. Usually the examination is in form of multiple-choice test.

Ayo, et. al. (2007) defines e-examination as a system that involves the conduct of examinations through the web or the intranet. They proposed a model for e-Examination in Nigeria where all applicants are subjected to online entrance examination as a way of curbing the irregularities as proposed by the Joint Admissions Matriculation Board (JAMB), a body saddled with the responsibility of conducting entrance examinations into all the Nigerian universities. This model was designed and tested in Covenant University, one of the private universities in Nigeria. Their findings revealed that the system has the potentials to eliminate some of the problems that are associated with the traditional methods of examination such as impersonation and other forms of examination malpractices.

Gardner, et. al. (2002) in their work developed a computer-supported learning system, named CECIL, which included an interesting function of 'self-Assessment' to enhance students' learning effectiveness. The function of 'self-assessment' is equipped with item pools and teachers can administer and construct examinations easily through the Internet. They also pointed out that the advantages of item pools are that 'teachers are able to incorporate large item banks (item pools) from textbook publishers and batch load these questions with a minimum of manual effort'. Moreover, Gardner et al. (2002) also stated that teachers who administer and construct an examination through the Internet have the advantage of helping students to check their understanding of the learning materials at all hours.

Wang et al. (2004) in their work developed an assessment system using Triple-A Model (assembling, administering, and appraising) as the baseline qualification in order to provide the most comprehensive form of Computer-Based Test (CBT) or Web-Based Test (WBT) and to be more suitable for teacher education. The Triple-A Model includes the essential functions of CBT system. *Assembling* deals with the construction of item pools, test items, and schedules of tests. *Administering* is to assign the test items and item choices randomly, provide examination passwords for testees to apply the test through Web as well as collecting and recording the scores data of the tests. *Appraising* focuses on analyzing the collected/processed data of tests and to generate the statistic report.

Zhenming, et. al. (2003) proposed a web-based operational skills examination and evaluation system for computer courses. In another research work by Rashad, et. al (2010), a web-based online examination system was proposed. The system carries out the examination and auto-grading for student's examinations. The system facilitates conducting examinations, collection of answers, auto marking the submissions and production of reports for the test. It supports many kinds of questions. It was used via Internet and is invariably suitable for both local and remote examination. The system could help lecturers, instructors, teachers and others who are willing to create new examinations or edit existing ones as well as students participating in the examinations. The system was built using various open source technologies. AJAX, PHP, HTML and MYSQL database are used in this system. An auto-grading module was generalized to enable different examination and question types. The system was tested in the Mansoura University Quality Assurance Centre. The test proved the validity of using this kind of web based systems for evaluating students in the institutions with high rate of students.

e-Examination (Computer-Based Examination)

In many tertiary institutions in Nigeria, the conduct of examinations as well as the process of producing results has been fraught with various problems leading to inability to release results on time, inability of some students to get their results and several incomplete results. These problems can be mitigated using electronic medium.

E-examination, as used in this paper, refers to a system that involves the conduct of examinations through the web or the intranet using the computer system. Recently, because Internet and database technology have been fully developed, CBT which before was once hosted only on personal computers (PCs) or local area networks (LANs), has now gradually been upgraded to work on the Internet using browsers as the test interface so that users can use it anywhere in the world. WES has been seen to be an effective solution for mass education evaluation (Zhenming etal, 2003).

Computer-based examination and test tools have been applied for different purposes, e.g. placement tests, entry-level tests (prognostic tests), self-assessment tests, regular written and oral examinations (selective and diagnostic examinations), and online surveys.

METHODOLOGY AND SYSTEM DESIGN

This technical paper intends to showcase the development of e-examination application towards enhancing effective distance education where digital divide is eliminated in access to qualitative education across the globe.

The application was developed using different programming models and languages which include HTML, CSS and PHP (for the front-end interface) and MYSQL (for the backend) and served through a web server, APACHE. The use of HTML and CSS, which is a markup language for information presentation and a styling language respectively, allow for the user-interface to be designed and properly laid out. To enable dynamic content generation, PHP (a web scripting language) is used to generate dynamic contents based on the user of the system and the corresponding content stored in the backend database which is managed by MySQL. The web server is used to serve the webpages to users when they are needed, and also to interpret the PHP scripting commands contain in the page. In other words, the computer simply acts as the medium for students to take examinations, for teachers to construct tests, and for the transmission of test papers.

Web-based Examination System Phases

This WES has three phases. Namely: (i) The *presentation phase* offers an interface to the user. (ii) The *business/logic phase* serves as the middleware that is responsible for processing the user's requests. (iii) The *database phase* or question bank serves as the repository of a pool of questions to be answered by the student.

DEVELOPMENT LANGUAGES

Cascading Style Sheet (CSS)

It is a set of rules that allow user to control how the web document will appear in the web browser. It defines the formatting applied to a Website, including colors, background images, typefaces (fonts), margins, and indentation. The basic purpose of CSS is to allow the designer to define a style (a list of formatting details such as fonts, sizes, and colors) and then, to apply it to one or more portions of HTML pages using a selector. CSS information can be specified in three different places: (i) within the specific tags in the document body (Inline CSS), (ii) at the top of the document within a <style> block, or combined with named <div> or <span> containers in the document body (Embedded CSS), and (iii) in one or more separate files shared across many Web pages (External CSS)

Hyper Text Mark-up Language (HTML)

It is the core technology in which all Web pages are written. HTML is not a programming language rather it is a mark-up language for collection of mark-up tags to describe Web pages. Mark-up is made up of tags, and tag names are enclosed in angle brackets.

Hypertext Pre-processor (PHP)

It is a widely-used Open Source general-purpose scripting language that is specifically suited for Web development and can be embedded into HTML. Unlike other CGI script written in other languages like Perl or C, where lots of commands are written to output HTML, the PHP code is enclosed in special start and end tags that allow you to jump into and out of PHP mode. What distinguishes PHP from something like client-side JavaScript is that the code is executed on the server?

Structured Query Language (SQL)

This is the standard language designed to access relational databases.
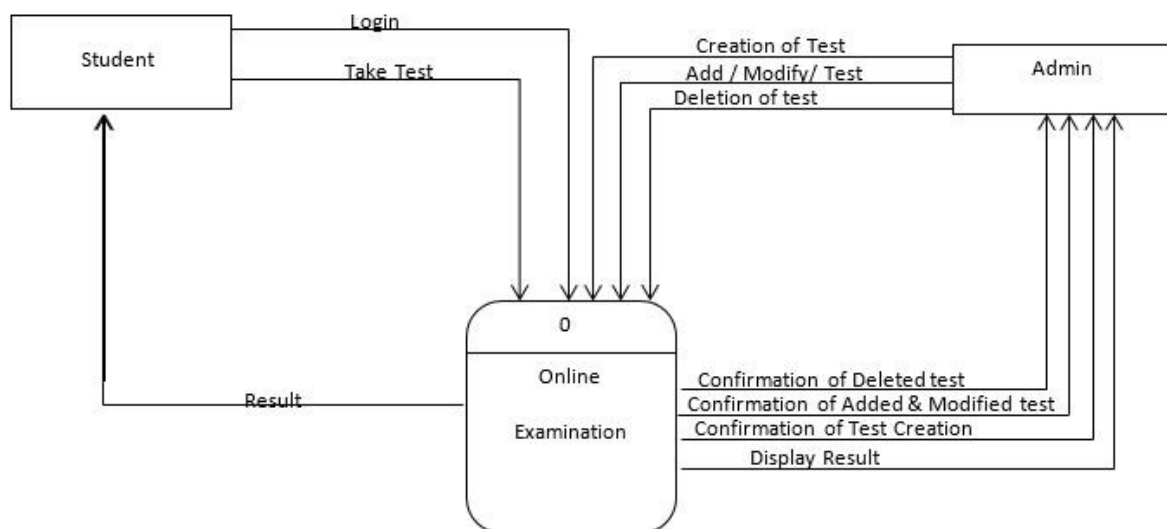
Figure 1: Architecture of the system

To make software development easier and faster, Integrated Development Environment (IDE) may be adopted. An IDE is a software application that provides comprehensive facilities to computer programmers for software development. An IDE normally consist of a source code editor; build automation tools and a debugger (Burd, 2005).

MySQL Workbench

MySQL is the world's most popular open source database, enabling cost effective delivery of reliable, high-performance and scalable web-based and embedded database application. The data in MySQL are stored in tables.

MySQL workbench is a unified visual tool for database architectures, developers, and DBAs. It provides data modeling, SQL development and comprehensive administration tools for server configuration, user administration, backup and much more. MySQL workbench enables a DBA, developer, or data architect to manage databases. It includes everything a data modeler needs for creating complex Entity Relational (ER) models, forward and reverse engineering and also delivers key features for performing difficult change management and documentation tasks that normally require much time and effort. MySQL workbench delivers visual tools for creating, executing and optimizing SQL queries. The SQL editor provides color syntax highlighting, auto-complete, reuse of SQL snippets and execution history of SQL. The database connections panel enables

developers to easily manage database connections. The object browser provides instant access to database schema and objects.

Dreamweaver CS5

Dreamweaver is a web design and development application that provides a visual WYSIWYG editor (colloquially referred to as the design view) and a code editor with standard features such as syntax highlighting, code completion and code collapsing as well as more sophisticated features such as real-time syntax checking and code introspect for generating code hints to assist the user in writing code. The design view facilitates rapid layout design and code generation as it allows users to quickly create and manipulate the layout of HTML elements. It also features an integrated browser for previewing developed webpages in the program's own preview pane in addition to allowing content to be open in locally installed web browsers. Dreamweaver provides transfer and synchronization features, the ability to find and replace lines of text or code by search terms or regular expressions across the entire site, and a templating feature that allows single-source update of shared code and layout across entire sites without server-side includes or scripting. Dreamweaver like other HTML editors, edit files locally then uploads them to the remote web server using FTP, SFTP or WebDAV.

SYSTEM DESIGN

Database (Backend) Design

Database design is concerned with how data is represented and stored within the system. The examination questions, answers, grades, and reviews must be stored in a persistent way. Moreover, we need to keep information about the students. The system stores the above information in a MySQL Database server. Such database has been chosen since it is open source, and there are implementations available for the main architectures

User Interface (Frontend) Design

Usability is the ease with which a user can learn to operate, prepare inputs for, and interpret outputs of system or component. This usability of a system is made less more or less stressful by the usability and complexity of the user interface. The user interface of a system is therefore the part of the system that the end user interacts with. User interface design is concerned with how users add information to the system and with how the system presents information back to them.

Bootstrap

Bootstrap is a collection of tools for creating websites and web applications. It contains HTML and CSS-based design templates for typography, forms, buttons, navigation and other interface components as well as optional JavaScript extensions. Bootstrap was developed at Twitter as a framework to encourage consistency across internal tools. Bootstrap is compatible with all major browsers and it also supports responsive design i.e. the layout of web pages adjusts dynamically, taking into account the characteristics of the device used (PC, tablet, mobile phone). Bootstrap works by proving a clean and uniform solution to the most common, everyday interface tasks developers come across. It is flexible enough to work for many unique design needs.

SYSTEM REQUIREMENTS AND SPECIFICATIONS

Functional Requirements

Functional requirement defines the capabilities and functions that a system must be able to perform successfully. In software engineering and system engineering a functional requirement defines a function of a system or its component. These functions are the set of inputs, the behavior and outputs of the system in question. In order words it captures the intended behavior of the system. This behavior may be expressed as services, tasks or functions the system is required to perform and it shows the features that differentiate the system from other systems. Functional requirements should include: Descriptions of data to be entered into the system, descriptions of operations performed by each screen,

descriptions of work-flows performed by the system, which can enter the data into the system and how the system meets applicable regulatory requirements
The intended software's functions are highlighted below:

> The system has a homepage where respective users (administrator & students) can login to perform their different operations.
> The system has the test page where the student would be presented with test questions to be answered by him/her. The system then automatically adds the marks allocated in each question to determine the total mark for the test.

Non-functional Requirements

These define system properties and constraints e.g. reliability, response time and storage requirements. Constraints are I/O device capability, system representations, etc. It is a requirement that specifies criteria that can be used to judge the operation of a system, rather than specific behaviors. This should be contrasted with functional requirements that define specific behavior or function.

SYSTEM IMPLEMENTATION

To test the effectiveness of the design, PHP and HTML were used, with MySQL as the back-end integration database. The choice of these programming languages is based on the features of the languages that make them very appropriate for this work.

System Requirement and Specification

The minimum hardware and software requirements for the WES are: Minimum of Pentium IV or IBM compatible system, 500Mhz processor speed or higher, minimum of 512MB memory capacity, minimum of Windows XP as the operating system (OS), support any web browser. Internet Explorer, Mozilla Firefox, Google Chrome and Xamp server.

Interfaces
Login/register page
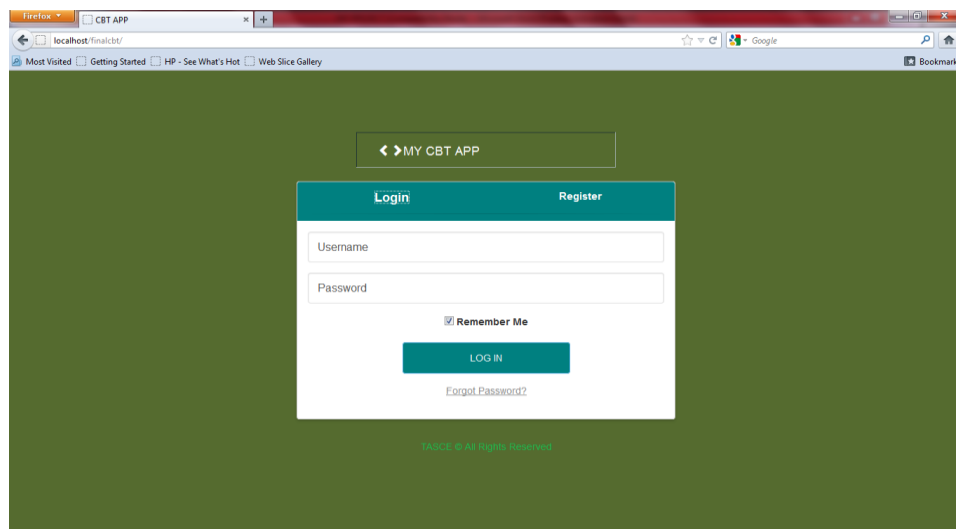
Figure 2. Log-in Page

Login module helps the user (students or lecturers) to login to the site. The lecturer cannot login on this platform but would be done by the administrator. An administrator is to register the lecturers' credential and then provide each lecturer with login credentials. The students must register first before using the registered credentials to login. The login provision in this page helps the already registered user to directly access the site. On the page spaces have been provided for the user (students) to enter their respective username and password.
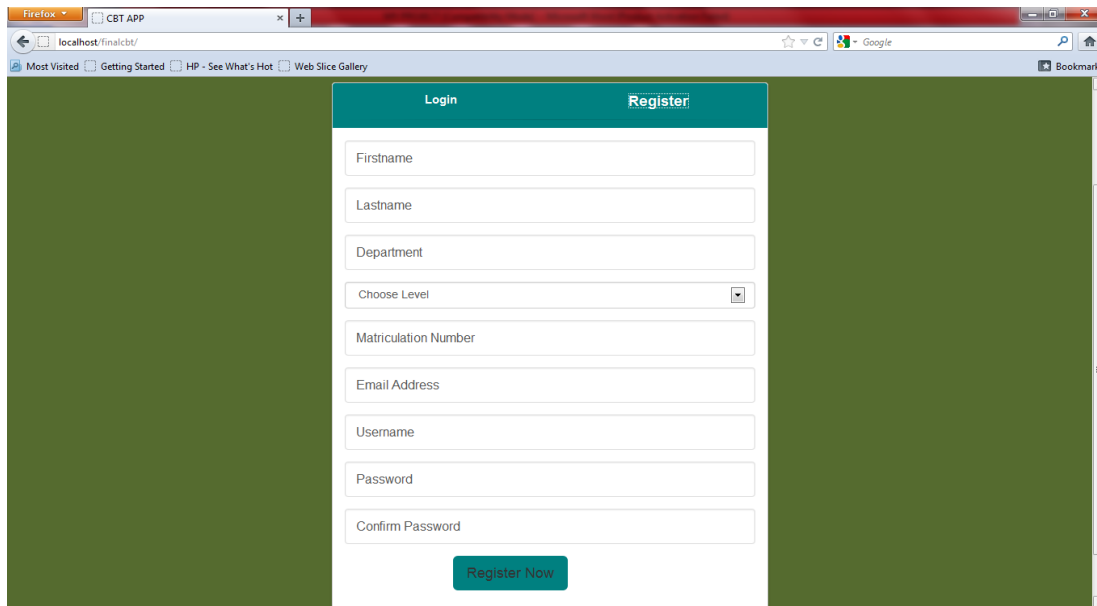
Figure 3. Register Page

Lecturer's examination creation page

This platform enables the lecturer to set examination mode before proceeding to set the questions. Here, course name and code will be specified by the lecturer including the allocated time and date of the examination.
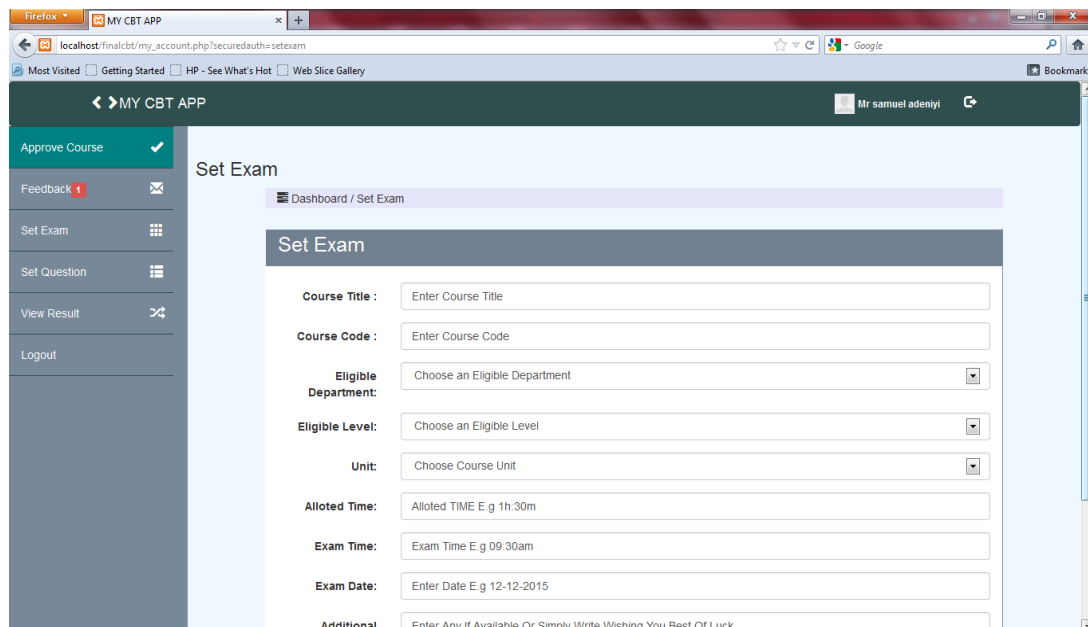
Figure 4. Examination Setup Page

Question, examination and result pages

After setting up the examination, the lecturer will proceed in setting up the questions for the examination. This platform will provide the avenue for questions setup and correct answer to each question will be marked by the lecturer.
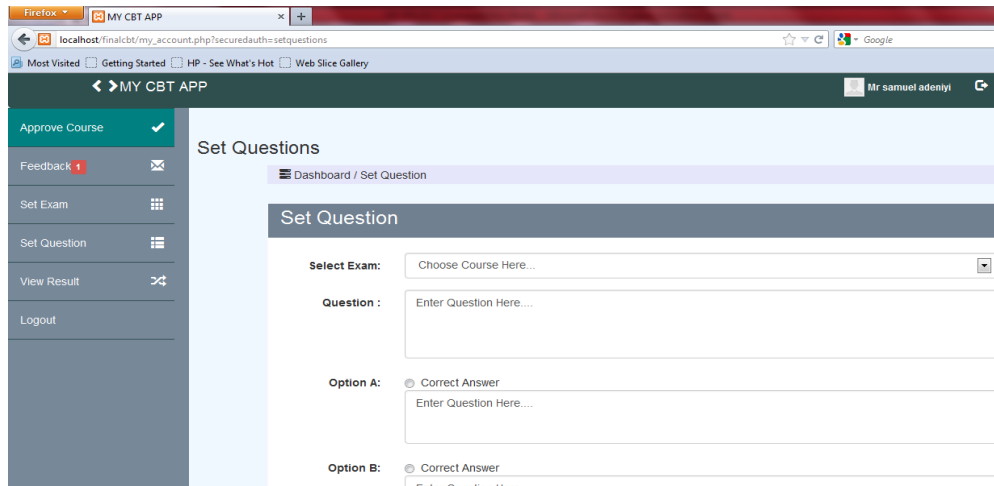
Figure 5. Question Creation
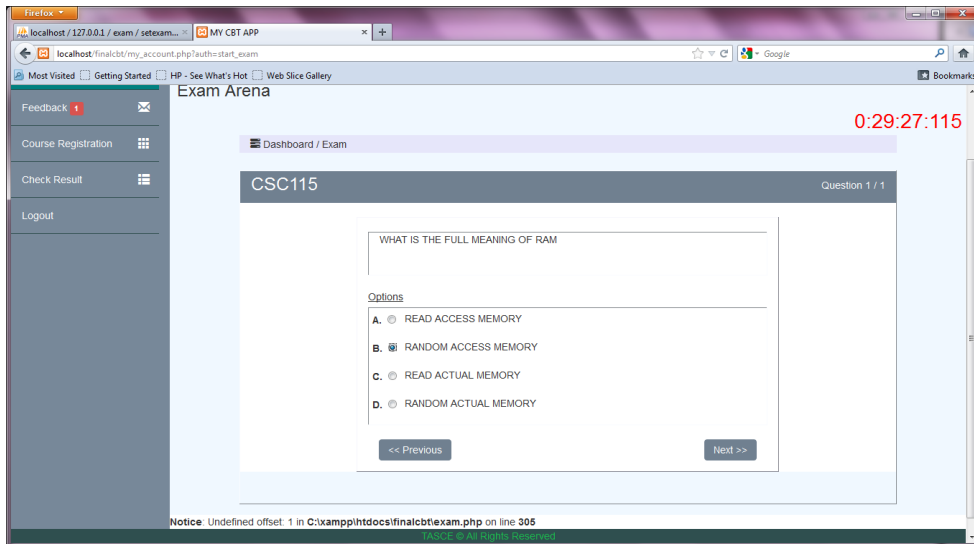
Figure 6. Examination Page
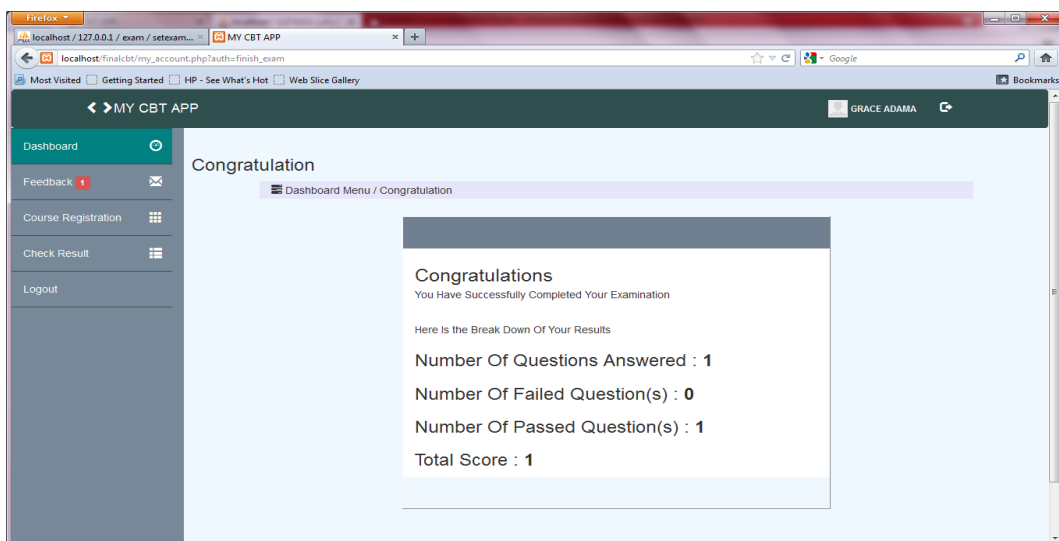
Figure 7. Examination Completion Page
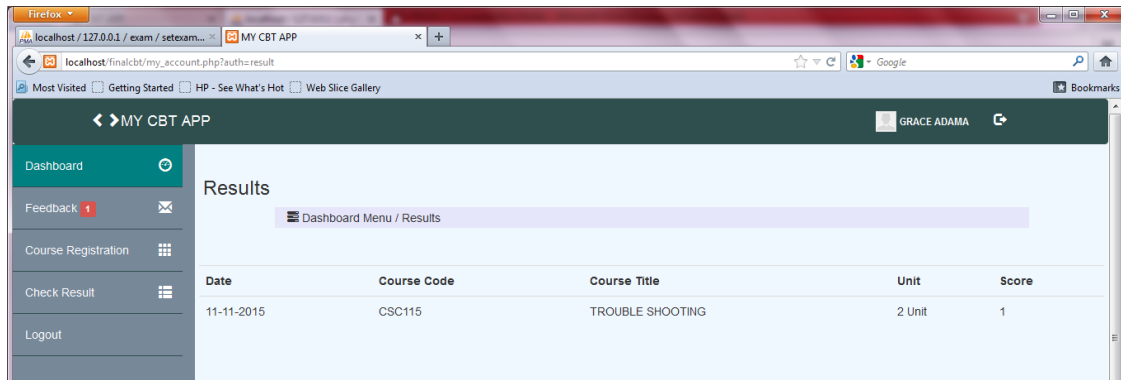
Figure 8. Result Page

Backend/Database Design
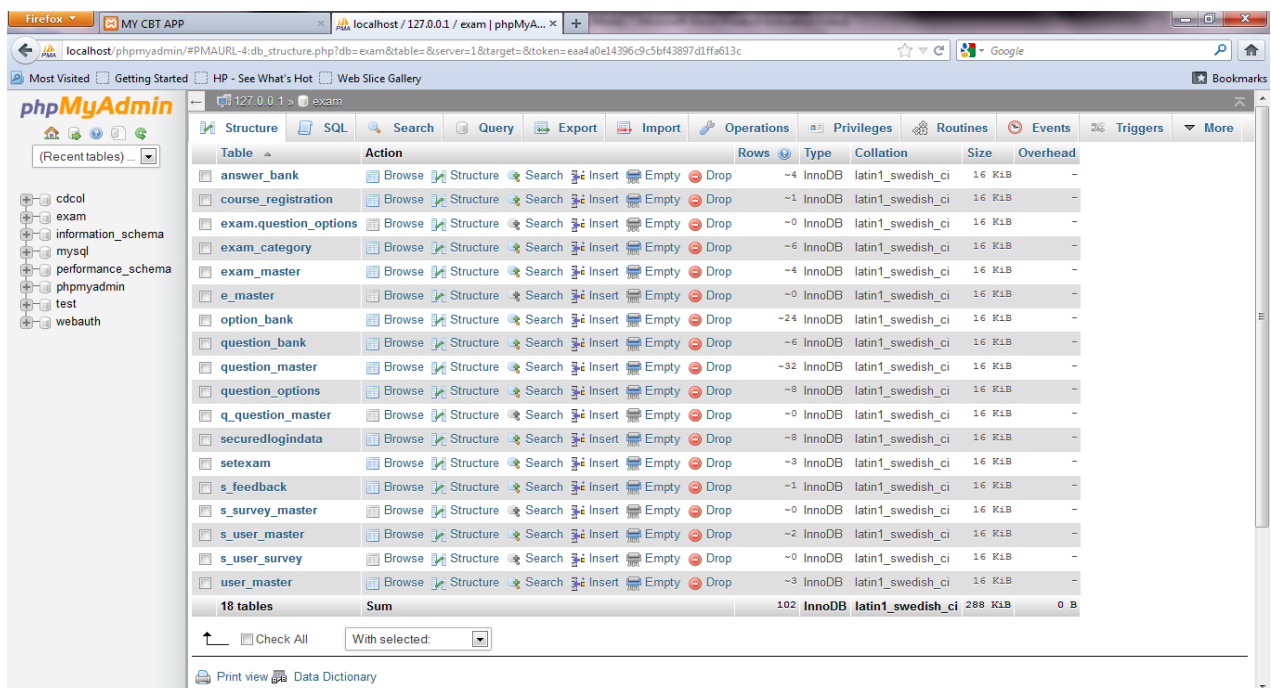
Figure 9. Database View Page

Database design is the process of producing a detailed data model of a database. This logical data model contains all the needed logical and physical design choices and physical storage parameters needed to generate a design in a Data Definition Language, which can then be used to create a database. The database of the system is presented below. The database has eight tables (admin, courses, option, question, registration, results, student, and tests) in it. The option table holds the various options to the questions to be presented to the students, the results table holds the various scores of the students that partook in the test, the question table holds the questions that would be presented to the students, while the students table holds the students' information.

CONCLUSION AND RECOMMENDATIONS

It is not enough to focus on the passing required skills to the learners in distance education but to equally furnish them with their performances shortly after evaluation without hitch. Consequently, the developed WES is capable of solving the associated problems with the traditional test methods and equally promotes distance education.

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When online method of instruction is used to acquire skills in higher education, the application can be used for efficient assessments regardless of the location of the examinees across the globe.

It is possible with this system to space the period of examination without compromising quality and integrity of the examination. The system has the potentials to reduce drastically examination malpractice as applicants are duly authenticated online, real-time before taking the examination and the integrity of the result could also be enhanced since the candidates have access to instant result checking.

Hence, in the current era of distance education prompted by the adoption of ICT, the e-Examination has the advantage of being easy to administer, ability to offer applicants instant results, easy verification, devoid of paper work and long-time involved in marking examination scripts which in most cases are prone to errors and misplacement of some scripts due to the large volume of scripts that has to be marked and accessed. The system also saves the instructors from sufferings and boring grading of works as well as examinees' access to results thereby promoting efficient distance education system.

If the e-examination system is fully optimized and it is introduced into the institutions, it will go a long way to control and check examination malpractices and all fraudulent acts associated with the manual process of writing examination. However, for the system to be adopted on a large scale, efforts should be intensified to ascertain its disadvantage on accounts of IT illiteracy on the part of the students', by making the interface easy to interact with. Also, to ensure that the e-examination system is not intensified by those that may want to engage in any form of examination malpractice, the addition of user authenticated protocol/methods such as biometrics (fingerprint, retina, iris etc) identification will be of good help.

In future, we intend to address the limitations of the current application by incorporating online collation of results from various courses examined, compute Cumulative Grade Point Aggregate (CGPA) and generation of transcripts (with necessary security features) to foster implementation of distance education.

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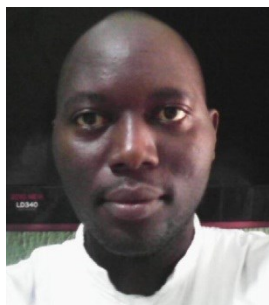
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AN EVALUATIVE STUDY OF AN ICT MODULE FOR A SCHOOL LEADERSHIP AND MANAGEMENT PREPARATION PROGRAM

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ABSTRACT

This study reports on findings of an evaluative study on the effectiveness of an information and communication technology (ICT) module that forms part of the Advanced Certificate in Education: School Leadership and Management program. The study was carried out among distance education (DE) students from the University of the Free State enrolled for above mentioned module. Two ICT audit surveys were used to gather data. This study used two modes of evaluation: Jung and Latchem's (2007) quality indicators for DE and comparison. The findings highlight ready access to ICT, technical support, appropriate guidance and support by knowledgeable, innovative and committed facilitators and the creation of a sense of community as imperatives for teaching education leaders ICT skills and knowledge.

Keywords: Distance education, ICT, ICT audit survey, quality assurance, South Africa, school leadership.

INTRODUCTION

The school principal is fundamental to the improvement of the quality of education and is seen as the gatekeeper of innovation and change (Bush, 2012). The principal often decides the fate of innovation that stems from the department or educators. This implies that school leaders should be prepared effectively to create good schools that will embrace innovation for the betterment of their schools. Information and communication technology (ICT) has the potential to improve the quality of education and training (Naicker, 2013). Researchers (Flanagan & Jacobsen, 2003; Naicker, 2013) however, found that principals have not been prepared to assume the role of ICT leaders at their schools and have therefore struggled to develop both the human and technical resources necessary to achieve ICT outcomes in their schools. There is, nevertheless, no guarantee that school leadership preparation programs that include a section or module on ICT, will prepare principals to be effective ICT leaders. The effectiveness of leadership preparation programs, including ICT preparation programs, depend on the appropriateness thereof (Flanagan & Jacobsen, 2003).

Bialobrzeska and Cohen (2005) developed a module (*Managing ICTs in South African schools: A guide for school principals*) to prepare current and aspiring education leaders in South Africa for their role as ICT leaders. This module forms an integral part of the Advanced Certificate in Education: School Leadership and Management (ACE:SLM)

program. The ACE:SLM is offered as a distance education (DE), part-time program that makes provision for face-to-face meetings with facilitators. To meet the needs of ACE:SLM students in South Africa who are often geographically scattered in rural areas, face-to-face contact sessions are organized for these students at various centers around the country. The University of the Free State (UFS), Bloemfontein, South Africa, has been contracted by the Free State and Mpumalanga's provincial departments of education to present the ACE:SLM in their respective provinces.

While there are numerous definitions of DE, we follow Keegan's (1990) definition (cf. Simonson, Smaldino, Albright & Zvacek, 2012 for a review of definitions). Keegan's (1990) definition identifies five main elements of DE: the separation of teacher and learner; the influence of an educational organization; the use of technical media to unite the teacher and learner and to carry educational content; the provision of two-way communication so that the student may benefit from or even initiate dialogue; and the possibility of face-to-face meetings with the teacher. The DE program under study includes these five elements. DE as a mode of delivery can help to overcome challenges of access, equity, cost effectiveness and quality for higher education in poverty stricken, remote rural areas (DHET, 2012; Wright, Dhanarajan & Reju, 2009).

Quality assurance is important for the UFS. UFS have to compete with local and overseas institutions for the opportunity to present ACE:SLM and should also adhere to the criteria of the Higher Education Quality Committee (HEQC) of the South African Council of Higher Education (CHE, 2005). The South African Department of Higher Education and Training (DHET, 2012) places the responsibility for quality assurance first and foremost on the providers of DE. Quality in DE can be defined and judged as conforming to the standards applying to conventional education, fitness for purpose, meeting customers' needs, continuous improvement and conformity with international standards and requirements (Jung & Latchem, 2007).

The coordinator and facilitator of the ICT-module – who is also the first author of this paper – made it clear from the outset that she did not want to use a linear instructional model when integrating ICT into her teaching of the ICT-module, but to use a more personalized, learner-centered, non-linear and learner-directed model (cf. Kundi & Nawaz, 2010). In contrast to traditional lecture halls where lecturers use a linear model, the facilitator thus opted for a model that consists of three key components, namely: pedagogy, social interaction and technology (Wang, 2008). The theoretical foundations for this model can be found in social constructivism. This theory suggests that learners actively and collaboratively construct meaningful knowledge (Wang, 2008).

A pedagogical design that creates opportunities for active and collaborative ICT learning necessitates insight into learners' knowledge of ICT, as well as the reasons for their inadequate or proficient use of ICT. Insight into learners' differentiated prior knowledge of ICT is also an effective way to scaffold learners during the learning process. At the commencement of the ICT module, students were therefore asked to complete an ICT skills audit questionnaire. The aim of the ICT skills audit questionnaire is, among other things, to give insight into students' (who are also fulltime educators, see Table 1) proficiency to use ICT; their concerns regarding the ICT module; to form an important point of departure for the evolvement of the ICT module for ACE:SLM; and to form a point of reference for evaluating the quality of the ICT module. At the conclusion of the module – which has been presented as a DE part-time course over a period of two years – the students were once again asked to complete an ICT skills audit questionnaire. The central aim of the second questionnaire is the students' appraisal of the module by gaining insight in students' newly acquired ICT skills and their perceived value for them.

Using data emanating from both questionnaires the aim of this paper is to answer the following question: *How effective is the ACE:SLM ICT DE module for education leaders and potential leaders?*

CONTEXTUALISATION

The ACE:SLM was introduced in South Africa during 2007 as a threshold qualification for aspiring school principals as part of the Department of Basic Education's (DBE) strategy to improve educational standards. The ACE:SLM is being delivered by universities through a common framework agreed upon with the national DBE and the National Management and Leadership Committee. The two-year, part-time qualification is presented at numerous canters around the country. School leaders, as well as potential leaders are annually invited by the nine provincial Departments of Education to apply to study for the ACE:SLM qualification. Successful applicants receive grants to cover all costs (including travelling costs).

This study was undertaken among 40 educators who were enrolled for the ACE:SLM, presented by the UFS in Ermelo, a small town in the poverty stricken Mpumalanga Province (MP) at the beginning of 2013. This cohort of students was presented with laptops which were bought by the university through the Student Laptop initiative and funding was provided by the MP Department of Education. Table 1 gives a summary of the demographic details of the 34 educators (hereafter referred to as participants) who completed both questionnaires.

Table 1. Demographic details of participants who completed both ICT audit survey (n=34)

Post level	Response percent	Response count
Principal (P)	38.2	13
Deputy principal (DP)	14.7	5
Head of Department (HOD)	38.2	13
Post level 1 teacher (T)	5.9	2
District supervisor (DS)	2.9	1
Type of school	Response percent	Response count
Primary (Grade 1-7)	41.2	14
Secondary (Grade 8-12)	35.3	12
Combined (Grade 1-12)	17.6	6
Intermediate (Grade 1-9)	2.9	1
No response	2.9%	1

The purpose of the ACE:SLM ICT module is to give school principals and senior management information on the use and management of ICT resources so that they can provide ICT leadership at their respective schools, and gain insights into the potential and implication of ICT usage for teaching and learning (Bialobrzeska & Cohen, 2005).

Working within a non-linear, social constructivist framework the facilitator created opportunities for the students to actively and collaboratively construct meaningful knowledge (Wang, 2008). The following is a glimpse at the way the facilitator introduced the students into the world of ICT during the first workshop: to create a feeling of empowerment and ownership students were guided on how to set up their own computers – a task usually performed by technicians. Their first assignment was to use the Paint-program to portray what they thought to be the reasons why they were appointed to their specific promotion posts and to give their vision for their schools. Without their realizing, the students were taught how to use a mouse, type and save information on a computer. These pictures were used to introduce the students to one another. During the presentation of the pictures, students shared with one another how they used the Paint-program. The first ICT audit questionnaire, that was completed online during the first workshop gave the facilitator immediate feedback on the students' access to ICT. The survey showed, among other things, that 50% of them had access to computers at the school where they teach; 52.5% have a computer at home; and only 15% have access to the internet at the school where they teach. All the students

indicated that they have their own mobile phones. Yet their responses on questions regarding their usage of MixIt and WhatsApp show that they do not use the mobile phones' applications optimally. Students were therefore guided on how to create 'buddy groups', a potentially important support basis for DE students, on their mobile phones. Office 365 accounts with email were created for all students. Through hands-on activities students were also guided as to how to send emails and attach files, and how to send instant messages to each other using their outlook accounts. Despite efforts by the facilitator to guide the students in the use of ICT, some of them were extremely anxious at the conclusion of the first workshop – as will emerge in our discussion of their concerns.

Over a period of two years, four full-day workshops were presented in Ermelo. Three full-day workshops were also presented at the Bloemfontein campus of the UFS. The latter was presented during school holidays and aimed to give the students the opportunity to work in an environment where there was adequate, high speed Wi-Fi internet access. The visit to the UFS was also important as it was possible for a technician to be available to support students with issues, such as viruses on their laptops, forgotten passwords, or hardware-related issues they might experience after using the computer for one year.

The facilitator and students corresponded by means of WhatsApp, text messages and mobile phones – a mobile phone was staffed by either the facilitator or her assistant during office hours. The turnaround time for enquiries was usually four hours. The facilitator also used an online OneNote document to attend to the most common concerns of the students.

As there was not reliable internet access in the areas where most of the students lived, the decision was made not to use an online learning management system (LMS), but rather to create the ACE:SLM course with all its modules in OneNote. This allowed for offline usage, as well as for online sharing and communication. OneNote was introduced during the first ICT workshop as a program that could be used to take notes in class. When students were shown how to use it offline, they easily adapted to the online version where they could collaborate on documents. This was enforced during the second workshop. Within two contact sessions, students started using their laptops for note-taking in other ACE:SLM modules as well. Students were also encouraged to utilize free Wi-Fi available in eateries in the larger towns and if available at their schools. Some of the students who reside in areas that have internet connectivity, later on entered into contracts with 3G service providers.

RESEARCH METHOD

This study utilizes data originating from two ICT skills audit questionnaires developed by the first author. After an extensive study of the literature on educators' ICT competency levels (cf. Bialobrzeska & Cohen, 2005; Bush, Duku, Glover, Kiggundu, Kola, Msila & Moorosi, 2009), a pilot study conducted on the previous year's ACE:SLM students, and personal reflection (the first author has acted as facilitator for ICT modules at the UFS for 5 years), the ICT skills audit questionnaires were given to two colleagues, an educationalist and an ICT-expert, for further scrutiny. They were asked to establish the face and content validity of the questionnaires. Feedback from the two was used to ensure that the items measured the content areas of investigation and were culturally and technically appropriate for the context of the study (cf. Afshari, Bakar, Luan, Samah & Fooi, 2009). The instruments included closed questions classified in predefined categories (demographic information; access to ICT; confidence level of ICT usage, including hardware and file organization, application software, audio and visual media, email, internet and social networking; ICT usage at the participant's school), as well as open-ended questions. The first questionnaire, completed during the first workshop, probed participants' ICT confidence levels before the onset of the module, aiming to ascertain their ICT proficiency, expectations and concerns regarding the ICT module. The second

questionnaire, completed during the final workshop, investigated participants' ICT proficiency at the conclusion of the module, and their appraisal of the module.

In line with the aim of this paper, namely to investigate ACE:SLM students' appraisal of the ICT module, we will focus on data emanating from two open-ended items put to them during the first and last workshops respectively: *What is your biggest concern/s for this year, regarding the module about ICT for school leaders*? and *Reflecting back on this module, what have you gained?*

Content analysis was used to identify and summarize the content of the open-ended questions. Nieuwenhuis's (2007) guidelines for qualitative content analysis were used in order to reduce, condense and group the content of the answers to the open-ended questions. The two researchers analyzed the data independently. Thereafter, a consensus discussion was held to confirm the findings and enhance the trustworthiness of the study (Creswell, 2008).

FINDINGS

In the ensuing discussion of the findings emanating from the participants' answers to the open-ended questions, participant identifiers were used. Numbers were allocated to all participants at the completion of the first survey, whether or not they answered the open-ended questions (1-40). The following codes were used to identify the post levels of the participants: principal (P), deputy principal (DP), district supervisor (DS), head of department (HOD) and post level 1 teacher (T). 'Educator' is used as an umbrella term.

Concerns Regarding the ICT Module

Twenty of the 34 participants (58.8%) who completed both surveys, provided answers to the following open-ended question put to them in the first ICT audit survey: *What is your biggest concern/s for this year, regarding the module about ICT for school leaders?*

Eight of the 20 participants who wrote about their concerns mentioned that they are apprehensive about using a computer. Four of them mentioned that they have never used a computer previously. The fact that they were informed during the first workshop that they would have to use a computer to complete their assignments and submit them electronically, was found to be daunting to several of them, e.g., "My concern is that I never used the computer before and it seems that I am expected to excel in using computer and I don't know whether I will master the basic skills so that I can communicate with the University and write my assignment using it" (11DP) and "My greatest concern is if I will be able to finish my assignments on time because I am struggling to type since it is my first time to operate a computer" (17HOD). Lack of typing skills, as alluded to by the above quoted participant, seems to be a common stumbling block for the participants. Several of the particpants also noted that they do not know how to send emails, do electronic searches on the internet and use the different Microsoft programmes.

Interlinked with partcipants' lack of ICT skills was their fear of failure, e.g., "Will I be able to properly use the computer when I am alone at home/school to complete my assignments? Will I remember all the steps that I have to follow when doing a particular exercise with the computer? Can I successfully complete all assignments of the course as expected? I want to pass this course" (22P). Four particpants expressed fear that they would not be able to cope with the demands of the ACE:SLM in general and the ICT module in particular, amidst their already heavy workload as education leaders.

During the first workshop the particpants were told that it would be expected of them to teach their colleages basic computer skills (an expected outcome of the module, cf. Bialobrzeska and Cohen, 2005). Given the fact that at that stage of their studies most of them had very basic or no ICT skills, it is understandable that they were concerned, e.g.,

"Will I be able to give or teach others the knowledge I will receive from training?" (15HOD) and "Will I be able to assist my colleagues with knowledge that I acquire?" (31P).

Only two of the particpants were not concerned about the ICT module, but saw it as an ideal opportunity to expand their existing ICT skills. One of them wrote: "I am eargerly looking forward to acquire more skills/knowledge in the usage of computers for school administration and curriculum implementation and its management" (16P).

Participants' concerns thus focused on the demands regarding the module, such as the requirements that assignments must be computer generated and electronically submitted, the ability to use specific Microsoft programs, the need to use electronic media to communicate with the facilitator, to search for information on the internet and to teach colleagues ICT skills. Participants moreover feared being left struggling without support and with the possibility of failure. The participants suggested that the possibility of failure was ever present due to their heavy workload, possible lack of support and their dearth of computer and software knowledge and skills. Participants' concerns and fears formed an important point of departure for the evolvement of the module. By means of electronic and telephonic communication with the students and during further workshops the facilitator tried to address students' concerns.

Reflective Assessment of ICT Module

Whereas the participants' answers to the question about their concerns attested to their fears and uncertainties, the following exposition of their reflections at the conclusion of the ICT module bear witness to their self-confidence, pride in acquiring ICT skills and praise for their facilitator.

A large percentage (82.4%) of the participants who completed both questionnaires responded to the following request put to them in the second survey: *Reflecting back on this module, what have you gained?* Reflection, as defined by Dewey (1933) is a systematic, rigorous, disciplined way of thinking with its roots in scientific inquiry. Reflection is a part of the critical thinking process referring specifically to the processes of analyzing and making judgments about what has happened. Reflection, as Dewey defines it, cannot be equated with mere haphazard "mulling over" something (Rodgers, 2002: 849). By actively participating in reflective thinking – assessing what they knew, what they needed to know to become ICT proficient, and how they bridged that gap during learning situations – the participants gave us insight into what they had gained in the ICT module. In the ensuing discussion their reflections will, where possible, be presented against the background of the concerns expressed by them at the commencement of the ICT module.

A fear of failure was an important concern among participants at the commencement of their studies. An analysis of their reflections reveals that their fear was replaced by confidence. Several of the participants mentioned that the ICT module enhanced their confidence as leaders, e.g., "I am a confident manager because of the ICT skills" (1P) and "I gained confidence and self-esteem as a pioneer at my school" (11DP). Three of the participants moreover suggested that the acquisition of ICT skills made them better leaders, e.g., "All that I have learnt has made me a better leader and manager" (7P) and "I am a better manager as my administration skills have vastly improved" (28HOD). Not only did their professional confidence grow, but also their status among colleages, e.g., "I now command respect from my colleagues because I am always of assistance to them and I fit in the leadership descriptors" (7P) and "I gained a lot of respect from my colleagues" (5P). The confidence gained developed into a growth in selfworth, e.g., "I am proud that I can get on the internet to search for information with confidence" (2P) and "I can't believe that I am a member of a digital village" (17HOD).

The data furthermore revealed that some of the participants' growth in confidence and respect among colleagues within the school environment, transferred to a more vibrant

leadership role in their communities, e.g., "I can prepare slides for presentations in meetings locally and outside the school" (1P).

Several of the participants acknowledged that they were dependent on their administrative staff for most, if not all computer-related work before they registered for the module. Four of them mentioned that they are no longer dependent on their administrative staff, e.g., "I am no longer a burden to my administrators; I even help them when they experience problems" (1P).

Whereas the partipcants previously voiced concerns that they would not be able to cope with their workload as school leaders and as students, some of them conceded, after completion of the module, that their newfound knowledge reduced their workload, e.g., "My workload has been extremely reduced …" (17HOD) and ensured a more organised working environment, e.g., "I am more professional in keeping records" (37HOD).

While the particpants were anxious at the beginning of the module of the prospect of training their colleages in ICT skills, it seems from their reflections that there is an eagerness among some of them to share their newfound knowledge with members of staff, e.g., "I am … determined to assist my staff members to bridge the digital divide" (17HOD) and I "teach my fellow educators computer skills" (16P).

The positive impact of the particpants' newly aquired ICT skills on their teaching and learning is highlighted by several of them, e.g., "My class is no longer the same because they write typed tests, get hand-outs extracted from the internet" (1P); "I use my skill to engage learners on the programmes of the Department of Education like downloading and answering old ANA (Annual National Assessment) papers" (12HOD) and "My learners seem to be enjoying my lesson presentations and their performance indicate a steady improvement" (28HOD). Participants thus use the internet to expand their own knowledge base of the subjects they teach, use technology to make their classes more interesting and learner centered, and guide their learners to gain ICT skills that may increase independent learning.

The study also found that the ICT module had a positive impact on particpants' personal lives. One of the principals wrote that "I now get my statements through email. When I want to buy something I just google and find out where to find it at what price. I have a grade 12 child. She has applied online for different institutions. I don't know how we would have done the applications if I didn't have ICT skills" (32P). Another principial noted that "Apart from emails, I can also communicate with friends and relatives through Facebook, WhatsApp and all these are benefits of the SLC 121 computer course" (34P). It was suggested by a principal that the ICT module had had a profound influence on his personal growth. Paying tribute to the facilitator, he wrote that she had taught him "perseverance, time management, how to be prepared before you get in front of learners, honesty, tolerance [and to be] knowledgeable" (16P).

A major concern that emerged while analyzing data from the first ICT audit was the participants' limited or nonexistent knowledge of computers *per se,* as well as computer software programs. In their reflections of what they have gained as students of the ICT module, participants also made reference to their initial lack of knowledge. Their reflections are an acknowledgement of how their skills have grown over time from being virtually nonexistent to being able to use ICT with confidence. The following two quotations aptly illustrate the participants' initial lack of knowledge: "I was a ZERO coming here" (28HOD) and "When Madam (referring to the facilitator) asked us to show her our ICT competency, I was at zero because I had never used a computer in my life. When I heard that we will have to write and submit assignments through computers via email, I wanted to give-up, but I told myself that failing to try won't help me" (32P). Thereafter he lists the skills he had acquired. Another school principal wrote: "When I started this course, I was really blank" (9P). He goes on to confess that "I am ashamed to mention the fact that for the first three months, I was travelling a distance to my friend

who can email, as I was afraid to give my assignments to any Tom, Dick or Harry to email for me, but now I can do that even with my eyes closed" (9P).

In their reflective notes several of the particpants listed the computer programmes that they have mastered and the skills aquired. In numerous of the respondents' reflections it was also apparent that they were especially proud of the internet skills they had acquired. In the foregoing discussion we have already referred to the fact that participants now use the internet extensively to enhance their teaching.

Six of the participants paid tribute to the facilitator. All of them mentioned her by name. Reference was made to her "guidance, patience and hard work" (32P), her ability to motivate them, e.g., "All credit goes to … who patiently opened my mind and eyes to see the importance of ICT" (17HOD), set new challenges to keep them interested, e.g., "Each time we were with you, there were always new things to learn" (7P), and motivated them to exceed their own expectations, e.g., "I have learnt more than what I thought I will" (32P). One of the participants wrote that "she will remain my mentor, my lifelong role model" (16P). (This paragraph should not be seen as self-glorification. It was included in this paper on the insistence of the second author. The aim of the inclusion is to illustrate the important role that facilitators play in the success or failure of teaching ICT competencies to adults, especially education leaders, in a DE program.)

While participants were in fear of failure at the start of the ICT module, their reflections attested to their satisfaction with acquiring ICT skills. Their reflections alluded to the positive impact of their newly acquired ICT skills on their multiple roles of teaching and learning, administrative and being community leaders. Being ICT literate contributed to their professional and personal growth. None of the participants offered any dissatisfaction with the content of the module, the mode of delivery or the facilitator.

DISCUSSION

Reliable, easy access to ICT by both learners and facilitators is a prerequisite for the successful delivery of any study that has an e-learning component (Harris, & 2009). A common problem in teaching and learning ICT skills in South Africa is students' lack of ready access to ICT (Bialobrzeska & Cohen, 2005). Only half of the educators who took part in this study had access to computers at the school where they teach and 52.5% had a computer at home when they enrolled for the ACE:SLM program. This cohort of students was, however, all presented with laptops during the first workshop. This addressed problems regarding ready access to computers. We acknowledge that this is an expensive solution to the problem of accessibility. Projects such as these have often been created with donor funding. Unfortunately, most are funded for specific periods of time. The DBE and the UFS with the support of donor organizations should thus prioritize the development of sustainable and affordable ICT projects to empower school leaders to become ICT leaders.

Reliable internet connectivity and electricity remain a challenge in rural areas of southern Africa (DHET, 2012; Wright et al., 2009). Ngugi (2011: 280) writes that "insufficient, unreliable and costly bandwidth makes a mockery of the notion of browsing the Internet for content and research". Wright et al. (2009) found that internet access in southern Africa can cost 20 to 40 times more than in northern America, as 80% of the internet traffic is routed through satellites. According to the DHET (2012: 28) the minister of the DHET will put plans in action "within the foreseeable future … to ensure … meaning full access for all higher education students to appropriate learning technologies and broadband Internet access". Pending the realization of this promise, most of South African universities make use of mobile phone technology to communicate with their DE students (Aluko, 2009). To sidestep the lack of internet access in the remote rural areas where most of the MP students reside, the ACE:SLM course utilized OneNote rather than an online LMS. This enabled the students to seamlessly move from offline to online ICT.

Students were also encouraged to use any available connectivity – be it their school's internet, entering into a 3G-contract or using free Wi-Fi at eateries.

Flanagan and Jacobson's (2003) finding that education leaders' lack of knowledge may impair their pedagogical vision and experience to guide members of their staff, was also evident in the concerns voiced by participants at the beginning of their studies. Appropriate ICT training, nonetheless allowed the participants to become ICT leaders in their schools. On the completion of the module, they were able to lead by example in their classes, through their use of ICT in fulfilling administrative functions and by teaching members of staff ICT skills. The importance of education leaders to take up the challenges presented by ICT and lead by example is highlighted in the literature (Hadijthoma-Garstka, 2011; Naicker, 2013). It is promising that some of the participants presented training to members of their staff. Naicker (2013) found that due to heavy workloads, South African educators rarely attend computer training courses – even if they are offered by the DBE. It should be noted that the ICT skills training of colleagues was an obligatory assessment task for the participants. The fact that they embraced the task and felt proud to share their newfound knowledge is heartening. It is however necessary to do follow-up studies to ascertain whether they will train new/other members of staff after the completion of their studies. Owing to the ever-changing ICT landscape, the training of educators should be an ongoing process.

Educators who completed the ICT module boasted of their innovative ICT-supported teaching and the benefits thereof for their leaners. The positive spinoffs of the integration of ICT into the learners' curriculum are supported by the literature (Mdlongwa, 2012; Naicker, 2013). Mdlongwa (2012: 3) notes, for example, that exposure to ICT allows learners to develop skills that will "give them an edge in an ever-increasingly technology-saturated work environment". The introduction of ICT moreover allows learners "to become creators of knowledge in their own right". Mdlongwa (2012) also writes that learners who use ICT for their assignments and projects begin to cultivate a culture of personal information management; independent learning and working without supervision; communication skills; teamwork; and research skills.

A finding of this study, namely that newfound ICT skills allow education leaders to use their time more effectively and to independently act as administrative leaders of their schools, is supported by research (Mdlongwa, 2012). This study highlights the positive impact of the ability to use technology to communicate. Using technology to communicate with colleagues, DBE, learners and parents creates effective, fast communication.

Researchers (Sikwibele & Mungoo, 2009; Simonson et al., 2012) exposed the lack of adequate learner support as a fundamental problem faced by DE students. Botswana students told Sikwibele and Mungoo (2009: 4) that their tutors "failed" them and were "not helpful". Some of them went so far as to label their tutors as "lazy". These accusations and research findings stand in stark contrast to the homage paid to the facilitator of the ICT module under investigation. The important role a knowledgeable, committed facilitator in teaching adults' ICT skills – as highlighted by this study – is in line with prior research (Sampson, 2003; Simonson et al., 2012). Structures, such as an online OneNote document, as well as a helpline with a four-hour turnaround time, may have played an important role in the success of the ICT module.

To counter feelings of isolation, a common problem among DE students (Sampson, 2003), the facilitator guided the students during the first workshop to set up a 'buddy' list on their mobile phones. This created a sense of community among the students and promoted cooperative learning – a characteristic of social constructivism (Wang, 2008) and a prerequisite for successful DE (Simonson et al., 2012).

Wright et al. (2009) found that students in developing countries often lack technical support due to a dearth of technical expertise in remote areas. Wright et al.'s (2009) suggestion that faculty members must know how to install and maintain computers and

software, and troubleshoot problems that they and their students may encounter, was adhered to in the ICT module under investigation. To counteract participants', lack of computer knowledge they were guided in setting up their own laptops during their first workshop. Technical assistance was also given to them by an ICT technician during a workshop presented at the UFS. An administrative assistant was also available during office hours to assist students with technical and academic queries.

In addition to comparing the participants' responses to the open-ended items in the two questionnaires, the ICT module can also be evaluated using Jung and Latchem's (2007) DE quality indictors:

> *Conform to the standards applying to conventional education*: The ACE:SLM programme was approved by the HEQC of the South African Council of Higher Education (CHE, 2005) and is subjected to regular national and institutional quality assurance reviews.

> *Fitness for purpose*: The purpose of the module is to give school principals and senior management information on the use and management of ICT resources in order to provide ICT leadership at their respective schools, as well as to provide them with insights into the potential and implication of ICT usage for teaching and learning (Bialobrzeska & Cohen, 2005). Findings from the second questionnaire bear witness to the participants' ability to use ICT proficiently to fulfil their multiple roles as teaching and learning, administrative, academic staff and community leaders at the conclusion of their studies.

> *Meeting customers' needs*: Research by Harris et al. (2009) found that attitude and motivation are particularly important in ICT studies. It was therefore important to consider the customers' circumstances, needs, learning styles, expectations and motivations when planning and presenting an ICT DE module. Students' expectations and concerns, as conveyed in the first audit survey, as well as practicalities, such as a lack of reliable internet connectivity were used as point of reference for facilitating the module. Rigorous analyses of students' concern, but also their critical reflections convey the message that the ICT module meets their needs.

> *Continuous improvement*: The facilitator followed an action research approach to her teaching. She spends many hours reflecting, consulting her diary, and watching video clips and photo portfolios to gain insight into her students' needs, successes and failures. The main reason for this research report is to scientifically engage with the students' evaluation. Findings from this study will be used to improve the organisation, support and facilitation of future ICT DE modules.

> *Conformity with international standards and requirements*: The study guide for the ICT module was developed by acclaimed DE and ICT leaders from the South African Institution of Distance Education, namely Bialobrzeska and Cohen (2005). The study guide bears out their knowledge of up-to-date developments in the fields of ICT and DE.

CONCLUSION

An ICT module that set out to empower education leaders to become informed and skilled ICT leaders, was envisaged by the facilitator in accord with the social constructivist theory. Insight into the concerns of her students was therefore an important scaffold for unpacking the content of the module in a practical, nonthreatening, yet challenging manner. The first audit survey exposed the education leaders' lack of ICT knowledge and skills, as well as their fear of failure. By creating a sense of community, setting up support structures and innovative learner-centred facilitation, the facilitator attempted to address their concerns.

This study used two modes of evaluation: Jung and Latchem's (2007) quality indicators for DE and comparison (participants' concerns were compared with matters arising from their reflections at the conclusion of the module). Although no method of evaluation is perfect, it may be concluded that the ICT module succeeded in its aim to empower school leaders to become ICT proficient and that the module adheres to DE quality indicators.

The study highlights the importance of ready access to ICT, technical support, appropriate guidance and support by knowledgeable, innovative and committed facilitators. Furthermore, the creation of a sense of community is imperative for teaching education leaders ICT skills and knowledge. Providers of ICT DE programs should thus attend to issues, such as the availability and reliability of ICT, adequate technical support structures and infrastructure. The role of the facilitator in the success or failure of an ICT DE module cannot be overemphasized. It is therefore recommended that capacity building of ICT facilitators be prioritized. The creation of a sense of community and support by the organization is important in DE. Infrastructure, technical and academic support should be only a phone call, email or text message away. All of these recommendations may have huge cost-implications for universities, students, government, funding organizations and the providers of telecommunication. Yet, these costs should be juxtaposed against the positive outcomes of a well-planned, innovative and inspiring ICT module. Education leaders and potential leaders who were part of this study embraced their multiple roles as ICT leaders and managers in their classes, among their academic and administrative colleagues and in their communities.

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MOOCs 2.0: THE SOCIAL ERA OF EDUCATION

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ABSTRACT

The improvements in the Internet technology led an evolution in education. Some students' lives have changed since 2012 when the MOOCs gained popularity among the academia. The students now take courses from the top universities all around the world without time limitations and they even earn credits for their courses. They are able to discuss lecture topics not only with their instructors in the class but also with thousands of other online students and can get just-in-time help regarding to their questions from teaching assistants. These are some of the practices from the new era of MOOCs called "social MOOCs" or MOOC 2.0. The concepts of collaboration, blended learning and TAs are the new consequences. In this paper, we review the problems and the current solutions associated with MOOC 1.0 era. In the light of these, we analyze the MOOC 2.0 era and discuss its present and possible future affects to our lives.

Keywords: MOOCs 2.0, online learning, blended learning, distance learning, MOOCs, distance education.

INTRODUCTION

The world is becoming a place where the Internet is at the core of every activity. Education is one of the primary activities of the world. From a small kid to an old man, anyone wants to learn and this ambition lasts forever. Schools are the traditional medium for this, but can everyone go to a school in every part of their lives? An old man, a businessman, or even a student who wants to learn an additional topic may not be able to go to a traditional school. Massive Open Online Course, MOOC is a new concept, which has been popular since 2012, fills this gap. One of the most popular MOOC platforms, Coursera, around 15 million students, 1872 courses and 142 partner institutions across 28 countries. This number is nearly 200 times more than the largest University in US, based on the number of enrollments. Coursera is an academic platform where students can take courses and certificates from the top Universities around the world for free or with a small amount of fee. The education system is moving towards online and people are questioning whether there will be a need for big campuses in the future?

MOOCs are not the first to present online lectures. Previously, online lectures were only available in the form of camera recordings inside the real classrooms. The watchers were like one of the students inside the class who were not able to ask any questions but watch an old recording of the lecture and there was no interaction. In this context, MIT's OpenCourseWare was one of the best approaches. Being launched in 2002, MIT put all of its course materials online. Without a sign-up process, anyone was able to access a lecture's quizzes, exams, reading materials and some of the courses' lecture videos. As of March 2016, MIT has 2340 online courses and 88 of them has complete video recordings.

The term MOOC originated in 2008 by Dave Cormier in response to a course called *Connectivism and Connective Knowledge* in University of Manitoba, Canada. It is the first online course, which had 25 fee-paying, and 2200 free online students (Parr, 2013). Shortly after, open online education platforms like Khan Academy, iTunesU and TED were also beginning to evolve. They offered tutorial like contents with short video formats that were supportive to classwork materials (Sandeen, 2013).

The MOOC act's popularity begins in 2012, which is regarded as "the year of MOOCs" (Pappano, 2012). Three MOOC providers, Coursera, edX and Udacity emerged that year, which are still the most popular ones. Two Stanford Computer Science Professors Andrew Ng and Daphne Koller lead Coursera and Sebastian Thrun, who was also from the Stanford Computer Science Department lead Udacity. On the other hand, edX was founded by MIT and Harvard Universities. To emphasize the impact of MOOCs, the Artificial Intelligence course given by the Stanford University online in 2012 had 58,000 people signed up from all around the world. This number is four times the aggregate student count of Stanford University (Markoff, 2011).

What differs the MOOC approach from the rest is that the online courses of MOOCs are made only for the online students. There are video recordings, assignments, exams, and even projects on a weekly schedule according to the topics of the course. The videos have shorter lengths than a typical 40 - 45 minute lecture. Based on studies like (Guo *et al.*, 2014), to keep the student engagement at maximum, each week's video is chunked into roughly 10-minute segments based on the subject's subtopics, similar to Khan Academy, which is the first to endeavor this. Most importantly, students of a MOOC class are able to collaborate with each other through forums.

Today, MOOCs can be used all over the world by anyone in any age. A 15-year old Mongolian passing the Circuits and Electronics course in MIT is one of the many examples (Daniel, 2012). People now are wondering how it will change the classical education system. According to a recent study, in class and online students learn equally (Colvin *et al.*, 2014). In 2 years, we saw a great change in MOOCs itself. Now the MOOCs are more interactive and they need to be so because without one-on-one interaction, the learning pedagogy cannot be fulfilled. This leads to integrating (TAs) Teaching Assistants into the MOOCs, which we discuss briefly inside the text.

The rest of the paper is organized as follows; In Section 2, we discuss the previous problems of MOOCs, which are completion rates, pedagogy and certification. We summarize the current solutions to these. In Section 3, we express the evolution of MOOCs where some of the authors suggest the name MOOC 1.0 and MOOC 2.0. We analyze the MOOC 2.0 era in the spirit of blended learning and teaching assistants. Finally, we state our opinions about the future of MOOCs and conclude our paper.

PREVIOUS PROBLEMS AND CURRENT SOLUTIONS

MOOCs are a revolution in the current education system, however it still has serious problems according to some researchers. We divide these problems into three categories as Completion Rates, Pedagogy and Certification vs. University Credit. Using the current approaches as our arguments, we endeavor to convince the readers that these problems are mostly solved.

Completion Rates

The quality of a higher education institution is measured by several factors where the completion rate is one of the most significant one. People tend to evaluate MOOC platforms according to the same criteria as a regular institution and come up with a completion rate of a

single digit. Some critics say that this is one of the most significant failures of MOOCs, however, today, some people changed the way they look at these numbers.

According to a paper (Koller *et al.*, 2013), 40,000 to 60,000 people enrolled in a typical MOOC given by Coursera in 2012. However, only 50 to 60 percent of these people returned for the first lecture, 15 to 20 percent of the people watching the lectures submitted an assignment for grading and among these, about 45 percent completed the course successfully and earned a statement of accomplishment. Therefore, the success of a student in a MOOC class cannot be evaluated with these numbers.

Participants of MOOCs are very diverse and have different intentions. Some of them want to learn the course deeply, some are only interested in a particular topic of the course and do not follow all the lectures, some are only curious, just looking once to the course's website and maybe some are high school students analyzing the lectures to decide his/her major at the University level. There may be many more reasons why people enroll to a course and not get a statement of completion. The participants of the MOOCs can be divided into five categories as given below and Fig.1. (Hill, 2013);

> *No Shows:* Participants who register but not login when the course is active. Daphne Koller, one of the Coursera's founders says that this number decreases when the course announcement is closer to the start date.

> *Observers:* They just login, browse content and read discussions.

> *Drop-Ins:* These participants do some activity like watching lectures, but not complete the entire course

> *Passive Participants:* They watch lectures, take quizzes and read discussions but they do not complete the assignments.

> *Active Participants:* These are the students who fully participate to the lecture.
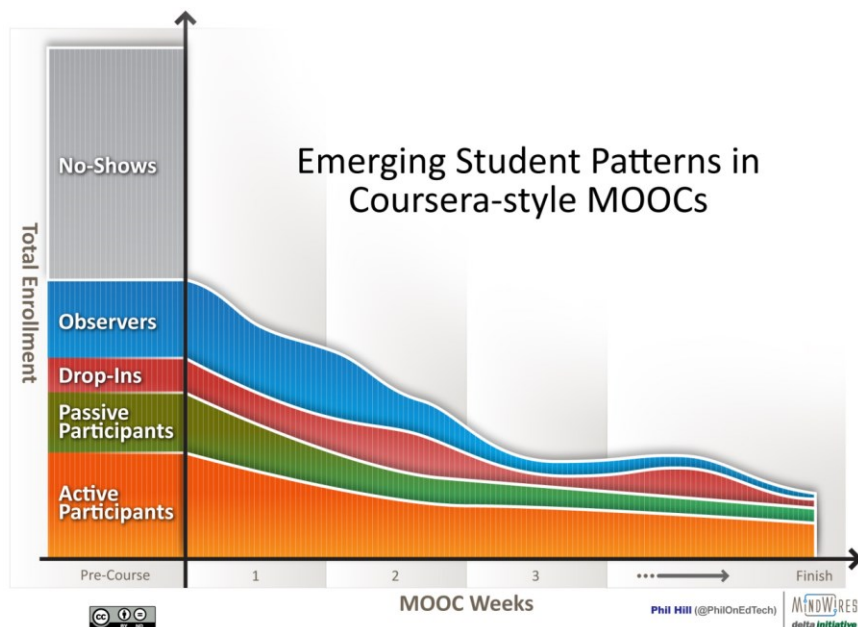
Figure 1. MOOC participant types (Hill, 2013)

Therefore, the intent of the participating students is the most important input to decide if the course is successful or not. Fig.2., highlights a key point for this discussion.
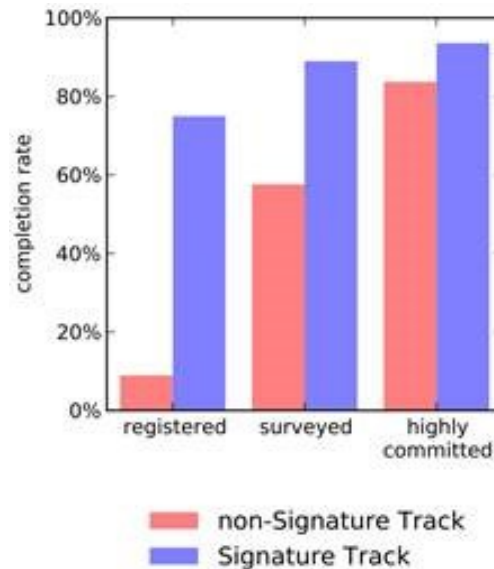
Figure 2. Completion rates of "Nutrition for Health Promotion and Disease Prevention" (Koller *et al.*, 2013, fig. 4)

In the figure, a comparison between non-signature track and signature track students is made for the first signature-track class of Coursera, "Nutrition for Health Promotion and Disease Prevention". Signature track students pay a fee to get an official certificate in the completion of the same course by participating in keystroke biometric and photo based identity verification (Maas *et al.*, 2014). Therefore, the aim of these students is truly to complete the course. The numbers show a 74 percent completion rate for these students whereas the rate for a regular registered student is only 9 percent. The surveyed students are the ones who indicate a strong intent to finish the course after the first month of the course's start date and highly committed students are the ones who indicated a high commitment to finishing the course by watching all the lectures and finishing all the assignments.

Pedagogy

MOOCs are regarded as the new era of learning and therefore, many claims whether it is pedagogically sound or not are being made (Daniel, 2012; Bates, 2012; Glance *et al.*, 2013). Although some people call this as the "new, emerging pedagogy" (Ontario, 2014), many people say that using outdated methods based primarily on information transmission using computer marked exams, assignments, etc. are not pedagogically sound. Most importantly, the main problem is the lack of one-to-one learning and collaboration.

MOOC providers are now working on the problems associated with collaboration and we briefly discuss it in "Learning by Teaching" section, but shortly, the second era of MOOCs, which is called MOOC 2.0, might be a solution to this concern.

What makes people believe that a new pedagogical perspective is needed for MOOCs? Clearly, the world has changed a lot with the Internet and technological innovations. We are now living in a faster world and the demands of people have increased greatly. Information is all around us, but knowledge and wisdom is needed to use it. Therefore, people will never stop learning to accomplish their intentions, but they do not have enough time to do so since they are busy of working. MOOCs can be a cure for this because the courses do not have limited time spans

and people can watch the content any time they want. Indeed most of the MOOC participants are highly educated people, which support our argument. According to a research conducted by the University of Pennsylvania, 79.4 percent of the students have a Bachelor's degree or higher and 44 percent have education beyond a Bachelor's degree. Over 40 percent are under the age of 30, 56.9 percent are males and only 13.4 percent are unemployed or retired (Christensen *et al.*, 2014).

Taking these into consideration, seven key elements contributing to the development of the new pedagogy are listed below (Ontario, 2014):

> *Blended learning:* Closer integration of online and classroom based teaching. Learning, reading, exams and quizzes are done online and class hour is reserved for discussion and interaction with the instructor.

> *Collaborative approaches:* The professor cannot deliver all the sources, but they are in the role of guiding. With the development of communities through the social media, students can share, discuss and learn from each other. Old style teaching is unnecessary.

> *Use of multimedia:* Following the Ted talks, iTunesU, MIT's OpenCourseWare, Khan Academy, etc. are now part of a course. There are also interactive materials, animations and graphics for the students to learn more effectively.

> *Increased learner control, choice and independence:* There are many choices for the students on the Internet even for free. They can choose any subject they want to study, so a strict curriculum chosen by an instructor is meaningless.

> *Anywhere, anytime, any size learning:* Everyone is using mobile devices and they are the basis of this concept. They can be integrated to course content, quizzes, communication among the learners, etc. Also the "just in time, just for me learning" approach is fulfilling the immediate needs of a learner.

> *New forms of assessment:* Learning analytics, peer assessments are used throughout the course and they give important feedback before the final assessment.

> *Self-directed, non-formal online learning:* MOOCs provide a motivation for self-directed and non-formal learning.

With these in mind, roles of the instructors are changing and assessments need to be considered differently. These concerns come to a single point, collaboration, which we discuss later in the text.

Certification vs. University Credit

The third common concern about MOOCs is the certification. Previously, in 2012, people were questioning why the students who passes a course in Coursera or edX and receive a certificate couldn't exchange it with a university credit. There was big controversy about it (Daniel, 2012). However, today, some universities' perspective has changed. It is up to the institutions to accept converting a verified certificate to credit. In 2013 American Council of Education (ACE) announced that they would recommend colleges to grant credit for some MOOCs (Korn, 2013) and approved five courses of Coursera for credit (Masterson, 2013). San José State University (SJSU) on the other hand run a pilot with Udacity to offer three math MOOCS for credit with a fee of $150 in 2013 (Harris, 2013a). The idea of replacing the classwork experience

unfortunately failed as the pass rate of online students was lower than the ones who took the course on campus. As a result, SJSU decided to pause these courses. There were many factors resulting this failure; firstly, the courses were put together in a rush, they were announced fortnight before classes started, as a result of the student monitoring was unsuccessful because the faculty was engaged in preparing the courses in parallel to running the course (Rivard, 2013). SJSU then reviewed the process and started the courses in Spring 2014 semester (Harris, 2013b). In Table 1, official result of the pilot project is given from (Firmin *et al.*, 2013, S.1.)

Table 1. First results of the pilot project in SJSU (Firmin *et al.*, 2013, table S.1)

Course		% Pass
Math 6L	*Matriculated*	29.8
	Non - Matriculated	17.6
Math 8	*Matriculated*	50.0
	Non - Matriculated	11.9
Stat 95	*Matriculated*	54.3
	Non - Matriculated	48.7

In Figure 3, we see the effect of solving the problem sets to passing the class.
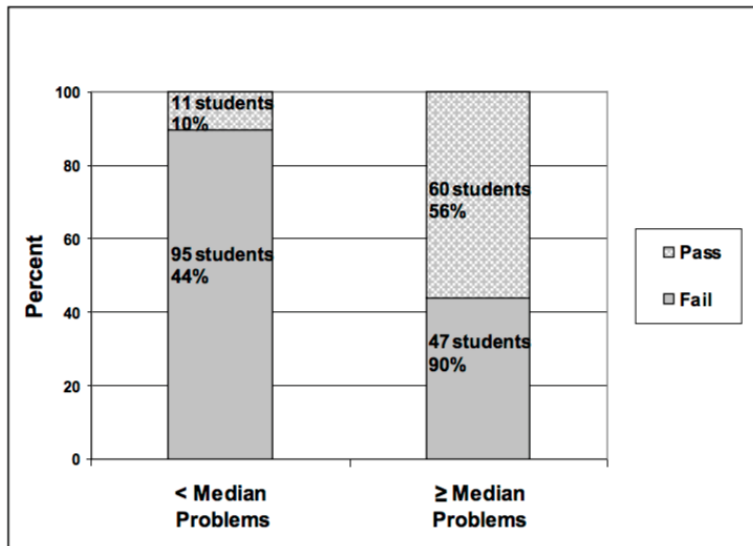
Figure 3. Effect of submitted problem sets to passing (Firmin *et al.*, 2013, figure S.1.)

In the meantime, SJSU announced to continue using edX platform as supplement to their classwork (Rivard, 2013). This is an example of a blended learning where the students watch edX video lectures before coming to class (Carr, 2013), therefore the time spent to lectures decreased and interaction, discussion time with the students increased together with the course pass rates. This also helps ease the capacity problems (Fitzgerald, 2013). Additionally, Coursera made a partnership with 10 US State Universities (Kolowich, 2013) to use blended teaching model and give credit to students.

Georgia Tech University on the other hand is giving "massive online master's degree in computer science" in collaboration with Udacity and AT&T for 134$ per credit hour and 301$ per credit term (OMSCS, 2014).

Apart from these, some universities require the completion of an assessment given by the University (Sandeen, 2013) to get a credit out of MOOCs. And finally, CLEP (Colloge Level Examination Program in US) and DSST (a program to receive college credits outside the traditional classroom in US) programs allow the students to take credit-by exam tests. Students can convert their knowledge gained in MOOCs to credit in US through these exams (ADO, 2013). As the examples show, there are lots of opportunities to get credit out of a MOOC completion certificate but it is mostly up to the institutions. In the near future, the opportunities will increase undoubtedly.

THE SOCIAL ERA OF MOOCs – BLENDED LEARNING AND TAs

Following the MOOCs' initial popularity, the act has progressed considerably. Now the most popular concepts in the online education world are collaboration and blended learning. We call this new era as "social MOOCs" which is also called MOOCs 2.0 for some people.

Initially MOOCs were endeavoring to pass knowledge to students in the form of short videos, reading materials, assignments and exams. The only interactions between the users were in the form of forums, which is a primitive style of collaboration for today.

MOOC 1.0
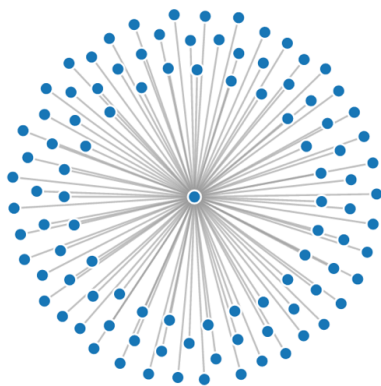
MOOCs scale on first dimension:
content delivery

MOOC 2.0

MOOCs scale on second dimension:
1-on-1, face-to-face learning

Figure 4. MOOC 1.0 vs. MOOC 2.0 (Salathe, 2014)

Figure 4 visualizes the main difference between the old style MOOC 1.0 and the new era, MOOC 2.0. As the figure displays, in MOOC 2.0, there are more interactions among the participants. These can be in the form of peer-assessments (Suen, 2014), face-to-face learning, etc. Today new possible interactions are being researched.

In Coursera, some of the courses use a tutoring service given by the students who complete the previous offerings of the course successfully. These students are selected from the ones who mostly achieved 100 percent success in the assignments and were helpful to others in

discussion forums. Some of these tutors are helping for free but some requests a fee. They give face-to-face help to the students of the course online. In this context, a distinct idea called Teeays has been developed (Salathe, 2014). Anyone can join the website and become a TA for MOOCs in various platforms. A TA gives just-in-time help to the students in the form of video chat over Skype. Each TA has a rating determined by the students. As the rating increases, TAs begin to earn money. In turn, the students can choose a TA for a specific course using their ratings. Higher ranked TAs' tutoring is more expensive which is also an indication of a TAs success.

The second component of MOOC 2.0 is the use of blended learning. It integrates MOOCs and the traditional classrooms, in other words, the online materials and face-to-face learning. There were flipped classroom traditionally, a form of blended learning, where the students study the contents of the lecture through online videos created by their instructor. In the class they used to have more time to explore the contents of the video lectures more deeply and discuss with their instructors (Bruff *et al.*, 2013). Today, this is integrated to MOOOC platforms where the students are asked to participate a MOOC hosted by any institution. The real class supports the online course, which is similar to the traditional flipped class approach. So some instructors today use the existing MOOCs as the online component of their courses without having to prepare the content themselves. With this approach, more time is given to discussions and communication inside the class like the flipped classrooms. This not only improves the self-study ability, which is gained through MOOCs, of the students, but also improves teamwork through the classroom discussions. At MIT, Anant Agarwal says, two out of every three undergrads use edX as part of their on campus courses (Lapowsky, 2014). Through blended learning, students also have the chance to discuss the lecture and content with thousands of other students who take the course online. They are not limited to the students and instructors in their traditional classrooms.

A case study (Bruff *et al.*, 2013) states that the students like this approach's flexibility, customization, and accessibility, which encourage structured self-paced learning. Although the success of the approach is emphasized in the paper, more experiments should be held before coming up with a strong conclusion. In a survey with 350 four-year college presidents, 81 percent expect the blended courses to have a positive effect on higher education (HM, 2014).

DISCUSSION AND FUTURE PREDICTIONS

We have witnessed the evolution of MOOCs in two years but MOOCs are not new, it is an enhanced learning, which actually has decades of history. The education and the Internet evolved independent from each other and MOOCs have merged them. These two concepts are vital in our lives and the humanity will hopefully benefit from this. In this section we give some future projections about education in the spirit of MOOCs.

Firstly, we see that MOOCs do not have an impact in everyone's life today, only the interested people from the academia are aware of this. I believe this act will spread everywhere include high schools, middle school and even the elementary schools. Additionally, it will be a part of all the students' education program beginning from the universities. The first steps of this effect can be realized in Erasmus Program, which is a very popular European Union student exchange program. Adam Tyson, head of Erasmus unit for higher education at the European Commission, announced that they want to offer any course supported by Erasmus are made open source (Glader, 2012). This means hundreds of MOOCs offered by the European Universities.

The second challenge may be related to personalization. The courses may be individualized when the importance of a traditional degree becomes irrelevant and learning becomes a continuous, on-the-job process (Horn and Christensen, 2013). This will lead us to a point where people will be free to study on the topics of interest or need and will not have a degree concern.

Thirdly, open source MOOC platforms will be available and people will be able to upload mini lectures to share knowledge. Open edX is such an example where people are able to contribute to edX platform. Academic Room [6] is another such platform, basically different from Open edX, allows the individual academics, researchers, and students to create highly specialized portals for their subfields. This is a kind of open community that supports the new era of MOOCs.

And lastly, we can add three more potential changes in education described partly in (Daniel, 2012); reduction in the University costs, education in undeveloped countries and improvement in the quality of teaching. The University education is US is unaffordable for most people where the **annual college fees are around $40.000 (UT, 2014).** The free nature of MOOCs will help reduce these costs to only a manageable limit because research needs money but the governments and companies cannot compensate all the expenses including the labor. Secondly, the education level in undeveloped countries can be increased with the help of MOOCs. This will take a longer time since the language difference and access to the contents may be a problem to be solved. Blended education type programs where an instructor assists people during the education process can be a cure. Lastly the quality of teaching will be increased because all the contents will be open to everyone and the students will not just because of its name but because of its education and teaching quality since an undergraduate student may not need a university with profound research opportunities and experience, they need the optimum education for their business life in today's world. Research related requirements are mostly for graduate schools.

Hopefully, in the near future, these initiatives will open a way to question the importance of knowledge. It is all around us and we can easily gain access to it. Therefore, we can question whether the knowledge is the true purpose of life. We will be able to reach any knowledge anytime and anywhere but this will not make us gratified from life. A search for wisdom might be the new motivation thereafter.

CONCLUSION

In this paper I endeavor to summarize and discuss the current state of the new era of education, the MOOCs. Although it is not a new concept, not all the people, even in academic world, are not benefiting from it fully. In addition to this, there are still various problems that need to be solved. The common ones include the completion rates, pedagogy and certification. I believe that these problems cannot be considered similar to the traditional educational approaches. The online nature of the MOOC platform should be kept in mind when making a decision.

TAs and blended learning are the newer concepts in the world of education and they are to change numerous practices. The new era, MOOCs 2.0 not only helps people learn the topics more easily by discussing with thousands of others, watching the online lectures of top instructors all around the world and having the freedom to study anytime, anywhere, but it also forces the instructors to improve themselves every day. Today, the information is everywhere and the students are aware of this. Therefore, the instructors need to prepare the course curriculum using the latest information so they must follow the literature closely. Lastly

the future of MOOCs is what most people are questioning. I believe that the current wind of MOOCs is the indication of its future. It will certainly change how we perceive the education.

A famous quote says, "College is a place where a professor's lecture notes go straight to the students' lecture notes, without passing the brains of either." (Lillie, 2012). However, online education or MOOCs are now changing this practice. Education is more interactive and cooperative now. There is no point in keeping notes of the professor. The knowledge is as close as a smart electronic device to anyone. Students will choose which information to conceive among many. Today we don't need to memorize, but use the available content and organize. This new era of MOOCs will change our lives and relations, hopefully in good manner.

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GENDER DIFFERENCES IN MOBILE PHONE USAGE FOR LANGUAGE LEARNING, ATTITUDE, AND PERFORMANCE

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ABSTRACT

Mobile phone technology that has a huge impact on students' lives in the digital age may offer a new type of learning. The use of effective tool to support learning can be affected by the factor of gender. The current research compared how male and female students perceived mobile phones as a language learning tool, used mobile phones to learn English and developed their learning performance. A five-point rating scale questionnaire was used to collect data from 122 students, comprising 65 females and 57 males. They were enrolled in a fundamental English course where mobile phone usage was integrated in certain language learning tasks with an aim to facilitate learning. The findings demonstrated that male and female students did not differ in their usage, attitudes toward mobile phone uses for language learning as well as their learning performance at a significance level. In addition, the constraints of using mobile phone for learning that students identified in an open-ended question included the small screen and keyboard the most, followed by intrusiveness of SMS background knowledge, and limited memory of mobile phone. The implication for classroom practice was proposed in how mobile phone can be fully incorporated into the instructional process in order to enhance learner engagement. The results of this study are important for teachers when implementing the mobile phone technology in language teaching. They can be used as a guideline of how mobile phone can be fully incorporated into the instructional process in order to enhance learner engagement.

Keywords: M-learning, mobile phone use, classroom teaching, higher education, mobile technology.

INTRODUCTION

According to Cavus (2011), the brisk advancement of new technologies makes change in the educational practice inevitably. Mobile learning or m-learning is identified by Lan and Sie (2010) as a new type of learning model which allows learners to receive learning materials without limitation of time and place through wireless telecommunication network and the Internet. The tools used to support m-learning include mobile technologies such as notebook computers, portable computers, Tablet PC, and cell phones. This concept is consistent with Low and O'Connel (2006) who state that mobile learning increases flexibility and gives feelings of freedom to students. As such, the changing roles of teachers in mobile learning are emphasized on the ability to use required mobile tools and technologies, being advisor or facilitator, eliminating the barriers which may occur, and creating materials or activities to increase motivation of learners.

The involvement of mobile technologies in education has occurred in many disciplines and contexts, including the field of language teaching. The use of handheld computers or mobile phones to support language learning is called "mobile-assisted language learning" or MALL. According to Kukulska-Hume (2009), MALL has attracted much attention since it is a new type of learning environment containing at least three factors of mobility comprising technology, learner, and content. MALL differs from computer-assisted language learning in that it uses personal portable device, has continuous access, and creates communication across diverse contexts of application (Kukulska-Hume & Shield, 2008). The importance of MALL is correspond with what Chinnery (2006) predicted in that mobile-assisted language learning would certainly appear in future language learning research.

Among many mobile technologies, mobile phones have a potential of improving the teaching and learning processes as they contain useful applications. Learning through mobile phone can occur anywhere and anytime (Brown, 2008). It is very easy to create a more useful learning environment if students either have a Blackberry or some other types of communication device. Also, they are cheap when compared to other ICTs, and everyone can afford them. Mobile devices such as Wi-Fi, Bluetooth, Short Message Services (SMS) and camera can be applied for various educational practices (Kizito, 1012). Hoppe (2009) states that students can read materials such as e-books and can watch lecture on mobile phones. According to Kafyulilo (2012), downloading feature on mobile phones can be used to get various kinds of materials and video. In addition, most of the mobile phones have features which can be used for recording and playing multimedia contents, so students can use a camera on mobile phone for documenting visual materials and collecting scientific data (Cuing & Wang, 2008). With emails and even access to the Internet, mobile phones will be greatly useful for learning English.

Although mobile phones are banned in many classrooms since faculty perceive them as intrusive stuffs which may distract the learners from learning, they can be turned to be a learning device if the faculty know how to use them to accomplish learning tasks wisely. According to Valk, Rashid, and Elder (2010), mobile phones have been found to be effective in improving educational outcomes because it (a) improves access to education and (b) promotes learning that is learner-centered, personalized, collaborative, situated, and ubiquitous. There is some evidence that mobile phones can create pleasant learning environment and have a positive effect (Cobcroft, Towers, Smith, & Bruns, 2006; Serrano-Santoyo & Organista-Sandoval, 2010). Various studies have investigated student's readiness, attitude and perceptions towards mobile learning by using quantitative method (Al-Fahad, 2009; Donaldson, 2011; Rahamat, Shah, Din, & Aziz, 2011) and the findings demonstrated satisfactory outcomes.

According to Mitra, Willyard, Platt & Parsons (2005), technologies are not utilized in similar ways by males and females and as a result some differences still existed. Previous studies indicate that females are more likely to develop mobile phone involvement (Beranuy, Oberst, Carbonell, & Chamarro, 2009; Billieux, Van Der Linden, & Rochat, 2008; Grellhesl & Punyanunt-Carter, 2012; Hong, Chiu, & Lin, 2012, Walsh, White, Cox, & Young, 2011). However, no differences in how males and females used mobile phones were found in many studies (Bianchi & Phillips, 2005; Junco, Merson, & Salter, 2010; Lemish & Cohen, 2005). So, there is still a great deal of disagreement among various studies. With regard to attitudes toward mobile phone, one study reported that female college students possessed more positive attitudes than males (Zhang, 2002) while another study revealed the opposite result (Muhanna & Abu-Al-Sha'r, 2009). A study did not find any significant impact of gender on attitudes (Kwon & Chidambaram, 2000).

Mobile phones have surpassed the initial purpose as a communication device. They have become a learning tool for language progress to users. Since the combination of technology and pedagogy is believed to make better learning outcomes, the current study was conducted to elicit answers from EFL students regarding the usage of this technology in learning English and attitudes when an English course integrated mobile phones into

classroom activities. Since gender is found to have an impact on these variables in the literature review, the current study explores how males and females accept the exploitation of technology for language learning through a survey of attitude and usage. Even though there was only one study which investigated the performance as result of mobile phone usage based on gender (Omede & Achor, 2015), the current study aimed to compare how well the two groups performed in the given tasks. The four research questions guiding this study included:

> - Do male and female students differ in their usage of mobile phone for language learning?
> - Do male and female students differ in their attitudes toward using mobile phone for language learning?
> - Do male and female students differ in their learning performance?
> - Do students encounter any obstacles when they use mobile phone for language learning?

Research Hypotheses
> - There is a statistically significant difference in mobile phone usage for language learning between males and females.
> - There is a statistically significant difference in attitude toward using mobile phone for language learning between males and females.
> - There is a statistically significant difference in learning performance between males and females after taking this course.

METHODOLOGY

Participants
This study took place at a private university in Thailand where the course of Fundamental English II was provided for the first-year students across faculties. It was a 3-unit credit course that met three hours weekly within a 14-week period. This course was designed to develop student's vocabulary, grammar, and reading and writing skills. For listening, pronunciation and conversation skills, students will have a chance to practice them through the use of the computerized self-study language laboratory. One hundred and twelve students, from three sections, enrolled in Fundamental English II in the second semester of 2013 academic year participated in the research. There were 65 females and 57 males. They were taught by the same instructor. All of them completed the course requirement (i.e., did all assignments and took part in an in-class test). All participants signed consent forms, and the instructor assured them that all data would be confidential and that the survey responses would not influence course grades.

Personal Data
As for the demographic information, 57 participants were male while 65 participants were female. All of them took mobile phones to class. Of the total participants, 108 participants reported their experience of using their mobile phones for academic purposes while 14 participants did not have this experience, but used them for other purposes such as communicating with others, taking photos, playing games and surfing the Internet for pleasure.

Research Design
The current study employed the theoretical framework of Vygotsky's social constructivism which had an emphasis on the role of social interaction in learning and on the concepts underlying the communicative approach in L2 learning (Vygotsky, 1978). As Craig (2009) puts up, the learning theory can be integrated with mobile learning. Since the constructivist approach indicates that people can build up their own experiences when they develop their own personal world of information sharing, there is a need to find out whether mobile technology integration, along with the constructivist approach to learning, is a perfect match. This study used quantitative analysis to investigate students'

mobile phone usage for language study and their attitudes towards mobile phones for language learning focusing on gender.

Learning Procedure

Prior to the implementation of mobile-assisted language learning, I made a survey to see how many students carried a mobile phone to class as well as what brand they were using. The results showed that students were ready to adopt the cell phone for class work since all of them had mobile phones, 86 of which were smart phones and 36 were non-smart phones. Moreover, our university has provided a free Wi-Fi for students and faculty members. Therefore, I decided to adopt an m-learning system in a fundamental course as a case study. All learning tasks were adjusted in order that students would have a chance to deploy mobile phones for language learning. The full score was 40 points.

All students in the class had mobile phones with wireless networking capabilities and both classrooms were equipped with Wi-Fi. The class was conducted based on the course syllabus designed to promote learner-centeredness. About 60% of class time was devoted to reading and writing activities while 40% of class time was spent on discussions, speaking, and presentation. There were four activities to be done in class which focused on the use of mobile phone:

> ➢ **Word power activity:** Each week, students were given 10 new English words which they needed to handwrite along with meanings in English and Thai in an A4-sized notebook and made up a sentence for each word. To earn 10 points, they were required to do this activity in class. Students were allowed to use online dictionaries in their mobile phone to find good examples. This activity covered 10 weeks. The total number of vocabulary would be 100 words.
> ➢ **Summary writing activity:** Students had to read a passage containing about 250 words and wrote a summary after they had learned basic rules of writing good summaries. While reading, students were encouraged to look up the meanings of unknown words from online dictionary via mobile phones. They needed to understand the story and grasped the main ideas before writing a summary. There were two pieces of summaries students had to do for this activity to gain 10 points.
> ➢ **Creative writing activity:** After students studied the lessons in the textbook, they chose ten words to make a story. While doing the assignment, they were able to use cell phones to access online dictionary in order to check how sentences could be made. There were two pieces of writing which totaled 10 points.
> ➢ The last activity was related to students' speaking performance. Students were required to make a presentation about steps to do something to earn 10 points. They were allowed to download information relating the topic they chose from the websites and used it to prepare a draft in class. Before a presentation would be done, students were suggested to check pronunciation from online dictionary. The total score was 10 points.

Apart from the four activities that demonstrated the pedagogical use of mobile phones, students had to use their mobile phone for other academic purposes such as checking e-mails, communicating with peers and teacher in LINE group, studying materials and the course content in LMS, text messaging through SMS, and sharing files in Google Drive. The use of mobile phone for language learning was not limited only in-class; students were encouraged to use their phone to facilitate language learning outside class too. However, it was rather difficult to control the tool they used at home. For instance, they might use a PC instead of mobile phone if they perceived more convenient.

Instrument

The instrument in this study was a questionnaire which consisted of four main parts. The first part asked the participants to give their background information comprising gender, type of mobile phone they were using, and their experience of using mobile phone in the

study. The second part asked students about their actual use of mobile phone for language learning comprising 10 items with a choice of five rating scale responses (5= always to 1 = never). The third part surveyed students' attitudes towards the use of mobile phone for language learning. It comprised 7 items with a choice of five rating scale responses (5 = strongly agree to 1 = strongly disagree). The last part contained an open-ended question asking if students encountered any obstacles to using mobile phone technology for language learning. This issue is considered important because the shortcomings might cause the pedagogical use of mobile phones ineffective.

The Likert scales items in part 2, 3 were checked for their content validity by three experts in the English teaching field. All of the items had IOC index higher than 0.6, so they were acceptable. In order to test the proper reliability, the questionnaire was piloted with 40 undergraduate students who were not the target group and calculated by using Cronbach's Alpha. According to Cronbach and Shevelson (2004), coefficient ranges in value from 0 to 1. The higher the score, the more reliable the generated scale is. They have also indicated 0.7 to be an acceptable reliability coefficient. Two parts in the questionnaire yielded acceptable coefficient-alpha estimates with the reliability value of .92, and .87 warranted the use for the purposes of this research study (Cronbach, 1951).

Both the students' actual use of mobile phones for language learning and attitudes towards the use of mobile phone for language learning were investigated after they studied in this course. After the questionnaires were collected, quantitative data were statistically analyzed by SPSS/Window program. Regarding non-parametric data, the Mann-Whitney U tests were employed to answer the first and second research questions. Students' learning performance was evaluated from the scores received. An independent samples t-test was used to compare the mean score of performance based on gender. The acceptable statistical significance level was set at alpha (α) < 0.05. To answer the last research question, the replies from the open-ended question were categorized and counted in numbers.

RESULTS

Research Question 1: Do male and female students differ in their usage of mobile phone for language learning?

After taking the course, students were given the survey of using mobile phone for language learning. According to Table 1, it is noteworthy that female students used mobile phone for learning more than male students in six items including number 1, 2, 3, 5, 6, 9. It is interesting to see that both groups equally used Line Application on mobile phone to connect teacher and peers ($\bar{x}$ = 3.83). For male students, the first highest mean score fell on item no. 10 (using online dictionary, $\bar{x}$ = 4.13), followed by item no. 5 (talking with teacher and peers about study, $\bar{x}$ = 4.06), and item no. 4 (using LINE application on mobile phone to contact the teacher and peers, $\bar{x}$ = 3.83). The lowest mean score of usage was item no. 7 (using SMS, $\bar{x}$ = 3.30). For female students, the first highest mean score fell on no. 5 (talking with teacher and peers about study, $\bar{x}$ = 4.13), followed by item no. 10 (using online dictionary, $\bar{x}$ = 4.09), and item no. 9 (taking photos and recording information for study, $\bar{x}$ = 3.94). The lowest mean score was on the same item as male chose (no.7, using SMS, $\bar{x}$ = 3.29). To answer research question 2, a comparison of mobile phone usage was made based on gender, using Mann–Whitney U tests. Results revealed that male and female students did not differ significantly in how they used their mobile phone for study in all items (p> .05). Therefore, Hypothesis 1 stating that a significant difference existed in usage of males and females was rejected.

Table 1. Comparison of mobile phone usage between male and female students

Mobile Phone Usage	Gender	$\bar{x}$	Z	p-value
1. I searched and downloaded information from websites on my mobile phones in order to do assignments.	Male Female	3.47 3.68	-1.224	.221
2. I used LMS on my mobile phone for my study.	Male Female	3.51 3.70	-1.227	.220
3. I used Facebook on my mobile phone to communicate with my teacher and peers.	Male Female	3.77 3.81	-.174	.862
4. I used Line Application on my mobile phone to connect my teacher and peers.	Male Female	3.83 3.83	-.011	.991
5. My mobile phone was used for talking with teacher and peers about exercises and class activities.	Male Female	4.06 4.13	-.488	.626
6. I used Google Drive on my mobile phone to share information resources.	Male Female	3.64 3.87	-1.666	.096
7. I used SMS to deal with my study (e.g. sending homework, asking about assignments)	Male Female	3.30 3.29	-.326	.745
8. My mobile phone was used to check e-mails.	Male Female	3.81 3.77	-1.916	.045
9. My mobile phone was used to take photos and record information for my study.	Male Female	3.66 3.94	-.280	.779
10. I accessed on-line dictionaries in my mobile phone to look up new words.	Male Female	4.13 4.09	-.172	.863

Research Question 2: Do male and female students differ in their attitudes toward using mobile phone for language learning?

Table 2 compared male and female students' attitudes toward using mobile phone for language learning after taking the course. For males, the third highest mean scores fell on item no. 5 (improving foreign language performance, $\bar{x}$ = 3.89), item no. 3 (accomplishing learning tasks more quickly, $\bar{x}$ = 3.42), and item no 7 (being useful for study, $\bar{x}$ = 3.30). The lowest mean score of attitudes was on item no. 1 (being fun, $\bar{x}$ = 3.00).

The third highest mean scores of females' attitudes were item no. 5 (improving foreign language performance, $\bar{x}$ = 3.81), followed by item no. 3 (accomplishing learning tasks more quickly, $\bar{x}$ = 3.43), and item no. 7 (being useful for study, $\bar{x}$ = 3.29). The lowest mean score was on item no. 2 (giving control over learning, $\bar{x}$ = 2.93).

It is clearly that male and female students had similar mean scores in all items. In order to find out whether a difference in attitudes toward using mobile phone for language learning existed between males and females after taking this course, Mann–Whitney U tests were conducted. The results from data analysis indicated that there was no difference in attitudes between males and females in all items at a significance level of .05. Therefore, Hypothesis 2 was rejected.

Table 2. Comparison of attitudes toward mobile phone usage based on gender

Attitudes	Gender	$\bar{X}$	Z	p-value
1. Learning on the mobile phone created a pleasant learning environment.	Male	3.00	-.349	.727
	Female	3.07		
2. Learning on the mobile phone gave me more control over my learning.	Male	3.06	-	.278
	Female	2.93	1.084	
3. Learning on the mobile phone enabled me to accomplish learning tasks more quickly.	Male	3.42	-.102	.919
	Female	3.43		
4. Learning through mobile phone enabled me to solve language problems.	Male	3.21	-.186	.853
	Female	3.19		
5. Learning on the mobile phone helped me develop my language performance.	Male	3.89	-.755	.450
	Female	3.81		
6. Learning on the mobile phone made learning language easier.	Male	3.21	-.011	.991
	Female	3.20		
7. I found learning on the mobile phone useful for my study.	Male	3.30	-.064	.949
	Female	3.29		

Research Question 3: Do male and female students differ in their learning performance?

Table 3. Comparison of scores based on gender

Gender	$\bar{X}$	S.D.	t	p-value
Male	29.79	3.57	1.73	.085
Female	28.75	3.03		

Students' performance scores gained from the four tasks were taken to analyze based on their gender. From the total score was 40 point, the average score that male students received was 29.79 while female students had the average score of 28.75. When the t-test was taken to analyze, it was found that male and female students did not differ in their learning performance. As a result, Hypothesis 3 was not accepted.

Research Question 4: Do students encounter any obstacles when they use mobile phone for language learning?

Students were asked to reply in an open-ended question about obstacles to using of mobile phone in their study. The finding revealed that 49 from 122 students did not find any obstacles in their learning. So, Seventy-three students who had obstacles were further asked to specify any constraints they encountered during the coursework. The findings showed that they identified the small screen and keyboard the most (65.75%), followed by intrusiveness of SMS background knowledge (43.83%) and limited memory of phone (17.81%). A nearly equal number (12.33%) stated that the university wifi was limited. A connection was not good. They often lost connection when they were doing the activity. Five students (6.85%) found it difficult to adapt themselves to learning through mobile phone technology. Only two students (2.74%) complained that they had to do a lot of activities using mobile phone.

Table 4. Number and percentage of students identifying the obstacles

Obstacle	Number	Percentage
The small screen and keyboard	48	65.75
Intrusiveness of SMS	32	43.83
Limited memory	13	17.81
Ineffectiveness of University's Wi-Fi	9	12.33
inadaptability to this learning process	5	6.85
Too many activities to be done on mobile phone	2	2.74

DISCUSSION

The first discussion is on students' usage of mobile phone for language learning. The two highest mean scores of items male and female students chose for their usage were the same. These items really reflected benefits of mobile phone to facilitate their learning. They communicate with peers and teachers using LINE and use online dictionary so as to understand new words. This indicates that mobile phones have a potential of improving the teaching and learning processes as they contain useful applications. In addition, the usage of mobile phone in this course aims at enabling the learners to develop themselves at their own pace and to the best of their potentiality. Therefore, the course activities might help reinforce the usage. The functionality of advanced mobile phones provides more choices of activities to be designed for improving students' language proficiency. Also, it was found that male and female students did not differ in their usage. This is probably because all students had to do the activities to fulfill the requirement of this course. The finding was in accordance with some previous studies (Bianchi & Phillips, 2005; Junco et al., 2010; Lemish & Cohen, 2005) in that there were no differences in how males and females used mobile phones.

The next discussion will be on the attitudes toward mobile usage. Interesting, male and female students expressed the same for the third highest mean scores. These are 1) improving language performance, 2) completing learning tasks more quickly, and 3) being useful for study. Based on the results from Mann-Whitney U tests, male and female students did not differ in their attitudes after taking the course at a significance level. This is probably students similarly gained experience of how mobile phones were used for language learning through specifically designed activities. Moreover, students were encouraged to use mobile phones for other academic purposes such as checking e-mails, communicating with peers and teacher in LINE group, studying materials and the course content in LMS, text messaging through SMS, and sharing files in Google Drive. Therefore, the current study presented the similar results to previous studies which also found students' positive attitudes and perceptions toward mobile learning (Al-Fahad, 2009; Donaldson, 2011; Rahamat et al., 2011). In addition, male and female students did not differ in their attitudes toward using mobile phone for language learning. This is probably because students can see the potentials of mobile phone in enhancing various activities in the English course. Not only they gain a new learning experience, they realize that they can improve the language proficiency with this technological tool. It can be concluded that gender has no impact on students' attitude. The finding is found to be consistent to that of the study conducted by Kwon & Chidambaram (2000).

Also, the study did not find any difference in males and females' learning performance. The result for the third research question was not surprising since the attitudes and usage of the two groups were not different, their learning performance was the same too. This is due to the fact that all of the tasks were done in class. The students had to complete the tasks within the given time. The teacher acted as a facilitator who helped them when they had problems. Based on the researcher's observation, they paid much attention to the work they were doing. The course was designed to be activity-based. Students realized that they could gain a lot of points from these tasks, it was better for them to do

their best. These scores could help them in case they failed in their exam. The current finding was found to be consistent to the previous study conducted by Omede and Achor (2015) identifying that there was no significant difference in males and females' learning performance.

Based on the findings, students had encountered a number of obstacles. In this regard, the limitation of small screen and keyboard was identified the most. One of the reasons they stated this limitation is probably because many activities were related to typing the keyboard. For instance, students had to look up new words from online dictionary. In designing the future course, it is better to avoid any activity requiring them to type on keyboard. More activities can be focused on displaying video clips since the full color of most screens is now really quite good. The study also found that since students were encouraged to use SMS to ask or consult their friends about assignments, many of them felt disturbed by SMS. However, students did not mention the intrusiveness of messages they received in LINE group. Such finding is noteworthy; means of communication might have an impact on students' attitude toward mobile technology use. So, this issue should be taken into account too.

IMPLICATION FOR PRACTICE

The present study makes several contributions to the area of language teaching. It provides how mobile phone technology can be used for language proficiency development. It would be beneficial for concerned people in developing a future course as follows:

> Since gender has no impact on students' attitude and usage of mobile phone for language learning, learning tasks can be prepared more easily. However, students should be more motivated to make use of learning on the mobile phone since the levels of attitude and usage are not high in this study. It is the teacher's duty to make students see benefits from those tasks rather than perceive them as a big burden.

> When mobile phone is implemented in class, teachers should design the learning tasks that will really suit the capability of the phones that students have. For instance, students may not carry advanced mobile phones or they do not have certain applications. So, it is the teachers who will explore the readiness before real use. It is better to check the availability of applications or services in their cell phones. Running certain activities might not be possible if students don't have applications on their cell phones. Otherwise, students may develop a negative attitude toward using the mobile phone technology for educational purposes.

> Realizing the role technologies are playing in the teaching and learning process, the university administrators should place more importance on the combination of mobile technologies and pedagogy in language classes. Teachers should have more training to update their knowledge of how to implement those technologies into their teaching. This will help them to arrange the learning tasks more effectively with good support from mobile technologies.

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ANALYZING THE EFFICACY OF THE TESTING EFFECT USING KAHOOT™ ON STUDENT PERFORMANCE

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ABSTRACT

Lower than expected high-stakes examination scores were being observed in a first-year general psychology class. This research sought an alternate approach that would assist students in preparing for high-stakes examinations. The purpose of this study was to measure the effectiveness of an alternate teaching approach based on the testing effect to address low high-stakes examination scores. This was accomplished through the introduction of an online quizzing application that utilized a game show-like user interface called Kahoot™. The results showed a significant difference in high-stakes examination scores for students who utilized Kahoot™ versus students who did not. It can be suggested that pedagogical tools like Kahoot™ have the potential to enhance and improve high-stakes examination scores at the college and university level. Students that used Kahoot™ felt positive about their experience. The results of this study also suggest that creating a fun and engaging environment also supports improved academic performance.

Keywords: Educational technology, self-regulation, formative assessment, gamification, testing effect.

INTRODUCTION

As a professor in higher education for a number of years now, I have seen a common perplexing pattern of student behavior. Students who reportedly study diligently and are engaged in class are not always the ones that excel in summative course examinations. Two thoughts immediately come to mind. Either I am being deceived by the perceived practices of my students or how my students study and prepare for the examinations needs to improve. I decided to focus on the latter and my inquiry led me to a memory retrieval practice called the testing effect. Will the practice of the testing effect in a higher education setting influence high-stakes examination scores? Finding an answer to that question was the motivation behind this study.

The objective of this pilot quasi-experimental action research study was to measure the effectiveness of an alternate teaching approach based on the theory of the testing effect to address low high-stakes examination scores. The sample groups are from an undergraduate level psychology course in a four-year university located in the south Pacific. The intervention used to implement the testing effect utilized an online quizzing application that utilized a game show-like user interface called Kahoot™. This research assessed the effectiveness of this approach by comparing high-stakes examination scores and also by surveying the sample groups for their feedback on their experiences through this study.

LITERATURE REVIEW

The testing effect is a robust and reliable phenomenon that demonstrates that taking an initial test improves performance on subsequent tests (Chan & McDermott, 2007). The testing effect (or retrieval practice effect) has traditionally been measured in the laboratory setting, however, evidence of the testing effect has recently been shown in real-world settings (Agarwal, Bain, & Chamberlain, 2012). Low-stake quizzes have shown improved summative exam scores over the course of a semester relative to not being quizzed (Roediger, Agarwal, McDaniel, & McDermott, 2011a). Roediger et al. (2011a) found that sixth grade social studies students performed better on material they had been quizzed on throughout the semester, performed better than students who were tasked to re-read material, and also performed better when tasked to self-quiz themselves outside of the classroom. The time-delay between exposure to material, and chapter and final exams, were typically one to two months, which was much longer than previous studies conducted in a laboratory setting. This showed evidence of the long-term benefits from retrieval practice learning. The testing effect was also demonstrated in eighth grade science students who underwent a longer time-delay of five to eight months between the teacher's lessons and chapter and final exams (McDaniel, Agarwal, Huesler, McDermott, & Roediger, 2011).

McDaniel, Anderson, Derbish, and Morisette (2007) also demonstrated the testing effect among college students. Students took weekly quizzes followed by unit tests and a final cumulative exam. Quizzes were both short answer and multiple-choice format with the unit tests and exam in a multiple-choice format. Improved performance was seen with quizzing versus additional reading.

The testing effect has also been shown in novel situations (McDaniel, Thomas, Agarwal, McDermott, & Roediger, 2011). Experiments conducted in seventh and eighth grade science classrooms utilized different quiz and exam items as opposed to previously reported experiments where questions were the same with random assignment of multiple-choice items. Performance on quizzed material was significantly greater than non-quizzed material as the previous studies demonstrated. Significant testing effect was also demonstrated whether quizzes and exams were in the same or different formats.

McDaniel et al. (2011) discovered that the testing effect was seen when students had items of an applied nature on a quiz and items of a conceptual nature on an exam, but not vice-versa. The testing effect stands to dispel the misconception that test and retest is a form of rote memorization. The test and retest cycle, which improves encoded information recall, shows that active processing of information is required for the testing effect phenomenon to occur (Yigit, Kiyici, & Cetinkaya, 2014).

Roediger and Butler (2011b) have identified five points regarding the testing effect. First, testing produces better retention relative to passive studying methods (e.g., re-reading material). Second, testing repeatedly is more beneficial than taking a single test. Third, the

testing effect can be seen when no feedback (providing correct answers) is given after a test, however, providing feedback yields greater benefits. Fourth, sometime is required between being exposed to material and testing for retrieval practice to be beneficial. Finally, the benefits of the testing effect are not constrained to learning a specific response, rather, can be generalized to different contexts.

A foil to the testing effect is the negative testing effect, where recall is poorer after subsequent restudy (Mulligan & Peterson, 2015). Tests consisting of free-recall items more consistently showed a negative testing effect in participants of Mulligan and Peterson's study. They believed the negative testing effect takes place due to the lack of mnemonic effect of episodic retrieval. Semantic retrieval of testing items were also not present in free-recall. The positive benefits of the testing effect are not present when test items are not actively encoded and given meaning (Jang, Pashler, & Huber, 2014).

The testing effect is not without factors that can contribute to an increase in memory recall and decrease in time-dependent forgetting. Teachers are also factors in the testing effect phenomenon. The ability to encode information in a mnemonic and semantic manner can also be catalyzed by teachers who move from testing for testing's sake, toward a focus on the importance of what is being tested (Watson, Johanson, Loder, & Dankiw, 2014). Essentially, testing is a valuable tool that teachers can use to promote learning rather than merely evaluating what has been learned.

Teachers are not the only part of the equation in developing a mastery-level approach to learning; student motivation is also a strong component. Self-regulated learning is a process that involves a learner transforming their mental abilities into academic skills (Zimmerman, 2002). It refers to the behaviors and thought processes that learners engage in to attain goals they set for their learning. Hargis (2000) argues that students who are able to regulate their own learning with structure and discipline or have appropriate support ultimately perform better. Students that are better able to self-regulate have higher chances of learning, especially in an online environment.

One such tool that supports the testing effect is an Internet-based application called Kahoot™. Kahoot™ is an online application where quizzes can be developed and presented in a "game-show" type format. Points are awarded for correct answers and participating students will immediately see the results of their responses. Game-based learning has the potential to be an effective tool for learning because it stimulates the visual and verbal components of our processing. (Woo, 2014).

Laski and Siegler (2014) found the active encoding within game-based learning platforms to be effective in student learning by utilizing different styles of game in their study. A passive style of game, which did not provide meaning was less effective than game styles that utilized mental preparation and consideration. Plass, et al. (2013) found that although competitive nature of game-style learning activities did not have a noticeable trend in outcome, it did have a positive effect for a mastery goal orientation for learning. A study conducted on 58 eighth-grade students showed that there was an increase in mastery goal orientation toward learning when the game featured competition and collaboration (Plass, et. al., 2013).

The purpose of this pilot quasi-experimental action research study is to introduce and assess the effectiveness of an alternate pedagogical approach for high-stakes test preparation that utilizes gamification through the use of Kahoot™. The basis of this pilot study is to see if the testing effect applies to students in higher education and if its use results in improved multiple-choice exam scores when compared to a control group. Confirming the efficacy of the testing effect by using a fun and engaging online application like Kahoot™ adds an empirically

supported pedagogical tool to the repertoire of university professors that has the potential to improve academic performance on high-stakes summative exams in a fun and engaging way. This pilot study will also add to a very limited amount of literature on the testing effect and gamification in a higher education setting.

METHOD

In order to address the challenge of low student scores on a high-stakes examination, two research questions were developed for this pilot action research study. The first question asked,

> ➢ **What is the difference in exam scores between students receiving course content through lecture, group discussions, and Kahoot™, and students who receive course content through only lecture and group discussions?**

The second question asked,

> ➢ **What kind of change can be brought about by engaging introductory psychology students with Kahoot™, an online quizzing application?**

RESEARCH DESIGN

This pilot quasi-experimental action research study occurred in this researcher's General Psychology class, which consisted of two separate sections. Prior to the start of the semester, the researcher flipped a coin to determine which section would be the experimental group and which would be the control group. The online application Kahoot™ was introduced to the students in the experimental group.

Both groups received the same syllabi, lectures, viewed the same videos and presentation slides, and conversed about the same topics during in-class group discussions. The difference between the two groups occurred in the last 10 minutes of pre-determined classes. For the experimental group, the researcher would close up the discussion approximately 10 minutes prior to the end of class. The control group would continue on through the end of class.

During those final 10 minutes, the experimental group participated in the online no-stakes quizzes (7 multiple-choice questions per chapter) through the use of Kahoot™. Questions for Kahoot™ were written by the researcher based on the key concepts that were going to be on the upcoming high-stakes exam. Questions in Kahoot™ aligned with the key concepts, but the actual wording of the questions were not identical to the questions used for the high-stakes exam. Questions for the high-stakes exam were chosen from a test bank that was associated with the assigned text for the course.

Students who chose to participate by logging into Kahoot™ would create a screen name (using their real name was discouraged to encourage anonymity) using any Internet browser on any type of mobile device (e.g., laptop, smart phone, tablet). As questions appeared on the screen, students would select their response on their mobile device. Once all of the students responded or the preset time (20 seconds) elapsed, students received immediate feedback on the correct answer. The top five screen names who responded accurately and the quickest would appear on the screen for all to see. Students were made aware that the results of these online quizzes had no impact on their course grade.

Both the control and experimental groups took the same high-stakes multiple-choice exam in their respective classes on the same day. In preparation, the control group received a study guide with all of the key concepts that were also covered in the Kahoot™ questions. In addition, an entire class period (50 minutes) was spent reviewing all of the concepts in a

lecture-based format. Students in the control group were allowed to ask questions any time during that class period. In addition, the researcher was available during office hours for students who wanted to discuss the material in more depth. The experimental group did not receive a study guide. Instead, the experimental group spent an entire class period (50 minutes) replaying all of the Kahoot™ quizzes. After all of the quizzes were completed, students were allowed to ask questions. In addition, the researcher was available during office hours for students who wanted to discuss the material in more depth. Both groups received the key concepts that were going to be tested on the high-stakes exam, but the control group received it in writing and through a lecture versus the experimental group who received it in the form of no-stakes quizzes using Kahoot™.

The mean score of both groups were analyzed to determine if a statistically significant difference between the two data sets existed. In addition, the researcher gathered qualitative feedback from all participants through the use of a questionnaire. Qualitative responses were thematically analyzed to determine trends and also to receive feedback about their preparation experience leading up to the high-stakes exam.

Recruitment Strategy

As the primary stakeholder for the findings from this study, this researcher's positionality as a scholar-practitioner is a key element of this quasi-experimental action research study (Herr & Anderson, 2005). Since the purpose of this action research study was to determine an alternate pedagogical approach to increase student performance in the researcher's class, utilizing a convenience sample that consisted of the researcher's students was found to be appropriate. Although a convenience sample is commonly defined as a sample that is easiest to access, having the researcher's students be involved appropriately addressed this study's two research questions by providing useful qualitative and quantitative data directly from the study's target population.

Post-secondary students (18 years or older) from this researcher's undergraduate General Psychology course were sampled for this pilot quasi-experimental action research study. The only exclusion criteria is that participants cannot be considered a minor (under the age of 18). Students who decide to opt out of the study will not receive any type of penalty or loss of points. Their exam score (dependent variable) will not be included in the calculation of the mean score.

Sample

The sample size was 49 undergraduate psychology students enrolled in a first-year general psychology course. The student population at this research site consists of 68% females and 32% males. Sixty-seven percent is Asian/Pacific Islander, 17% White, non-Hispanic, 6% Hispanic, 4% African-American, and 6% other. The diversity within the sample groups was representative of this.

Data Analysis

The exam is multiple-choice utilizing Scantron software for grading. The mean exam scores will be statistically analyzed using an Independent-Samples T-Test. An Independent-Samples T-Test tests for statistical significance when comparing the mean scores of two groups consisting of interval and ratio level data.

The researcher gathered qualitative feedback through the use of the following questionnaire:
1) What helped you in class prepare for the exam?
2) During class, what helped you comprehend the material being presented?
3) What would have supported your learning more if implemented?

For the experimental group only:
4) What effect did the Kahoot™ quizzes have on your preparation for the exam?

Qualitative responses were thematically analyzed to determine learning trends and for feedback about the efficacy of the preparation methods implemented by the researcher. In addition, responses were analyzed for common words and phrases using a text analyzer developed by online-utility.org (The text analyzer can be accessed through http://www.online-utility.org/text/analyzer.jsp). This questionnaire is a form of Classroom Assessment Technique (CAT) created by the primary author.

Confidentiality
Exam scores
- ➢ Administered using Scantron;
- ➢ Participants' results data were entered into SPSS (Statistical Package for the Social Sciences) by the researcher to administer T-Test, which compares mean scores of the experimental and control group;
- ➢ Electronic data were password protected on this researcher's office computer;
- ➢ All paper copies of student scores were protected with a double lock system in this researcher's private university office; and
- ➢ All of the examination data were kept securely for one year after the completion of this study.

Questionnaire
- ➢ Upon completing the questionnaire a thematic analysis was conducted to assess the students' perceptions and practices in preparing for the exam;
- ➢ After the analysis has been conducted by this researcher, all of the questionnaires were protected with a double lock system in this researcher's private university office; and
- ➢ All of the questionnaires are kept securely for one year after the completion of this study.

Informed Consent
This researcher introduced the study in each class. Students were able to ask questions. The researcher provided each student a link to a Google Form, which included the informed consent form as the first page the student would see. Students needed to agree with the informed consent form prior to gaining access to the survey. No participants were minors. The researcher emphasized when introducing this study to each class that no penalty of any kind will be received if a student wishes to opt out of this study.

Potential Risks to Participants
The pilot research study is not more than minimal risk. Research occurred in an established educational institution and setting, which involved normal educational practices.

Potential Benefits to Participants
Participants learned an alternate studying tool to assist them in taking future high-stakes exams. In addition, the literature on the testing effect consistently shows that practicing taking tests enhances a person's memory retrieval skills when taking a high-stakes exam. Kahoot™ is used primarily in the K-12 setting and after an exhaustive literature review no studies involving Kahoot™ were conducted in a higher education setting. Because Kahoot™ engages students through game play, the experience of taking frequent low to no-stakes test should not be as threatening or intimidating when compared to frequent low to no-stakes tests administered traditionally through paper and pen/pencil. The primary benefit is adding an empirically proven tool that university professors can implement that will have a positive influence on academic performance in high-stakes exams.

The source of the data was derived from the following:
     (a) multiple-choice examinations, and
     (b) a student dispositional survey.

An Independent-Samples T-Test was conducted to compare the effects of the online application Kahoot™ on the mean test scores in the experimental and control groups. Significance was determined between the two groups at the $p<.05$ level ($F(1, 47) = 7.801$, $p = .008$). These results suggest that the use of Kahoot did have a significant effect on test scores beyond chance.

Through the utilization of the online text analyzer the following was also determined. In response to the first question, "What helped you in class prepare for the exam," participants in the control group (n=23) mentioned "PowerPoint" 11 times followed by "notes" (9) and "study guide" (8). Participants in the experimental group (n=24) mentioned "Kahoot™" 17 times (see Tables 1 and 2).

Tables 3 and 4 indicate results of the 2nd survey question, "During class, what helped you comprehend the material?" Participants in both the control group (n=22) and experimental group (n=24) mentioned "videos" (14 and 7 respectively), however the experimental group responded with "Kahoot™" 10 times.

The third survey question that was asked to both control and experimental groups was, "What would have supported your learning more if implemented." The control group (n=23) mentioned both "quizzes" and "activities" 3 times. The experimental group (n=24) responded with "discussions" 4 times (see tables 5 and 6).

The final question was asked only to the experimental group, "What effect did the Kahoot quizzes have on your preparation for the exam?" Table 7 shows that participants responded with "helped" 17 times, followed by "fun" (3), "good" (3), and "positive" (2).

Table: 1
Control Group: What helped you in class prepare for the exam? (n = 23 responses)

Word Used	Times Mentioned
PowerPoint	11
Notes	9
Study Guide	8
Videos	6
Lectures	3
Discussion	2
Labs	2
Textbooks	2

Table: 2
Experimental Group: What helped you in class prepare for the exam? (n = 24 responses)

Word Used	Times Mentioned
Kahoot	17
Notes	5
Review	4
Quizzes	3
PowerPoints	2

Table: 3
Control Group: During class, what helped you comprehend the material being presented? (n = 22 responses)

Word Used	Times Mentioned
Videos	14
PowerPoints	7
Group	3
Labs	3
Discussions	2
Lecture	2
Relate to Real Life Situations	2

Table: 4
Experimental Group: During class, what helped you comprehend the material being presented? (n = 24 responses)

Word Used	Times Mentioned
Kahoot	10
Videos	7
PowerPoints	3
Notes	2
Discussions	2

Table: 5
Control Group: What would have supported your learning more if implemented?
(n = 23 responses)

Word Used	Times Mentioned
Quizzes	3
More Activities	3

Table: 6
Experimental Group: What would have supported your learning more if implemented?
(n = 24 responses)

Word Used	Times Mentioned
Discussions	4

Table: 7
Experimental Group: What effect did the Kahoot quizzes have on your preparation
for the exam? (n = 24 responses)

Word Used	Times Mentioned
Helped	17
Fun	3
Good	3
Positive	2

DISCUSSION and CONCLUSION

Upon reflection of this study's findings, it became apparent that the common theme discovered from both the experimental and control group was the importance of applied learning. Participants consistently expressed the need for active reviewing, visual learning, and making the content meaningful to them by applying what they learned to a form of experience. Although the means of achieving this theme varied, the theme of applied learning was consistent in the analysis of the feedback provided by both groups of participants. The more active the learning process the more effective that method appeared to be. This was evident in the findings in response to the two research questions.

The first research question asked "what is the difference in exam scores between students receiving course content through lecture, group discussions, and Kahoot™ and students who receive course content through only lecture and group discussions?" The statistical analysis comparing the examination scores of the experimental and control groups suggest that the testing effect, through the use of Kahoot™, had a significant impact on academic performance

of the experimental group when compared to the control group. The qualitative findings also supported this analysis by providing feedback to the researcher about the efficacy of a lecture-based versus applied learning form of preparation for high-stakes exams. In particular, students appreciated the immediate feedback from Kahoot™ as it provided them a real-time gauge of where they stood in the class. Students also felt that being exposed to questions leading up to the examination helped them feel more comfortable when taking the high-stakes examination. Students also mentioned looking forward to class because they enjoyed playing Kahoot™ as it helped them to memorize key concepts of the class. Kahoot™ was the only pedagogical tool used that had no criticism of any kind in the survey. Students in the control group, who did not have access to Kahoot™, listed visual versus auditory tools highest on their preferred list of preparation tools. This supports the growing scholarship of teaching and learning (SoTL) literature that finds lecture-based pedagogy as less effective then student-focused approaches.

The second research question asked "what kind of change can be brought about by engaging introductory psychology students with Kahoot™, an online quizzing application?" The general consensus of the experimental group felt that Kahoot™ was an effective pedagogical tool because the students found it fun and engaging. This finding was impactful as students do not always welcome and actively engage pedagogical changes (Iwamoto, et al., 2016). Students commented on how they enjoyed the competitive aspect of Kahoot™. Students who preferred not to engage in the competitiveness could still participate as they could remain anonymous by using a fictitious screen name. Students in the experimental group were observed having fun and showing enthusiasm especially when seeing their screen names on the leaderboard. There were also comments made in class where students would prepare for class (e.g., read the text) because they knew that Kahoot™ would be played. This level of enthusiasm was not observed in the control group. The energy level, engagement, and even relevant class dialogue was observed to be higher in the experimental group. An interesting side effect to this was an increase use of peer study groups. Students in the experimental group were observed working together and supporting each other more than in the control group. Because students in the class were having fun with one another, starting conversations with one another appeared to be easier and less intimidating. This was not observed in the control group. Comradery was not as evident.

The utilization of games in the classroom setting has been shown to be an effective pedagogical tool to improve academic performance. It appears that this form of teaching and learning aligns with our culture's current demand for mobile applications and video games. Students can regularly be seen around campus using their mobile devices for communication, entertainment, and learning. The vast majority of students have a high degree of comfort using technology to learn. There was a very small learning curve when Kahoot™ was introduced to the experimental group. In fact, approximately one-fourth of the class had played Kahoot™ at some point during their K-12 schooling.

It can be suggested that pedagogical tools like Kahoot™ have the potential to enhance and improve high-stakes examination scores at the college and university level. Students in the experimental group felt positive about their experience. The results of this study also suggest that creating a fun and engaging environment also supports improved academic performance. Students will learn what excites them. If a student cares about what she or he is introduced to, she or he will be motivated to learn.

LIMITATIONS

This pilot quasi-experimental action research study was limited by its relatively small sample size (n=49) and convenience sample. Although it began to answer the research questions for the researcher as it applied to the researcher's class, utilizing a larger sample size at various levels (first-year, second-year, third-year, and fourth-years and higher) and from additional institutes of higher education would substantially increase the transferability of this study. Also, the fact that there was familiarity with Kahoot™ prior to this study could be considered a confounding variable. Another limitation was that the students' self-regulation skills were not assessed. By assessing self-regulation skills, the students' study skills could be analyzed to determine if that was another confounding variable in the students' performance with the high-stakes exam.

RECOMMENDATIONS FOR FUTURE RESEARCH

Recommendations for further research emerging from this action research study include;
- ➢ Future action research cycles should collect and analyze data over a longer period of time (e.g., the entire semester) versus just the first half of the semester.
- ➢ A study looking into the effectiveness of gamification at the higher education level would clarify if the significant findings from this study was due specifically to the online application Kahoot™ or the experience of learning through the gamification of the course's content.
- ➢ A study that looks into the self-regulation skills of students to determine how much time and energy they are putting into their examination preparation and if there is a positive correlation between that and academic performance.
- ➢ Develop a baseline assessment to determine the level of variance in the comparison groups. This will increase generalizability and transferability of the findings.

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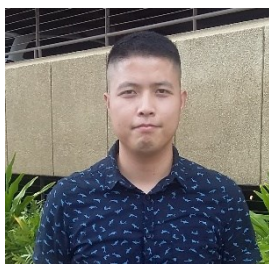
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E-LEARNING AS A TRAINING TOOL FOR CIVIL SERVANTS: A CASE IN THE STATE OF PARANA - BRAZIL

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ABSTRACT

The distance education (DE) modality evolves as new Information and Communication Technologies (ICT) are developed and based on the methodologies that are being used in the media dissemination of information, educational institutions and organizations take ownership of these innovations to promote their teaching processes. One of the methods that have achieved prominence is how e-learning, which is also called educational computer or online education, is conducted by the internet - synchronously or asynchronously, eliminating the figure of the pedagogical mediator in real time. This article aims to answer the main question: What is the perception of Parana civil servants, which undertake the distance e-learning methodology post-graduate programs in relation to the use of technologies and materials. The surveys of the study were 670 civil servants from Parana state, students of the post-graduation basis course in Public Management in e-learning methodology, which stems from Parana State Government's partnership with a federal institution of vocational and technological education. The research was conducted by using qualitative and quantitative approach, descriptive and questionnaire application method survey, containing 12 closed questions. The main results show that there is high familiarity and acceptance to e-learning. On the other hand, the use of teaching materials evidenced conservatism and attachment to printed learning materials, highlighting the printed book as a key to distance learning.

Keywords: Distance education, professional training, e-learning.

INTRODUCTION

From the advent of globalization and popularization of real-time communication brought out by the Internet, a range of new business came on the market, providing new jobs, new methods of work, job training, facilitated accessibility, possibilities of new learning modalities and forms of formal and continuing education. Thus, distance education is gaining ground and it provides the most diverse social groups access to education with the use of information and communication technologies, eliminating social barriers (Ferreira, 2009). It allows to benefit those individuals who do not have access to mainstream education, and those who are distant from the educational centers in quite remote or isolated locations (Ikeda and Knight, 2005) and by choosing this methodology for learning, turning it into a more competitive society (Salvucci, Lisbon and Mendes, 2012).

Distance learning has evolved from experience gained over the years in the semi-presential model, already established in professional, technical, higher and post-graduate courses, so as to make it more contemporaneously, the e-learning methodology has emerged, by justifying whether the mobility and autonomy that students have on the accomplishment of their studies, thus easing the access to education for those students who do not have the time to tele-presence lessons in loco. Likewise, access to e-learning to offer innovation and add value to knowledge, given that this tool has become popular for conducting training, courses and other activities in which real-time education is not possible.

The distance education in Brazil is a reality, and it has achieved continuous growth in enrollment form, as shown by the results of the Brazilian Association of Distance Education ABED (2016) from 2014 to 2015 (The Census Distance Education Learning Analytical Report in Brazil (EAD.BR), currently in its 7th edition is the effort to understand the education scenario the distance learning in Brazil and offer a mapping of the key trends in the sector related to the segments and to the academy). This growth in distance education enrollments occurred in blended forms and e-learning (online) by 25% strengthening even more, this kind of education by obtaining users.

In addition to the private institutions these new forms of educational opportunities and learning public institutions are also being developed, including the Federal Institute of Parana (IFPR) which is following the worldwide trend of expansion of distance courses, offering courses in various levels, including graduate courses, which is the objective of this research. Since its creation by the Law number 11.892, of December 29th, 2008, the IFPR provides education in basic, technical and technological levels, but this study deals only with students of the post-graduate degree in Public Management, which had the opportunity to study it by using the e-learning modality as a result of a partnership between the IFPR and the Government of the State of Parana through its Secretariat for Administration and Security, which administers the School of the State Government, Secretary for Urban Development (SEDU). The post-graduation basis course was offered to government civil servants (also called by public servants or public workers) from 399 municipalities in Parana State.

This partnership was designed by thinking about the difficulty in empowering the state and the municipal civil servants to carry out some functions in public administration, given the large number of people who are unable to access a higher institution in a classroom mode, for reasons such as the distance of their residences to the educational institution, downtime due to hours of work, family issues and inadequate factors related to this methodology. In the first stage of the project objective was to train, at the level of expertise in the specialization, 1257 state and municipal civil servants.

Seeking with this study, to check with the workers of a public sector of the post-graduate course in Distance Education Public Management of IFPR, as they evaluate the progress in addressing the use of technology and its acceptance on the practiced methodology and how this public is receptive to new learning modalities.

THEORETICAL BASE

From the idea that education is a civil right, several types of education are now reflected in the society as a way to promote access to knowledge, especially in formal education. In this context, distance education (DE) has increasingly occupied space by democratizing this access. Thus "the adoption of distance education must be accompanied by training and theoretical and practical reflections." (Vilaca, 2011: 2). Similarly, this method "takes on a key role as a learning format by eliminating social barriers, and expanding the development of citizens at various levels by making learning more flexible" (Ferreira, 2009:53).

The distance education (DE) in Brazil had its establishment by Article 80 of the Law No. 9.394, regulated by the Decree No. 5.622, of December 19th, 2005, which in Article 1 is conceptualized as:

Characterized distance education as an educational modality in which the didactic-pedagogic mediation in teaching and learning processes occur with the use of media, information and communication technologies, with students and teachers who are developing educational activities in several different places or times. (Brazil, 2005, p.1).

It is observed that the concept that guides the distance education in Brazil has some characteristics that are distinct from the traditional presencial classes, as it appears to have important points that distinguish this modality. In relation to how learning is designed and implemented, it is emphasized that it has its own characteristics, but should not be seen as antagonistic to traditional modality, but they are analyzed from their particularities. In the distance learning process, it is developed in virtual spaces and the school is not just the place where you teach, but it happens to be the place where students learn by themselves, under the guidance of teachers and tutors. The learning by the new generation becomes an opportunity by offering tools to the subjects so that they develop for themselves the application of theory in practice, which they are usually in contact with.

Encouraging aspects which lead to e-learning to occupy even more space in a growing society and demand for competent professionals who are capable of disputes in academic and industrial sectors, it is pertinent to the thought of Levy: "Through virtual worlds, we cannot only exchange information but truly think together, to set our memories and projects in common to produce a cooperative brain." (Levy, 1998:96).

Based on this assumption, education becomes mediated by individuals who, by the use of machines, distribute and receive content through technological networks, being virtually together (synchronous model) or without interaction in real time (asynchronous model). This ability to interact each in their own time is one of the main features of the e-learning methodology. Its popularity in the distance is the result of technological advances, especially with the growth of the Internet generating profound effects such as, the distribution method of the content of education (Welsh et al., 2003).

The e-learning teaching modality can be conceptualized as a distance education model that combines various forms of synchronous and asynchronous communication by using dynamic interfaces with dialogue language and to arouse student interest in exploring the various learning objects that are gathered in a learning platform (Lima and Capitao, 2003). Its use is not restricted to the academic environment as an alternative to classroom learning, and it is a widespread form of professional training. Hairston and Nafukho (2011) present the advantages of using e-learning in organizations and companies. On the one hand, institutions derive cost savings in training programs as well as optimizing the logistics involved in trips and accommodations. On the other hand, for employees, it is a more flexible training schedule, thus expanding training opportunities and the acquisition of skills that, ultimately, it can add value to the organization.

In order to make e-learning methodology be used in an organization or institution, whether for continued corporative education or formal education, it is essential the existence of modern studios with audio and video capabilities for the production of classes. As well as, the existence of professionals with skills in handling equipment with sufficient technological capacity to store, retrieve and distribute data to users who are connected through videos, texts and other teaching resources of distance education in real time. Theoretically e-learning "is any kind of learning that has support from the Internet or Intranet (LAN or WAN) for distribution of contents, social interaction and learning support" (Lima and Capitao, 2003:37).

On the other hand, there must be space for collaboration and exchange of information among all the participants of education, which is one of the factors that made the social networks on the Internet one of the great innovations of the XXI century. This capability provides the necessary quality for dynamic language of this type of education. "This training method assumes that the initiative and management of the learning process are in

the hands of the learner, without excluding external support from the professor/tutor (Fernandez, 2014:75). In distance education tutoring, it is directly related to the teaching and learning processes and resembles the teacher's role in the classroom and thus it occupies key space, and the student has the tutor figure as the voice for their demands.

The profile of the tutor of a distance learning course, in the conception of Belloni (2003) has some characteristics that are not related only to an objective competence but are required. They are aspects related to interpersonal relationships and to realize that the construction of knowledge takes place internally. Motivation is utterly important, but it is critical to build the knowledge along with the student. The tutor's role is to provide online support in mentoring the distance, mediating the process of teaching and learning through ICT, to carry out and set targets, track students via telephone reports and contacts (registered) so that they realize proximity in order to establish and maintain close interpersonal relationship, seeking to maintain the motivation for studies, interest in the training themselves, avoiding evasion and the disengagement of the students.

Lahm Jr. and Rader (2015) present the possibilities of e-learning, claiming that this method allows the cultivation of multiple skills and expands non-traditional knowledge within the study area. Thus, schools and teachers should take advantage of the technologies and insist on the development of platforms that merge the functionality of social networking with virtual learning platforms.

The Virtual Learning Environment (VLE) for e-learning is a tool where all learning resources such as videos, texts, audios, articles, chat, forums, case studies, exercises, interaction spaces and collaboration are stored, all of which have interface with the student by using language that encourages learning. The Virtual Learning Environment is a fertile space of meaning where students interact with the technical objects in the construction of knowledge, in the pursuit of learning (Lavigne et al., 2015). There are several forms of synchronous and asynchronous interaction, by using the VLE as a learning support, mediated or not by an online tutor. Standing out are electronic book, web radio, chats, forums, case studies, practical research, directed and evaluation activities. In addition to this platform, students can receive printed educational materials as a way of expanding learning opportunities (Malinovski et al., 2014).

As for printed teaching materials in distance education, Preti (2010) emphasizes the need to provide not only education, but also above all the author's interaction with the student through texts with technical quality and depth of information. The author also points out that learning strongly depends on the recognizing and interaction with the text, thus giving a great responsibility to the student by the learning process. The printed teaching materials are important educational resources, which are produced with the intention of teaching and interacting with the student and facilitating the construction of knowledge.

Finally, for the e-learning method is implemented effectively it is necessary to keep up with the technological changes and there adapt to their audiences. Halicki et. al., (2016) described the technological trajectory of the implementation of the "web based learning method" in a Brazilian public university. It turned out that the changes introduced by the information and communication technology in the educational sector and transposed to the daily practices of teachers and tutors were able to generate transformations in the sector. There was sensitivity of educational managers to perceive, adapt and deal with the potential of web based learning technology in relation to the claims and needs of students in relation to the teaching method.

METHODS

This article is characterized as a descriptive study and it is divided into two parts: a qualitative approach (secondary data available at the institution) and other quantitative approach (questionnaire administered to students). The main strategy used in this study was a questionnaire or survey, which, according to Yin (2001:24), does not require control

over behavioral events and focuses on contemporary events. For the author, the form of the research questions "who, what, where, how and when" favors data collection strategies.

The variables in the questionnaires addressed concepts applicable methods of organizational learning through Information and Communication Technologies, for example, teaching resources, forms of interaction, knowledge mediation methods and assessment of learning. The research population is part of the students of the post-graduate course in Public Management IFPR, which is a federal education institution that offers technical, subsequent courses, technological undergraduate and graduate ones.

The secondary data collection began through literature review, which aims to, theoretically, support the present study. The questionnaire aimed to determine how public workers of Parana State evaluate the course in e-learning modality, relating to the use of technology and which its acceptance on this methodology is and to what extent this public is receptive to new learning modalities. As this questionnaire was based on an adjective scale with poles (Lickert's scale), it was possible to detect the intensity of the perception of the respondent. The results of the survey research were tabulated by using Microsoft Excel software, through simple tabulations and descriptive statistics about the issues pertaining to the questionnaire.

Object Study Description

In order to diagnose the student profile research, it was carried out with students of the post-graduation course in Public Management from the IFPR totaling 1257 students (who started the course) in 36 cities in the state of Parana – Brazil. There was a 22.4% dropout rate, totaling 975 students took part in the study sample. The number of respondents of the electronic form was 670, which amounts to 68.7% of the total sample.

The courses at IFPR were created thanks to the existing educational demands for very different audiences. The IFPR offers post-graduation courses in two formats, one semipresential and another totally distance learning.

Synthetically, the IFPR e-learning modality offers students three ways of interacting with knowledge: 1-Printed textbook; 2-Virtual learning environment; 3-Tutoring. The IFPR modality seeks to achieve effectiveness in teaching by using the following strategies:

Table 1. Model e-learning IFPR

AVA Learning objects	Resource	Description
Electronic Book	Web-class	Recorded videos by teachers with huge knowledge about the issue, which present the contents in a conceptual way. Must be integrated with another media in Virtual Learning Environment.
	Audio	Midiatical resource to highlight specific issues to students while using the eletronic book.
	Illustrations and animations	Audiovisual resource to exemplify and detail the concepts.
	Glossary	Aims to present the meanings of non-usual words, or technical terms.
	References	Indications of complementary readings, comments by the teachers, who aim to deepen the knowledge.
Directed activities		Objective exercises to fix the contents seeking contributing to the learning process.
Case study		Mediatical resource that aims to develop the analysis capacity in front of knowledge, experiences and perspectives, improving the ability to take risks and argumentation.
Forum		Is an interactive tool, mediated by the tutor who promotes the building of knowledge or deepen on the issue in a collective form.

Pratical research	The research of the context action is a must, thus the student must kick off in the theory towards practice, and understands how to apply specific content.
web radio	Their contents are related to courses and the discussion is mediated by teachers and tutors. They still can be fulfilled by synchronous form to the students, taking them to reflection and discussion to the proposed subject.
Chat	Promote chats among the students and tutors on specific subjects of the course. They can be scheduled previously and mediated by the tutors.
Evaluation	Subjective and objective questions fulfilled with consult to the didactical material by the student.

From the presented characterization, it is necessary to know the perception of civil servants of Parana as students of graduation course in Public Management which are offered by IFPR about ICT and effectiveness of e-learning as a professional training method.

DATA ANALYSIS

The survey was sent to students of the course via an electronic system, containing 12 closed questions involving the use of technology and methodology, enabling them to map the profile. Analyzing the profile of participants in relation to age, gender, marital status and family income, the following results are shown: 68% of the students are between 31 and 50 years (average 40.5 years), higher age group the average age of students presented by the MEC of Education Census/Inep of 2012, which states that the distance education this average is 31 years old. It is noteworthy that 11% of students are over 50 years old, which demonstrates the inclusive nature of distance education, especially for digital inclusion, given that students undertake all learning activities in the Virtual Learning Environment.

In relation to gender, it was found that 67% of the course students are women, a result that confirms the INEP data (2012), which shows that 56.1% of university students are female. Another important research finding is that 63% of the students are married or declared stable union. The predominant income group is between R$ 1,000.00 and R$ 3,000.00 (Brazilian currency) per month, totaling 53% of respondents, which demonstrates that the student who seeks the DL does not have high income, and in this type of modality, due to the low cost one factor of inclusion. Yet in terms of income, we highlight the 9% of students with income below R $ 1,000.00 and 13% with income above R $ 5,000.00 (Brazilian currency).

This research also sought to know what was the student's prior familiarity with distance education, and what were their attitudes regarding the use of new technologies of communication and information. The result worth mentioning is that 63% of students had performed some distance course previously. However, the fact that stands out is that 49%, nearly half, had studied with the e-learning methodology, i.e. teaching asynchronous models, using virtual learning environments as a teaching base, not depending solely on the presence support locations provided in the classic form of distance education. This fact indicates that the e-learning methodology is viable for continued training in the public sector.

When asked if they are adapted to this learning modality, the result shows that 7% are not suited, 22% do not agree or disagree, i.e., are neutral, and 72% totally agreed that are adapted to the methodology. Taking into account that the target audience are civil servants, aged 30-50 years old, this result is significant and demonstrates a shift in the distance education paradigm.

Chart 1. *Adaptation as the e-learning methodology (teaching via internet)*
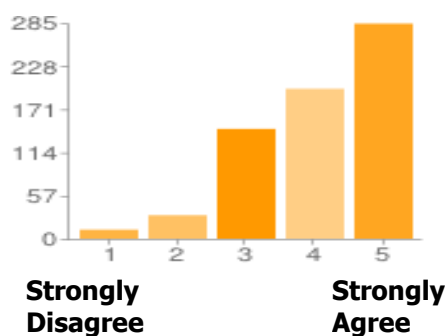
1 - Strongly Disagree	2%
2	5%
3	22%
4	30%
5 - Strongly Agree	42%

Strongly Disagree

Strongly Agree

When asked about the use of printed books as support in distance learning, students showed conservatism, stating that they are fundamental to undertake their studies. It is observed from the chart below that 80% agree that the book is essential for learning, and only 8% do not consider critical.

Chart 2. Printed book Need to carry out the course.
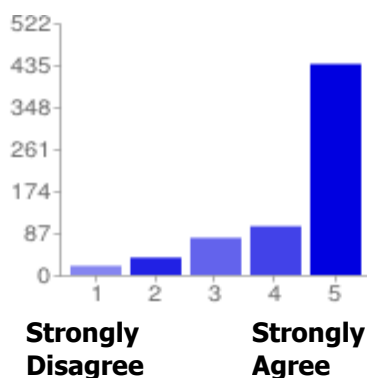
1 - Strongly Disagree	3%
2	5%
3	11%
4	15%
5 - Strongly Agree	65%

Strongly Disagree

Strongly Agree

Such conservatism is opposed, however, the results presented in Figure 2, which shows the results of the question on whether they would accept receiving a mobile device to replace books. It was found that 58% agree to the change, and only 26% of respondents did not agree to such a change.

This result may have a bias of interest outside the exchange itself, but the fact that the mobile device - tablet, could be used in addition to the study; therefore the results cannot express the reality. However, we must consider that 26% of respondents are in the age groups higher course, i.e. 45% of students over 40 years old, a generation known as "digital migrants", i.e., they had to adapt over life for the use of technologies, job functions, study and update information.

With regard to the presence, the federal law requires the student's presence during the assessments. Other participations depend on the decisions taken by the offering institution of the course. In the distance education of IFPR graduate course assessments and the board of examiners of the Final Work are prepared individually.

As the acceptance of video classes available in VLE, the result shows that 67% of respondents believe that they are fundamental to the detriment to other resources such as textbooks, directed activities, case studies, research, tutorials and forum discussions. This demonstrates that teaching is still very rooted in the lecturer teacher paradigm exposing their knowledge and the student absorbing the lessons passively and with little interactivity. This result shows little maturity of the student in the teaching-learning process.

An activity which is well accepted and considered important to support students is the class content review. At first, the class revision occurred in real time, prior to the presential review, but over time, it began to be recorded and made available in advance by allowing the student to be able to prepare at any time within their availability and organization. The results show that 77% agree that the preparation for the evaluations is essential, and 76% of respondents would be satisfied if the class revision was made available in advance at the virtual learning environment (VLE), allowing the review of the content at home and not needing to watch the class live at the presential support location before the evaluation.

Chart 3 - *Level of satisfaction with the course methodology.*

1 - Strongly Disagree	**1%**
2	**4%**
3	**16%**
4	**48%**
5 - Strongly Agree	**31%**
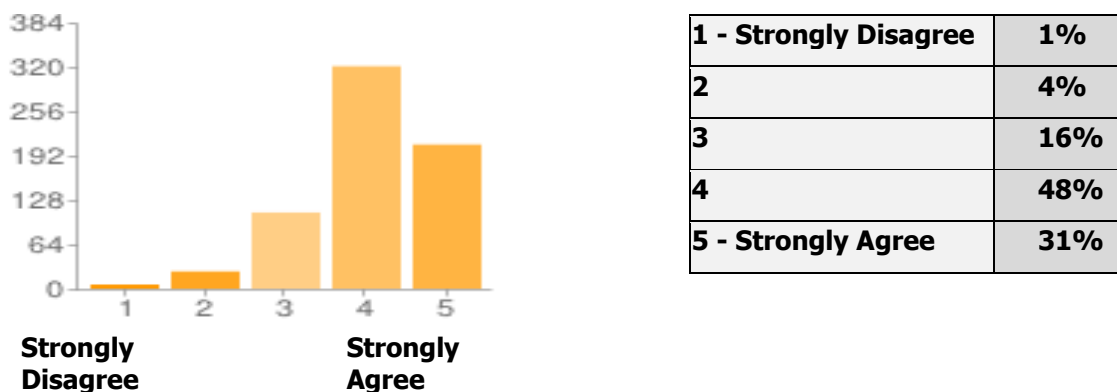
Out of the 670 respondents, 79% say they are satisfied in relation to the course methodology, i.e., teaching via internet, using information and communication technologies based on the teaching-learning process, and only 5% of the respondents showed dissatisfaction with the method.

These results strongly corroborate the study Hairston and Nafukho (2011), which sought to assess the performance difference between the participants in an e-learning course and those enrolled in a traditional classroom course. The results show that although both groups have significantly improved after the training, there were no statistically significant differences in performance between the groups. This result confirms previous studies that do not distinguish learning performance among different modalities, but at the same time calls attention to the distinction between different learning profiles of students.

It is believed that these results are motivating to educational managers, for taking into account the profile of the students, about the age, income and other socioeconomic conditions, they are quite encouraging. Thus, the public sector can implement new formal education programs and/or continuing to train workers of a public sector in several spheres. It is further believed that in the coming generations, taking into account students with higher income and younger age, methodologies for teaching e-learning tend to be better accepted, because it is a generation of people called "digital natives" i.e. the ones who were born in the internet generation. This audience can learn different types of knowledge through e-learning technology without the need for a teacher in person controlling and dictating the rules of the activities to be developed in a school setting.

CONCLUSIONS

The research shows that surveyees in the study herein are adults, mostly women, with constituted families, with an average income, and are adapted to the methodology of distance education. It is noteworthy that in relation to the familiarity of the respondents with the methodology and are willing to use new technologies, it was evident that 63% of them already knew the methodology, which may be a reflection of the degree courses offered by IFPR, since most of the respondents were undergraduates in Public Management which were previously offered at the same institution.

It is evident that the distance education occupies significant space, within the ways of training methods used in the public sector in Brazil, since 49% reported to have already performed some kind of training in this modality, which means that they can use this methodology for continuing their education, even it's confirmed that there's no differences in terms of performance between presential and distance trainings (Hairston and Nafukho, 2011).

Regarding to adaptation to distance education, the minority - 7% - indicated difficulty, which leads to a reflection, because only a minority of the states are not fully adapted, while 22% are neutral and 72% are fully adapted.

It is noteworthy that out of the 670 respondents only 49 showed some kind of difficulty, while 621 were adapted, which may represent a shift in paradigm, for people aged 30 to 50 years old, coming from the regular education, are adapting more and more to this methodology. These learning results also can be assigned to the high quality to access the internet. Opposite case was found by the study of Rahardjo, Lubis and Harijati, (2016) where students from rural areas of Indonesia have difficulties to enjoy the educational benefits in function of the barriers to access Internet. On the other hand, the results remain with certain conservatism in relation to teaching materials, as 80% consider the printed book as a basic material for their studies. However, at the same time, it is clear that the surveys accept to replace the printed book for a tablet, which cannot demonstrate that they in fact, agree to this change, they took into account other aspects such as the product itself and its use in other activities. The data shows the belief that there is openness to change, inasmuch as the 'quality online material might exert a significant effect on students' perceived satisfaction and enhance their learning outcomes (Yueh, Liu & Liang, 2015:124).

As for the 26% who disagree can be part of the "digital migrants", i.e. they can be adapted to the use of technology as a result of the need to work, driven by the need to study or search for information. When asked about the web classes and classes revision, most of them understand it as essential to their learning. Regarding the review classes, it is evident that the student needs freedom and must respect their studies schedule.

By watching the revision lessons at home, they have the possibility to better use what you do before the event time in the classroom presential location. Out of the 670 surveyees, 79% showed a significant positive result and answered they were satisfied with the methodology of the e-learning course and the use of ICT based in the teaching-learning process. 16.4% of the surveyees had an average perception of the quality of the course and only 4.6% showed low perception, i.e. dissatisfaction with the course methodology.

Checked that the positive results are encouraging for education managers, as it is evident that the majority of students are satisfied and adapted to the e-learning methodology of distance education. Considering the profile of the students in relation to age, income and other socioeconomic conditions, these results are also significant. Thus, the public sector has the ability to implement new formal education programs and/or continuing to train civil servants in the various spheres, but should take into account the demands and needs of students (Halicki et. al., 2016).

It presents as limitation of this study, the exclusive use of quantitative research to assess the perceived quality and acceptance of e-learning, as well as qualitative research and the combination of different research strategies can enlarge the view of the object of study. Another limitation refers to the level of education (graduate), it is also needed to understand whether it makes the prospects and limitations of e-learning methodology in vocational education and higher education. It is suggested that future research address the training and development of civil servants through different research methodologies and to understand the effectiveness of educational materials (digital and print) for e-learning. Also encourages that researchers investigate the social benefits from the distance learning, especially e-learning for people in remote areas of large cities.

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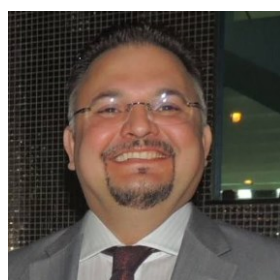
Marcos Rogerio MAIOLI is PhD student in Environmental Management from Positivo University – UP. Master's Degree in Tourism and Hospitality from UNIVALI (2016). Bachelor in Tourism from the Federal University of Parana - UFPR (1997). Specialization in Planning and Management of Tourism and Political Sociology both by UFPR. He is currently lecturer in higher education - Public Management, vocational courses in Events, Logistics, Administration and Distance Education in IFPR - Federal Institute of Parana. Has experience in the area of Tourism and Hospitality, with emphasis on Organization of Events.

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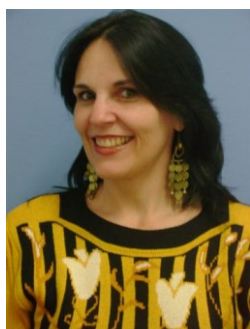IFPR - Federal Institute of Parana, Campus Curitiba
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PREDICTING THE ADOPTION OF
E-LEARNING MANAGEMENT SYSTEM:
A CASE OF SELECTED PRIVATE UNIVERSITIES IN NIGERIA

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ABSTRACT

Despite the availability of studies on e-learning management system (eLMS) using information system models, its theoretical foundations have not yet captured social constructs that are peculiar to developing countries including Nigeria. This study was undertaken with the aim of investigating factors that could influence eLMS adoption in higher education. Drawing upon the Social Learning Theory (SLT), Unified Theory of Acceptance and Use of Technology (UTAUT), and two other variables which are Technology Culturation and Power (electricity), an empirical based model was developed to identify predictors of eLMS. The study used Smart Partial LeastSquare-Structured Equation Modeling (PLS-SEM) to examine the pattern of inter-correlation among the SLT and UTAUT constructs. The survey method of research was used by administering questionnaires to undergraduate students of 3 selected private universities in Ogun state, Nigeria with a sample size of 472. The results show that Attitude, Social Influence and Technology Culturation are strong determining factors of intention to adopt eLMS, while Performance Expectancy and Power do not significantly influence the Behavioural Intention to adopt eLMS. More so, Performance Expectancy and Behavioural Intention have positive influence on student grades. The results of this study will provide theoretical information on the intention to adopt eLMS and should be of interest to both researchers and education administrators in terms of planning and decision making.

Keywords: e-Learning management system, SLT, UTAUT, PLS-SEM, technology culturation and power, Nigeria.

INTRODUCTION

E-learning could be defined as the utilization of technologies or electronic devices such as desktop/laptop computers, CD/DVD players, smart phones, and other modern day tools, to enhance traditional face-to-face method of learning (Abuhamdeh, 2010; Ahmad, 2012). It is the use of electronic educational technology in learning and teaching to enhance and support the process of knowledge dissemination (Oye, Salleh & Lahad, 2011; Azeta et al., 2009). E-learning ensures effective pedagogy and curriculum implementation in the computer age (Ajadi, Salawu, and Adeoye, 2008). With advancement in digital technologies, institutions are progressively searching for the potential utilization of information and communication technologies (ICT) to facilitate flexible teaching needs (Nanayakkara, 2007; Sihar, Aziz, &Suleiman, 2011). Inspite of the proliferation of ICT and benefits of e-Learning Management System (eLMS) in most developing countries, its effective use and operation has been a major concern to stakeholders.

Many studies have examined models in adopting technologies that aid in understanding and predicting users' adoption and usage pattern (Lin, Lu & Liu, 2013). It is essential to investigate students' perceptions of eLMS at the initial step of implementing eLMS in universities. Hence,the necessity to carry out research that recongnises the factors university students consider significant in the use and acceptance of elearning platforms.

e-Learning Management System (eLMS) is also known as Course Management Systems (CMS), and the two terms may be used interchangeably. Many universities have already adopted CMS and some others are planning on introducing CMS software such as Moodle or Blackboard to support their learning operations. However, currently, there has not been much research to explore the influence of Power (electricity) on the use of CMS. To this end, it is vital to learn its perceived usefulness from the perspectives of students. The results of this study could help universities and by extension, higher institutions make better investment decisions and help instructors in using this technology more effectively. Additionally, it can help designers of course management software to improve the learning tools and get higher satisfaction level in the learning environment (Marchewka, Liu &Kostiwa, 2007).

The purpose of this research is to study students' acceptance of eLMS in three private universities in Ogun State, Nigeria. The Social Learning Theory (SLT) and Unified Theory of Acceptance and Use of Technology (UTAUT) were engaged to identify the factors that significantly influence the Behavioural Intention to use eLMS. The seven factors investigated include Performance Expectancy, Attitude, Social Influence, Technology Culturation, Power, Behavioural Intention and Student Grades. Smart Partial Least Square-Structured Equation Modeling (PLS-SEM) was used to analyze and examine the pattern of inter-correlation among the seven constructs. PLS-SEM has been embraced by researchers for its ability to model latent variables, measurement errors, and estimate parameters of entire theories simultaneously(Dijkstra&Henseler, 2015).

The remaining part of this paper are structured as follows: Section two presents the literature review by examining related works on theories and model for predicting the acceptance of new technologies. The third section describes the proposed research model and hypothesis development. The fourth section highlights the research methodology. Section five presents the data analysis, and measurement for model reliability and validity. Hypothesis testing and discussion of results are contained in section six. Section seven concludes the paper.

LITERATURE REVIEW

Many institutions use eLMS as their platform to conduct fully online courses (Hsu, 2012). Examples of eLMS includes Moodle, Blackboard, WebCT, and a lot more. Moodle is a well-known Course Management System (CMS) or eLMS. Moodle, in fact, has become very

popular among educators around the world because of its easiness and economy. Blackboard is a course management software application that is used in higher insituions of learning. It has quite a number of learning tools that includes online discussion board, a course calendar, information announcement, course content management, electronic mail, reviews, navigation tools, access control, grade maintenance and distribution, student progress tracking, auto marked quizzes and exams, etc. (Hutchins, 2001;Marchewka, Liu&Kostiwa, 2007).

According to Ellis (2009), a robust LMS should contain several functions such as automation of administrative activities, self-service and self-guided services, rapid assembly and delivery of learning content, a scalable web-based platform, portability and standard support, and knowledge reuse. Moodle has all the aforementioned features.

The common features of any education learning management system include: (i) Content management, (ii) Assessment and testing, (iii) Curriculum planning, (iv) Reports generation, (v) Communication and collaboration, (vi) Classroom and college announcements (Kulshrestha& Kant, 2013). A learning management system for educational background should be able to do the following: (i) centralized and automate administration, (ii) self service and guided services, (iii) Speed in assembling and delivery of learning content, (iv) Integrated training initiatives on a web platform, (v) support for portability and standards, and (vi) content personalization and knowledge reusability feature (Sharma &Vatta, 2013).

Related Works

The literature in the individual acceptance and use of information systems recognizes different technologies acceptance models and frameworks of factors influencing user's adoption behaviour. The four most commonly quoted models in the literature are: (i) Technology Acceptance Model (TAM) (Davis, 1993) (ii) TAM2 (Venkatesh& Davis, 2000) (iii) The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al, 2003) and (iv) Diffusion of Innovation (DOI) by Rogers (1983).

The survey by Claar, Dias & Shields (2014), was carried out to measure several technology acceptance factors based on the technology acceptance model (TAM). The results supported the following relationships between the variables: Perceived Ease of Use (PE), has a significant positive influence on perceived usefulness (PU); Perceived usefulness (PU) has a significant positive influence on attitude toward using (AT); Perceived Ease of Use (PE) has a significant positive influence on attitude toward using (AT); Perceived Usefulness (PU) has a significant positive influence on Behavioral Intentions to use (BI); Attitude toward using has a significant positive influence on behavioral intentions to use.

The research by Nanayakkara (2007) investigated the factors that influence or restrain the adoption of e-learning systems in the universities, higher education institutes as well as polytechnics in New Zealand. The results revealed that while individual factors have significant contributions to the LMS adoption, the system as well as organisational factors are the most important for the acceptance of users in elearning platforms.

Lin, Lu & Liu (2013) reviewed and assessed models of behavioral intention which includes TAM, TAM2, TPB and UTAUT. This research generated a new conceptual model to explain the effect of teaching styles and learning styles on the extent of acceptance of e-learning systems. The proposed research model incorporates the above-mentioned constructs to understand system adoption more comprehensively and assesses e-learning management systems in higher education. In the study, the Education Behavioral Intention Model (EduBIM) was proposed as a new technology acceptance model.

The research by Alrawashdeh, Muhairat and Alqatawnah (2012) extended Unified Theory of Acceptance and Use Technology (UTAUT) using some factors involving flexibility of web

based training system, system interactivity and system enjoyment, so as to explain the employees' intention to use web based training system. The results of the research by Abu-Al-Aish & Love (2013), extends the UTAUT in the context of m-learning acceptance by adding quality of service and personal innovativeness to the structure of UTAUT and provide practitioners and educators with useful guidelines for designing a successful m-learning system.

Based on UTAUT, the study by Maina & Nzuki (2015) examined the influence of performance expectancy, social influence, effort expectancy and facilitating conditions on the acceptance of E-learning Management System (EMS) in institutions of higher learning in Kenya. The study found that expected performance, enabling infrastructures, institutional policies, training support and leadership and ease of use influenced the adoption of EMS in institutions of higher learning.

AlQudah (2014) applied Technology Acceptance Model's (TAM) extension to discover the attitude of staff towards Moodle. The results shows that the perceived ease of use (PEOU) is a more significant obstacle in adopting Moodle. This means that the instructors tend to use Moodle if they think Moodle is easy to use. PEOU refers to the degree to which instructors believe Moodle usage would be free of effort and it would be easy to handle. The study by Raman, Don, Khalid &Rizuan(2014) reported performance expectancy, facilitating conditions and social influence as having significant influence on the behavioural intention to adopt Moodle.

The study by Marchewka, Liu &Kostiwa (2007) describes student perception in terms of applying the UTAUT model. The UTAUT model combines earlier TAM related studies. Nevertheless, in this study, mixed reaction for this model was found in terms of the reliability of the scale items representing the UTAUT constructs and the hypothesized relationships. Although students tend to agree that Blackboard is good and they use it regularly, most of the software's features are not being used to their fullest capability.

Lwoga & Komba (2014) explored the factors that predict students' continued usage intention of web-based learning management systems (LMS) in Tanzania, with special focus on the School of Business of Mzumbe University (MU). The results reveal that actual usage was determined by self-efficacy, whereas continuous usage intentions of web-based learning system was predicted by performance expectancy, social influence, effort expectancy, self-efficacy and actual usage. Challenges for using web-based LMS were related to ICT infrastructure barrier, limited skills, weak ICT policies, LMS user interface was not user friendly, management and technical support, lack of awareness, lack of time to prepare e-content and use of the e-learning system and resistance to change.

To the best of our knowledge, no study has integrated the two social factor variables of *Technology Culturation* and *Power* to existing information system (IS) model (TAM, TAM2, UTAUT, DOI) to determine the level of acceptance of e-learning management system among higher institutions in Nigeria as a developing country.

RESEARCH MODEL AND HYPOTHESES

The following research questions were formulated for this study: (i) Can the UTAUT Model and SLT comprising Performance Expectancy, Social influence, Attitude, Technology Culturation, Power, Behavioural Intention and Student Grades be used to predict the acceptance of e-Learning Management System? and (ii) Will the establishment of the Behavioural Intention to adopt eLMS positively impact on student grades? The hypotheses in this section were formulated from the seven variables in the research model.

Performance Expectancy (PE): **PE is the degree to which an individual believes that using a technology will help to attain gains in task performance. It was predicted in this study that performance expectancy has a positive influence on student's behavioural intention to adopt eLMS which could impact positively on student grades.The results from the TAM-based study by AlQudah (2014) indicated that the perceived ease of use (PEOU) is a more significant barrier in adopting Moodle. Meanwhile, in the study by Maina and Nzuki (2015) and Raman et al., (2014), performance expectancy using UTAUT was discovered to influence the adoption of E-Learning Management System in institutions of higher learning. The study however considered eLMS as a general context, and was not specific on moodle, blackboard, etc. However, in this paper, SLT and UTAUT was engaged to ascertain level of relationship between performance expectancy and behavioural intention. Two Hypotheses (H) were formulated from PE as follows:**

> *H1-Performance expectancy has a positive influence on Student grades; and*
> *H2-Performance expectancy has a positive influence on behavioural intention to adopt eLMS.*

Attitudes (AT): **Attitude towards using technology is an individual's overall affective reaction to using a technology. Claar, Dias& Shields (2014) utilized the technology acceptance model (TAM) in their study and discovered that Attitude towards using has a significant positive influence on behavioral intentions to use. There is need to confirm if using UTAUT in this study, could have a positive influence on the intention to use eLMS, hence, the hypothesis:**

> *H3-Attitude towards the use of elearning has a positive influence on behavioural intention to adopt eLMS.*

Social Influence (SI): **SI is the degree to which an individual perceives the pressure from others (such as friends, colleagues, teachers, parents, leaders, etc.) influence the use of a particular technology. In the study by (Raman et al., 2014; and Marchewka, Liu &Kostiwa, 2007), significant relationship exist between social influence and behavioural intention to adopt eLMS. There was need to confirm this prediction with respect to the location (Ogun state) through this study. The relationship between social influence and eLMS was hypothesized in this study as follows:**

> *H4-Social Influence has a positive influence on behavioural intention to adopt eLMS.*

Technology Culturation (TC): **TC is a concept that represents a person's prior exposure to relative technologies like television, cable satellites, video games, etc. It assumes that this can affect an individual's acceptance of other ICTs or other advanced technologies subsequently (Nicholas-Omoregbe, 2015). In corroboration, Loch et al, (2003) argues that the degree of technological culturation is seen as influencing the extent of ICTs usage within a given society. Technology Culturation is the influence of technologically-advanced cultures on the attitude of an individual to technology (Okoli, 2003). Recent research on usage of ICTs argues the degree of technological culturation of a society impacts the usage of a technology by that society (Loch et al, 2003). Technology Culturation is hypothesized as follows:**

> *H5-Technology Culturation has a positive influence on behavioural intention to adopt eLMS.*

Power (PO): **PO is the energy that is produced by mechanical, electrical, or other means which is used to operate a device. Power, electricity and energy are often used interchangeably. According to eLAReport (2015), the problem of Nigeria is worsened by lack of adequate power. Frequent and irregular power supply in Nigeria has been a persistent problem affecting virtually all aspects of the economy, including education (Anene, et al, 2014). Chigbu and Dim (2012) reported that the problem of unsteady**

power supply is affecting technology integration in the Nigerian university. It was therefore necessary to confirm these claims with respect to the universities in Ogun State Nigeria. The relationship between power and student's behavioural intention to adopt eLMS was hypothesized as follows:

H6-Power has a positive influence on behavioural intention to adopt eLMS.

Behavioural intention (BI): BI shows the intention a user has to make use of a technology under a given behavior. It was predicted that student's behavioural intention to adopt eLMS has an encouraging influence on student grades.

H7-Behavioural Intention to adopt eLMS has a positive influence on student grades.

The proposed research model is contained in Figure 1with indicators, latent variables and hypotheses. The model integrates the *Technology Culturation* and *Power* constructs to understand the adoption of e-learning management systems in higher education more thoroughly in the socio-cultural context.The path model containing the path coefficient from variable to variable and from variable to indicators is shown in Figure 1. The coefficient of determination, R^2 for Behavioural Intention to adopt eLMS is 0.430 endogenous latent variable and Student Grades is 0.369. This means that the five latent variables (Performance Expectancy, Attitude, Social Influence, Technology Culturation and Power) moderately explain 43.0% of the variable in Behavioural Intention. Performance Expectancy and Behavioural Intention both explains 36.9% of the variance of performance of Students Grades.
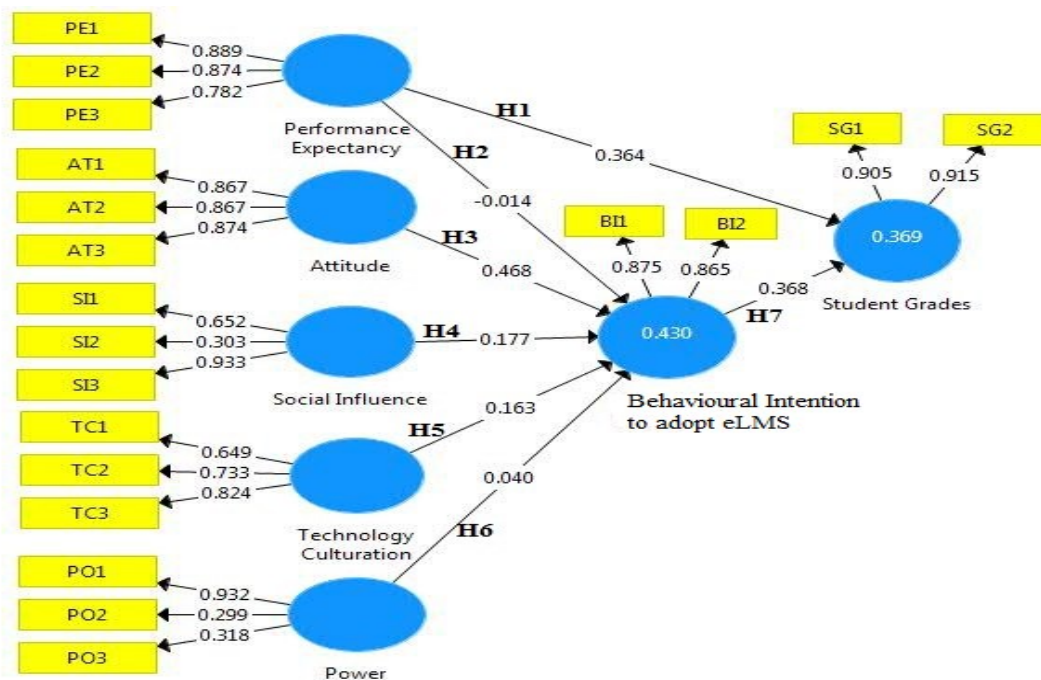
Figure 1. Research model and coefficient
Source: Survey Data (2015)

RESEARCH METHODOLODY

The research design of this study uses survey method for data collection. Samples were taken from undergraduate students from three (3) universities out of the eleven (11) private universities in Ogun State, Nigeria. The method of selecting the three (3)

universities was random sampling technique. The research instrument used was questionnaire and a sample size of 472 was considered for the study.

Data collection was conducted in the month of December, 2015. The questionnaire was structured into three parts. The first part asked questions relating to demographic details such as, gender, age, years of Internet/computer experience, eLMS in use, how many semesters they have been using eLMS. The second section investigated the factors for eLMS adoption. The section was divided into sub sections.

The section B questions on the questionnaire were based on seven variables (Performance Expectancy, Attitude, Social Influence, Technology Culturation, Power, Behavioural Intention and Student Grades). The participants were asked to rate three indicators under all the variables, except Behavioural Intention and Student Grades with two indicators. All the variables where rated on a scale from one to five, as strongly disagree, disagree, indifferent, agree, strongly agree, respectively. SmartPLS3 software was used to carry out the analysis and compute the loadings, factor loadings, R^2, Average Variance Extracted (AVE), Composite Reliability, Discriminant Validity and Convergence Validity.

DATA ANALYSIS

From the analysis, gender had 118 (25%) male and 354 (75%) female. Respondent's ages ranged from a minimum of 15 to a maximum of 19 (with an average age of 17 years). 227 (48%) of respondents between 6 and 10 years have used the Internet/Computer technology the most. The most used e-learning management system is Moodle 378 (80%). 109 (23%) said they have been using eLMS since 1 semester and 74 (15.6%) said since 6 semesters. All the demographic details are in Table 1.

Table 1. Demographic Data (N=472)

Items	Variables and Percentages
Gender	Male 354 (75%), Female 118 (25%)
Age	15 − 19 (68%), 20 − 24 (32%), 25 − 29 (0%), 30 and above (0%)
Years of Internet/ Computer experience	0-5 yrs (47%), 6-10 yrs (48%), 11-15 yrs (4%), 16-20 yrs (2%)
Which of these learning management system (LMS) is used by your school?	Moodle(80%), Blackboard(15%), WebCT(11), Others specify (4%)
How many semesters have you been using eLMSie Moodle, Blackboard, WebCT, etc	1 semester (23%), 2 semesters (11.2%), 3 semesters (83%), 4 semesters (7%), 5 semesters (12%), 6 semesters (15.6%)

Source: Survey Data (2015)

Measuring Reliability and Validity
The research model was tested for reliability and validity. A stable estimation was obtained given that the reliability test algorithm converged before reaching the maximum number of iterations. The algorithm converged only after 12 iterations (against the maximum number of 300, set as default in smartPLS), so the estimation is good. It is

important to establish the reliability as well as validity of the latent variables so as to complete the examination of the structural model. Table 2 shows the various reliability and validity items reported using smart PLS-SEM.

Table 2. Reliability and validity items

Latent Variables	Indicators	Loadings	Indicator reliability	Composite reliability	AVE
Performance Expectancy	PE1	0.889	0.790	0.886	0.721
	PE2	0.874	0.764		
	PE3	0.782	0.612		
Attitude	AT1	0.867	0.752	0.903	0.755
	AT2	0.867	0.752		
	AT3	0.874	0.764		
Social Influence	SE1	0.652	0.425	0.689	0.463
	SE2	0.303	0.092		
	SE3	0.933	0.870		
Technology Culturation	TC1	0.649	0.421	0.781	0.545
	TC2	0.733	0.537		
	TC3	0.824	0.679		
Power	PO1	0.932	0.869	0.553	0.353
	PO2	0.299	0.089		
	PO3	0.318	0.101		
Behavioural Intention	BI1	0.875	0.766	0.862	0.757
	BI2	0.865	0.748		
Student Grades	SG1	0.905	0.819	0.906	0.828
	SG2	0.915	0.837		

Source: Survey Data (2015)

From Table 2, the composite reliability values are shown to be larger than 0.6 for all the latent variables (except Power with 0.553), so high levels of internal consistency reliability has been demonstrated among all seven reflective latent variables (Bagozzi& Yi, 1988;Hair et al., (2012). To check convergent validity, each latent variable's Average Variance Extracted (AVE) is evaluated. It was found that all of the AVE values are greater than the acceptable threshold of 0.5 (except power with 0.353), so the convergent validity is confirmed as recommended by Bagozzi & Yi (1988). For indicator reliability, except for SE2 (0.092), PO2 (0.089) andPO3 (0.101), each indicator score higher than 0.4 threshold recommended for exploratory research (Hulland, 1999). This indicates that more than 75% of the indicators are reliable.

Table 3 shows the discriminant validity indicating that the value on top of each row is larger than other values in the column and its row, according to the theory in Fornell & Larcker (1981). Similar observations are made for all latent variables. The result shows that discriminant validity is well established.

Table 3. Discriminant validity

	Attitude	Behavioural Intention	Performance Expectancy	Power	Social Influence	Student Grades	Technology Culturation
Attitude	0.869						
Behavioural Intention	0.609	0.870					
Performance Expectancy	0.593	0.382	0.849				
Power	0.093	0.171	0.132	0.594			
Social Influence	0.386	0.405	0.362	0.226	0.680		
Student Grades	0.598	0.506	0.504	0.300	0.383	0.910	
Technology Culturation	0.478	0.442	0.302	0.302	0.267	0.498	0.739

Source: Survey Data (2015)

HYPOTHESIS TESTING AND DISCUSSION OF RESULTS

The T-statistics for significance testing of both the inner and outer model, and the results of the hypothesis testing are presented in Table 4.

Table 4. T-statistics of path coefficient (Inner model)

Hypothesis	Items	Path Coefficient, β	T Statistics	Remark
H1	Performance Expectancy -> Student grades	0.364*	9.269	Supported
H2	Performance Expectancy->Behavioural Intention	-0.014**	0.334	Not Supported
H3	Attitude->Behavioural Intention	0.468*	9.680	Supported
H4	Social Influence ->Behavioural Intention	0.177*	4.340	Supported
H5	Technology Culturation ->Behavioural Intention	0.163*	3.585	Supported
H6	Power ->Behavioural Intention	0.040**	0.431	Not Supported
H7	Behavioural Intention-> Student grades	0.368*	7.848	Supported

*p<=0.01; **p>0.05   Source: Survey Data (2015)

H1-Performance Expectancy has A Positive Influence on Student Grades

From Table 4, the path between Performance Expectancy and Student Grades was found to be significant (β=0.364, p<0.01), thereby supporting Hypothesis 1.

H2-Performance Expectancy has A Positive Influence on Behavioural Intention to Adopt eLMS.

The path between Performance Expectancy and Behavioural Intention to adopt eLMS was found to be insignificant (β =-0.014, p>0.05), thereby Hypothesis 2 was not supported. However, this result did not agree with the study of Abu-Al-Aish& Love (2013), and that of Maina and Nzuki, (2015).

H3-Attitude towards the Use of Elearning has A Positive Influence on Behavioural Intention to Adopt eLMS.

Individual Attitude (β=0. 468, p<0.01) has a significant influence on Behavioural Intention to adopt eLMS and thereby supporting Hypothesis 3. Infact, Attitude has the strongest effect, with a path coefficient of 0.468, giving emphasis to the important role of an individual's attitude in the use of eLMS technology. This result is similar to those found in the studies of Park (2009); Claar,(2014); Alharbi& Drew (2014); Wichadee (2015); Teoh& Hoe (2015); Rabaa'(2016); Adewole-Odeshi (2014); and Fidani & Idrizi (2012). However, a prior study by Amer, Ahmad &Jo (2013) gave a contrary result to this findings by reporting a lack of significant influence of attitude on behavioral intention to adopt eLMS.

H4-Social Influence has A Positive Influence on Behavioural Intention to Adopt eLMS.

Hypothesis 4 was found to be of high significance at p<0.01 (β=0.4340, p<0.01). (see Table 3).

H5-Technology Culturation has A Positive Influence on Behavioural Intention to Adopt eLMS.

Hypothesis 5 was found to be significant at p<0.01, (β=3.585, p<0.01)(see Table 3).

H6-Power has A Positive Influence on Behavioural Intention to Adopt eLMS.

Hypothesis 6 (Influence of Power on Behavioural Intention) was not significant (β=0.040, p>0.05).

H7-Behavioural Intention to adopt eLMS has A Positive Influence on Student Grades.

Hypothesis 7 was found to be significant at p<0.01. This outcome did not agree with the study of Klobas& McGill (2009) which found a weak relationship between Behavioural intention to adopt eLMS and students' grade.

The outer model can be explored by checking the T-statistic in the "Outer Loadings (Means, STDEV, T-Values)" window. As presented in Table 5, all of the T-Statistics variables satisfy the significant level criteria except PO2 and PO3 under Power. So, it can be concluded that the loadings are successful with nineteen out of twenty-one indicators showing significant levels in the outer model.

Table 5. T-Statistics of outer loadings

	Path Coefficient, β	T Statistics	Remarks
AT1 <- Attitude	0.867*	64.623	Supported
AT2 <- Attitude	0.867*	63.972	Supported
AT3 <- Attitude	0.874*	44.602	Supported
BI1 <- Behavioural Intention	0.875*	45.614	Supported
BI2 <- Behavioural Intention	0.865*	53.648	Supported
PE1<- Performance Expectancy	0.889*	70.486	Supported
PE2 <- Performance Expectancy	0.874*	64.336	Supported
PE3 <- Performance Expectancy	0.782*	26.489	Supported
PO1 <- Power	0.932**	2.112	Supported
PO2 <- Power	0.299***	0.970	Not supported
PO3 <- Power	0.318***	1.075	Not supported
SG1 <- Student Grades	0.905*	55.239	Supported
SG2 <- Student Grades	0.915*	85.033	Supported
SI1 <- Social Influence	0.652*	8.136	Supported
SI2 <- Social Influence	0.303*	2.938	Supported
SI3 <- Social Influence	0.933*	33.929	Supported
TC1 <- Technology Culturation	0.649*	10.680	Supported
TC2 <- Technology Culturation	0.733*	18.206	Supported
TC3 <- Technology Culturation	0.824*	30.209	Supported

*p<=0.01; **p<=0.05; ***p>0.05   Source: Survey Data (2015)

THEORETICAL IMPLICATIONS AND PRACTICAL SIGNIFICANCE OF THE STUDY

The two research questions were provided with their respective answers in this study. For the first research question, not all the UTAUT factors and one SLT factor of Attitude considered in this study have positive influence on the Behavioural Intention to adopt eLMS. Attitude, Social Influence and Technology Culturation all have significant influence on behavioural intention to adopt eLMS, whereas Performance Expectancy and Power does not have significant influence on the behavioural intention to adopt eLMS.Therefore, the prediction of expected performance of a technology among the selected universities in Ogun State Nigeria as part of the factors that could influence the acceptance of eLMS was not supported.

Against all expectations of the Power (electricity) supply problem in Nigeria, Power was not discovered through this study as one of the factors influencing the Behavioural intention by students in universities in Ogun state to accept eLMS. One of the reasons for this outcome may be that the universities used in this study are all privately owned where things arguably works. If this study is carried out probably in public universities in Nigeria, different findings may be discovered concerning Power influence on students' acceptance of eLMS. For the second research question, the establishment of Behavioural Intention to adopt eLMS comfortably predicted a positive influence on *student grades* with 0.368. This shows that the use of eLMS by students will positively influence *their grades*. However, this result was somewhat not in agreement with that of Klobas& McGill (2009), which found a weak influence of eLMS on students' grade.

Limitations of Current Study and Further Research

The main limitation of this study is premised on the fact that only three (3) private universities were considered in the survey out of eleven (11) private universities in Ogun State, Nigeria. Extending the scope to include public universities in Ogun State where we have the highest concentration of Universities in Nigeria is being suggested for further studies.

CONCLUSION

This study uses SLT and UTAUT to determine users acceptance of adopting eLMS among universities in Ogun State, Nigeria. Two social factor variables – *Technology Culturation* and *Power* were integrated with some existing factors of SLT and UTAUT to determine their significant relationship with Behavioural Intention to adopt eLMS. Findings from this research show that Performance Expectancy and Power have no significant influence on Behavioural Intention to use eLMS. Largely, the analysis of the survey results concludes that with the exception of few items, majority of the elements that have been recognized in the proposed model have a significant influence over user acceptance of e-learning management systems. The report from the study will assist stakeholders in planning, implementation and taking investment decisions on elearning systems.

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STUDENT TEACHERS' EXPERIENCES OF TEACHING PRACTICE AT OPEN AND DISTANCE LEARNING INSTITUTION IN SOUTH AFRICA

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ABSTRACT

This small-scale study focused on the experiences of student teachers towards teaching practice in an open and distance learning (ODL) institution in South Africa. The sample consisted of 65 fourth year students enrolled for Bachelor of Education, specializing in secondary school teaching. The mixed-method research design consisting of quantitative and qualitative approaches was used. Questionnaire and individual interview discussions were used as instruments for data collection. Descriptive statistics was used to analyze quantitative data. Content analysis was used to analyze qualitative data. The study revealed that student teachers experienced challenges with regard to on-time placement in schools, supervision and mentoring. Based on the findings, recommendations were made. Among others was that mentors and university contracted supervisors should be constantly empowered through workshops to work effectively in leading and guiding student teachers. On the issues of placement of students in approved schools, the university should consider implementing a system which will enable students to place themselves online. Placing students in approved schools is a major challenge for the ODL institution in South Africa given the great number of students that have to be placed in schools every year and the slow pace at which the institution is moving to integrate technology in addressing the problem.

Keywords: Teaching practice, open and distance learning, student teachers, experiences, South Africa.

INTRODUCTION

Higher education institutions offering teacher education programs in South Africa are required in terms of education policies to ensure that their students are placed in schools where they can interact with the realities of the classroom teaching and the broader school environment (Integrated Strategic Planning Framework for Teacher Education and Development in South Africa, 2011 – 2015; Minimum Requirements for Teacher Education Qualifications, 2011; Department of Basic Education and Training, 2011; Department of Higher Education and Training, 2011). This activity where student teachers are placed in schools in order to gain teaching experience is referred to as teaching practice (Department of Basic Education and Training, 2011; Department of Higher Education and Training, 2011). A number of concepts such as "practice teaching", "field studies", "infield experiences", "school-based experience" and "internship" are used in describing this activity (Taneja, 2000:35). However, the open and distance learning (ODL) institution under study prefers to use the term "teaching practice" over others since it embraces all the learning experiences of student teachers in schools.

Teaching practice has three major connotations, namely the practice of teaching skills and acquisition of the role of a teacher, the whole range of experiences that a student teacher goes through in schools and the practical aspects of the course as distinct from

theoretical studies (Nwanekezi, Okoli & Mezieobi, 2011). Therefore, teaching practice offers student teachers the opportunity to learn and develop as professional teachers along the dimensions of pedagogic knowledge, subject matter knowledge, pastoral knowledge, ecological knowledge, inquiry knowledge and personal knowledge (Mtetwa & Dyanda, 2003). Tillema, Smith and Leshem (2010) are of the view that during the teaching, student teachers experience a learning situation that is unique and different from campus-based learning as they are called upon to respond to new circumstances. In the same vein, Komba and Kira (2013) note that during teaching practice, student teachers observe subject teachers at work so as to learn about teachers' skills, strategies and classroom achievements. It is also the time when they evaluate their own teaching experiences through interactions with teachers and lecturers and, through self-reflection, implement a variety of approaches, strategies and skills with a view to bringing about meaningful learning (Komba & Kira, 2013). Thus, the underlying aim of teaching practice is to introduce students to, and prepare them for, the teaching profession (Ntsaluba & Chireshe, 2013). As a result, a student teacher may not graduate in South African Higher Education Institutions without having undergone the experience of teaching practice.

CONCEPTUAL FRAMEWORK

Teaching Practice as Part of Teacher Training Programs at ODL Institution in South Africa

The two most popular teacher training programs offered in South African Higher Education Institutions are the Post-Graduate Certificate in Education (PGCE) (a teaching qualification obtained after a first degree) and the Bachelor of Education (BEd) degree (an integrated four-year course in initial teacher education). However, the BEd degree program at the ODL institution under study consists of three phases, namely the Foundation Phase, the Intermediate and Senior Phase, and the Senior and Further Education and Training Phase. This kind of structure encompasses all phases of schooling in South Africa. The South African school education system incorporates four phases of schooling, namely the Foundation Phase, which includes the Reception year and Grades 1, 2 and 3; the Intermediate Phase, which includes Grades 4, 5 and 6; the Senior Phase, which is made up of Grades 7, 8 and 9, and the Further Education and Training Phase, which covers Grades 10, 11 and 12. Students may either enroll for the four-year BEd program, specializing in a particular phase, or combine two of the phases. For example, those who prefer teaching younger children would enroll for a BEd Foundation Phase (Grades R − 3), while those who prefer teaching older and much older children would enroll for a BEd Intermediate and Senior Phase (Grades 4 − 9) or a BEd Senior and Further Education and Training Phase (Grades 10 − 12) respectively. Teaching practice as a focus of this study is a component of the formal academic programs such as the Bachelor of Education (B.Ed) and the Post-Graduate Certificate in Education (PGCE) for preparing student teachers.

Reddy, Menkveld and Bitzer (2008) established that teaching practice for a Bachelor of Education (B.Ed) and a Post-Graduate Certificate in Education (PGCE) is organized in different ways in South African Institutions Higher Learning, ranging from weekly visits to schools for teaching practice and to block periods of school visits in others. At the ODL institution under study, it is organized in block periods (six weeks). This situation of variations in the number of days or weeks that student teachers spend in the schools including the manner of teaching practice supervision is similar to a variety of teaching practice models in Tasmania most of which include sequenced school placements supervised by cooperating teachers and university staff (Ntsaluba & Chireshe, 2013).

The research was undertaken following a concern raised by the review panel for the Higher Education Quality Committee (HEQC, 2008) which conducted a programs audit at the University of South Africa (UNISA), Open and Distance Learning Institution (ODL). A point of criticism in the report of the review panel relates to a compromised quality assurance in teaching practice component in both the BEd and PGCE programs. The report pointed out the following areas that needed to be improved: selection of schools, placement of student teachers, training of mentors and mentoring during the teaching

practice period, and assessment of student teachers' competence and feedback to the university (HEQC, 2008). It is on the basis of the HEQC report that this study was conducted solely to capture the views of the student teachers towards teaching practice at UNISA. Most studies focus on the importance of teaching practice and its supervision, and they exclude other concerns of student teachers, even though they are essential elements in their programs. Marais and Meier (2004) emphasize that the type of concerns student teachers encounter should be given more attention to enable proper organization and coordination of the teaching practice. The HEQC's criticisms referred to above, enabled formulation of the following main research question which guided this study was: What are the experiences in the teaching practice of distance learning students at UNISA?

Previous Research Studies on Teaching Practice in ODL Institutions

Internationally, teaching practice in Distance Education (DE) is an issue that has been researched for some time. Several studies on teacher training through Distance Education (DE) reveal that the organization of practice teaching for student teachers presents both logistical and educational challenges (du Plessis, 2013, Aldridge, Fraser & Ntuli, 2009). Problems facing practical teaching via DE include: the placing of students at approved schools, mentoring and supervising them during school visits, building relationships with all stakeholders, assessment, and feedback (du Plessis, 2013). Mubika and Bukaliya (2013) state that some problems in the training of teachers through ODL arise specifically from the nature of distance education among which are the factors to do with its scale, distribution of students, technology integration, tutors and schools, range of stakeholders and partners responsible for different tasks.

These authors further note that the assessment of students' competences during teaching practice remains problematic and contentious (Mubika & Bukaliya, 2013). Additionally, debates about the assessment of the practice of student teachers often reflect on-going philosophical debates about the nature of teacher education and traditional barriers between teachers and academics (Mubika & Bukaliya, 2013). Despite this, practice teaching remains a pillar of teacher education as it provides opportunities for evaluating in-service teachers in authentic environments (Mubika & Bukaliya, 2013)
In-service teachers enrolled in distance programs are usually in their place of work when they attend the teacher training programs. However, finding the means to assess their teaching practice eludes most institutions. Educational difficulties arise from the old problem of integrating theory and practice. Educational difficulties also arise from the fact that the task of supervising coupled with other duties makes it almost impossible for the teacher educator to witness as an in-classroom observer the wide range of instructional strategies that form the basis of an inquiry learning environment (Mubika & Bukaliya, 2013).

Due to numerous challenges encountered by DE, some institutions had abandoned supervision of teaching practice because of organizational difficulties. However, various alternative strategies have been put in place in attempts to mitigate the supervision needs of the teacher training program. For example, in Nepal peer-teaching sessions would be arranged to introduce a practical element to teacher education (Holmes, Karmacharya & Mayo, 1993). In Brazil where one of the teacher training programs had no capacity to supervise teaching practice, microteaching was incorporated into face-to-face sessions with teachers (Oliveira & Orivel, 2003). The Open University in United Kingdom, does not supervise teaching practice but has tried to link theory and practice by inviting teachers to report on their classroom experiences of ideas and practical activities covered in the course (Perraton, 1993).

Partnerships with various stakeholders in the teacher education program serve to maintain a clear understanding of the value of their program with people who may well be their future employers. In many countries where there are several providers of teacher education there can be competition for the use of schools. Under such

pressure the school/institutional links are especially vulnerable to the effects of misunderstanding. The supervision that occurs during field experience also reflects theoretical and practical conditions. During supervision both the mentor (also known as the cooperating teacher) and the lecturer, need to cooperate and find solution to the problems that may be affecting the teaching practice for teacher students. In some cases, it is also often the case that it is difficult for a teacher education institution to find sufficient schools in which to place their students (Mubika & Bukaliya, 2013).

On the issue of mentoring, Halloway (2001) states that the mentor generally takes on the role of mentoring and supporting student teacher from a sense of commitment to their profession rather than of commitment to any institution or for the remuneration. Such arrangements usually require the school or the mentor teacher to work exclusively with the contracted institution and thus close that link for other institutions and their students. Mentors need special preparation for their role so that the experience they provide links with the program goals. Therefore training of mentors is also a critical aspect before the mentors can be assigned to particular student teachers (Halloway, 2001)

RESEARCH METHOD

The study focused on the experiences of student teachers towards teaching practice in an open and distance learning (ODL) institution in South Africa. The research was conducted at UNISA, and more specifically in the Department of Teaching Practice, one of the biggest departments in the College of Education in the university. UNISA was selected for the following reasons: firstly it has a large student population compared with other universities in South Africa, and secondly it was easier for the researcher and author of this article to conduct this study as he is a lecturer in the College of Education at UNISA. This study used a mixed-method design which is the combination of qualitative and quantitative methods. Morgan (2014) contends that mixed-method helps answer questions that cannot be answered by qualitative or quantitative methods alone. The mixed-method design was found to be appropriate for this study as it would potentially yield a better understanding of the challenges faced by student teachers in an ODL context. In line with Cohen, Manion and Morrison (2007), qualitative data from individual in-depth interviews was used to complement quantitative data and for the purposes of triangulation.

Participants of the Study
The research study targeted 150 undergraduate distance education students who were in their fourth year of study enrolled for the module in teaching methods (subject didactics) of life sciences for a BEd degree, specializing in secondary-school teaching. The Life Sciences module was selected because it is one of the priority learning areas for the South African Department of Basic Education. The sampling ratio of 40% (n=60) was decided on, following the sampling guidelines as provided by Grinnel and Williams (1990:127), who consider performing basic statistical procedures on a sample of 40% as being sufficient. The sample may be relatively small for a quantitative study; but the sampling frame contained the complete target population. In addition, purposeful sampling was used to select the qualitative sample. Purposeful sampling occurs when individuals are selected who possess the characteristics or attributes of interest to the study (Creswell, 2013). Five (5) students as illustrated in Table 1 also in their fourth year of study were selected for qualitative interviews. These five (5) students did not complete the questionnaires for quantitative data. The entire sample of 65 students had already completed three cycles of teaching practice.

Table 1. Description of the qualitative research sample Student Teachers (N=5)

Gender	Female	3
	Male	2
Qualification & Phase	BEd (Senior & FET Phase)	
Pseudonyms of participants	Student A; B; C; D and E	5

Data Collection Tools

A non-experimental descriptive survey research design involving quantitative data was used to collect data from members of the population in order to determine their views toward teaching practice in an ODL context. A combination of questionnaire and semi-structured interview guides for individual interviews were used to collect quantitative and qualitative data respectively. A questionnaire consisting of 8 items, adapted from Caires and Almeida's (2005) Inventory of Experiences and Perceptions at Teaching Practice (IEPTP) was used to collect data. The questionnaire consisted of two parts. The first part was designed to elicit socio-demographic data from the students teachers and contained closed questions (multiple-choice or yes/no questions). The second part of the questionnaire, represented in Table 2 was designed to elicit information on the degree of agreement with the item statement presented on the questionnaire following the purpose of the study. The items in this part of the questionnaire were also closed questions.

Individual interview discussions with fourth year student teachers were conducted in order to obtain a better understanding of a problem or an assessment of a problem, concern, new product, program or idea (MacMillan & Schumacher, 2006). The semi-structured interview guide was used to generate information on the challenges faced by the student teachers in an ODL context. An expert in teacher education discipline checked on the relevance of the instruments' items for both quantitative and qualitative. Furthermore, to ensure quality of qualitative data, participant or member-checking was used to confirm with the participant that the data were what the research participant meant.

Data Collection Procedure

The researcher distributed the questionnaires with the aid of lecturers and supervisors who supervised students during teaching practice. Other questionnaires were self-administered by the researcher since he is involved in the supervision of student teachers during teaching practice in schools. The questionnaires were collected on the spot. All distributed questionnaires were returned. Five (5) students who participated in the interviews were purposefully selected from the group of students who did not complete the quantitative questionnaire. The rationale was to determine if the information provided in the questionnaire would be confirmed or reputed or elaborated upon when a different approach was used. Interviews were conducted after working hours and each interview lasted for thirty minutes. The researcher took notes during individual interviews and to enhance accuracy mechanically recorded the discussions with the use of an audiotape recorder.

Data Analysis

The researcher made use of descriptive statistics to analyze data collected by way of questionnaires. Qualitative data were analyzed with the content analysis method, one of the qualitative data analysis strategies (Cresswell, 2009). For content analysis, first, data were coded by dividing the text into small units and unitized until themes and relationships were identified. Verbal codes reflecting or illustrating the main findings from the interview discussions were presented.

Ethical Considerations

The questionnaire contained a section explaining the purpose of the study, confidentiality and the voluntary nature of the study. The participants gave informed consent verbally. However, confidentiality was guaranteed by making sure that the data could not be linked to individual respondents by name since the participants were not requested to write their names on the questionnaires (Ntsaluba, 2012).

FINDINGS AND DISCUSSIONS

Findings from Quantitative Questionnaire
Biographical information

Participants provided biographical information regarding age, gender and ethnicity, and the phase and the sector they would prefer to teach the following year. The majority of the participants (70%) were aged below 30 years, thus being able to offer several future years to the teaching profession. The gender balance was expectedly uneven with 80% being female participants and 20% being male participants. This situation confirms the notion that most men do not wish to enter the teaching profession (Mokoena, 2012).

Table 2. Biographical information (N=60)

Student Teacher Gender	Frequency	%
Female	48	80
Male	12	20
Student Teacher Age	Frequency	%
30 and younger	42	70
31-39	12	20
40 and above	6	10

Responses from closed questionnaires items
Table 3. Responses of student teachers (N=60)

	Variables	Yes Frequency	%	No Frequency	%
1	Were you placed on time at the school not far away from where you live?	10	33	50	83
2	Were you placed in a well-resourced school?	35	58	25	41
3	Were you supervised during your teaching practice in schools?	15	25	45	75
4	Were you supervised by the University lecturers?	20	33	40	66
5	Was the supervision arranged by the University?	60		0	
6	Was the supervision beneficial towards your training as a teacher?	36	60	24	40
7	Were you assigned a mentor during the practice teaching?	40	66	20	33
8	Was the mentoring beneficial towards your training as a teacher?	25	41	35	58

Results in Table 3 show that 83% of the student teachers indicated that they were not placed on time in approved schools in order to do their teaching practice. This is the biggest challenge Unisa is faced with, that is placing more than 20 000 students in a year using manual system (phoning-in the schools). Therefore, there is a need for the university to re-visit the current student placement system. Again, 75% indicated that they were not supervised while placed in schools for teaching practice. This problem could be linked to a shortage of supervisors. At this stage the University is relying heavily

on contracted supervisors and mentor teachers in schools to assist the student teachers during teaching practice. This is an unsafe approach which might compromise quality given the concerns raised by the review panel for the Higher Education Quality Committee (HEQC) which conducted a programs audit at UNISA. For instance, student teachers who were supervised, 58% indicated that there was no meaningful mentoring. The student teachers might have experienced the feelings expressed by Maphosa, Shumba and Shumba (2007) that the mentors saw student teachers as relief teachers, who ended up taking full loads while mentors took a back seat. This disheartened the student teachers because such behavior is contrary to the concept of mentorship wherein the mentor operates normally in his or her classroom with the student teachers observing and learning and not given full charge of classes when they would still be learning the trade.

Maphosa, Shumba and Shumba (2007) also expressed another observation that, while some mentors overloaded student teachers during practice teaching, others might not have confidence in the student teachers and consequently they would not leave their classes in the student teachers' care. Others would not let student teachers to teach at any given time because they felt that student teachers would delay and waste learners valuable time and they would not be able to finish the syllabi on time. This might result in the student teachers getting discouraged and experiencing feelings of inadequacy and loss of confidence in their ability to teach. Such feelings of inadequacy could have negative influence on student teachers perception of the teaching profession.

Findings from Qualitative Interview Discussions

The study focused on the experiences of student teachers towards teaching practice in an open and distance learning (ODL) institution in South Africa. And the following research question guided this study: *What are the experiences in the teaching practice of distance learning students at UNISA*? The raw data that was collected from face-to-face interviews were studied, analyzed and generated themes are presented in in Table 4 after which a detailed explanation of the themes is given.

Table 4. Generated themes from qualitative data analysis

Research question	Generated themes
What are the experiences in the teaching practice of distance learning students at UNISA?	Theme 1: Placement
	Theme 2: Supervision and assessment procedures
	Theme 3: Effectiveness of teaching practice in improving student teachers' teaching skills

Theme 1: Placement

The majority of the participants shared frustrations that they experience especially with regard to their placement in approved schools. Some students blamed the teaching practice office/unit at UNISA which do not responded to their queries timely. As student teacher A stated:

> *Since there are many of us including students from other Universities we struggle to get space especially in good schools where we can be nurtured so that we become good teachers. Another problem relates to communication breakdown with the teaching practice unit at Unisa. Sometimes they don't answer phones and it frustrates us especially if you are stuck and you can't find a good school closer to where you stay to do practice teaching.*

These views complement the results obtained from the questionnaire. This finding confirms problems facing teaching practice in DE institution like Unisa which include a

challenge of placing of student teachers in approved schools to undertake teaching practice (du Plessis, 2013). It also became apparent during the interviews that some schools are willing to accommodate student teachers, however, at some schools there is poor management, non-existent timetables, lack of staff and non-mentoring all these impact negatively on the practice, leaving some students demotivated and disillusioned.

Theme 2: Supervision and assessment procedures

As indicated earlier in this article, teaching practice is an integral part of Bachelor of Education (B.Ed) and Post-Graduate Certificate at Unisa, a DE institution. In support of this, module lecturers are expected to design workbooks, visit schools during teaching practice and are available to students to discuss problems. During the interviews it emerged that some students, especially those who have registered a four a year degree qualification were visited twice others once over the three cycles of teaching practice. For example, student teacher C had this to say:

> *Last year when I was doing my second teaching practice no one from the university visited me. And how do they expect us to be effective teachers on completion of our degree if they do not support us.*

Sharing the same view, student teacher D remarked as follows:

> *The following week will be my last week doing teaching practice at this school. However, I have not been visited by any of my lecturers or supervisors. I do not know whether it will be possible for the remaining week to be visited and have the needed assessments.*

Analysis of these quotations from the student teachers is an indication that the supervision of student teachers during teaching practice was ineffective despite HEQC audit report which urged lecturers at Unisa to improve students' experience of teaching practice (HEQC, 2008). Again, these views reiterate a compromised quality assurance issue raised in the HEQC report.

Theme 3: Effectiveness of teaching practice in improving student teachers' teaching skills

Apart from the organization of the teaching practice, the researcher was also curious to know from the participants if teaching practice had improved their teaching skills. According to Caires and Almeida (2005:112) teaching practice represents "a unique opportunity for the development and consolidation of a significant variety of knowledge and skills" for the vast majority of student teachers. During the interviews, student teacher B had this to say:

> *No! In my opinion, teaching practice is not effective at all in improving our teaching skills. How can it be effective when we are not supervised and assessed the way it is recommended? In some instance we do not receive the required number of visits and assessments and there are occasions when some of us are not assessed the whole teaching practice period.*

In the same vein, student teacher A remarked as follows:

> *How can you expect effectiveness in teaching practice while the supervision and assessment is not up to the scratch? For example let me tell you something that you might not be aware of...when lectures or supervisors come assessments, most of them do not stay longer in the classroom throughout the lesson or until the lesson ends. Some stay only for only ten minutes whereas the lesson is forty minutes. How can you we be effective in that case, that's impossible.*

When these quotations are carefully analyzed, these injustices could be linked to the limited number of lectures or supervisors who are always in a rush to assess large number of students within a short space of time, especially at this time when students' enrolments rate has increased at Unisa.

CONCLUSION AND RECOMMENDATIONS

In true spirit, UNISA can produce good teachers through teaching practice. However, the quality of the program tends to deteriorate with the increasing numbers of students needing placement in schools. As the student enrolment increases, some students are placed in schools with inadequate facilities. The former reduces the control of students placed in schools and the latter reduces the relevancy of the program. Far from gaining valuable experience, students may be exposed to depressing conditions in schools which are hostile to the principles and methods supported by the university teaching practice unit. Instead of reinforcing theory, the experience may make it appear irrelevant. In order to build positive attitude of students towards teaching practice at UNISA, we propose the following:

> ➢ Problems facing the teaching practice unit at UNISA include the placing of more than 20 000 students at approved schools every year for teaching practice, the turn-around time in placing such a big number in approved schools, the shortage of supervisors to support and evaluate student lessons, the lack of support strategies, and contracted supervisors who lack knowledge and skills to evaluate certain critical learning areas, such as mathematics, science and technology. Another major challenge relates to the slow pace at which the university is moving to integrate technology in addressing the problem.

Given the great number of students that have to be placed in schools every year, the university should introduce an online placement system where students can place themselves by a click of a computer or a cell phone button. However, prior arrangements should be sought with the affected schools to ensure that students are accommodated without any difficulty. In addition, the affected ODL institution should enter into an agreement with the Department of Education to ensure that all the schools are loaded on the system. In fact all relevant stakeholders should be consulted and participate towards the design of the software. Figure 1 serves as guideline on how the envisaged system should be designed to alleviate the challenge relating to student placement at UNISA.

Log-in with the student number

⬇

Select Province

⬇

Select City / Town

⬇

**Select type of school
(Primary, Secondary, Foundation)**

⬇

Name of School

⬇

Select supervisor

⬇

Date for assessment/Visit

⬇

Send confirmation by SMS to the Supervisor/Lecturer

⬇

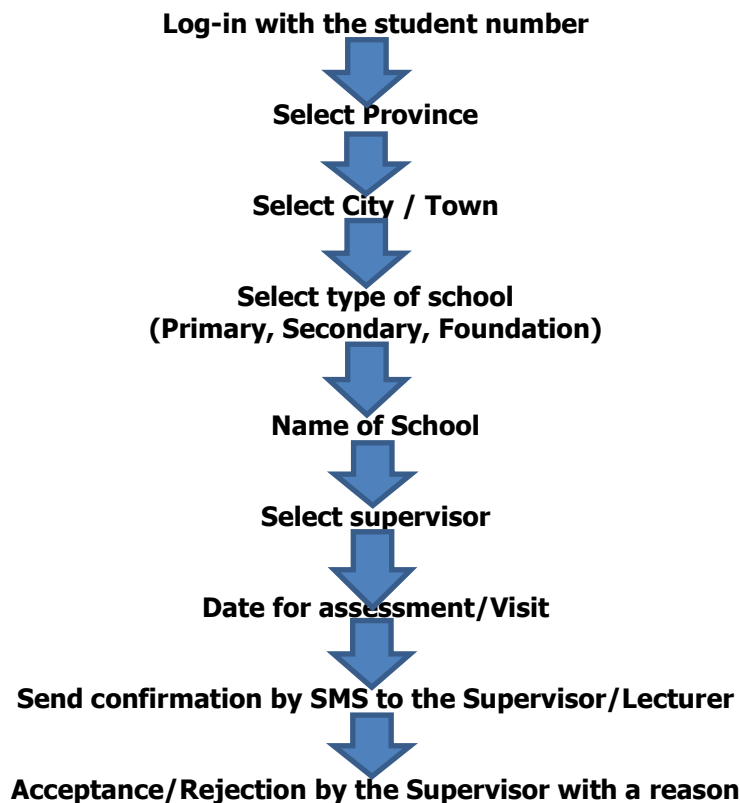**Acceptance/Rejection by the Supervisor with a reason**

Figure 1: Proposed Online Student Placement System

- > There should be a teaching practice handbook for the students so that they can follow a uniform method of preparing a lesson. Rules and regulations of practice teaching should also be stipulated in this handbook.

- > In addition to the handbook, a "Teaching Practice Guidebook" is required. Such a guidebook will outline the procedures of teaching practice modules. It will also deal with the following: how a school is chosen /allocated; introduction to the school; allocation of subjects / learning areas in each level of school education in South Africa; and the involvement of mentor teachers. The visit by UNISA supervisors should also be explained in detail so that student teachers will know what to expect and to do during the visit.

- > While some respondents indicated that the supervision and mentoring were beneficial towards their training, others felt exploited and unsupported by the mentors. The study therefore recommended that teacher training institutions should work hand in hand with the schools and organize workshops to empower and support mentors. This would mean identifying the mentor teaches with the assistance of the schools – especially school management – to ensure that the student teachers know from the start what is expected of them, their full responsibilities and to what extent they can be assisted in becoming well qualified and quality teachers in South Africa.

- > Receiving schools should be encouraged to be positive about teaching practice. Teaching practice should not be seen as an evaluation or assessment of whether one is a good teacher or not, but should be about the qualities, passion, commitment and willingness to make a difference in people's lives, especially the learners and the communities around the schools.

- > Peer support should be encouraged during teaching practice. This means that teachers must be encouraged to work harmoniously with the students in giving advice, general assistance and mentoring. This will possibly inspire the student teachers as it eliminates the fear of the teaching practice environment by encouraging the culture of collegiality and togetherness. This will hopefully improve the attitudes of the student teachers, based on their experiences of teaching practice.

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A COMPOUND LAMS-MOODLE ENVIRONMENT
TO SUPPORT COLLABORATIVE PROJECT-BASED LEARNING:
A CASE STUDY WITH THE GROUP INVESTIGATION METHOD

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ABSTRACT

Collaborative project-based learning is well established as a component of several courses in higher education, since it seems to motivate students and make them active in the learning process. Collaborative Project-Based Learning methods are demanded so that tutors become able to intervene and guide the students in flexible ways: by encouraging them to develop independent solutions and also by keeping their efforts and activities targeted towards the lesson goals. Students, on the other hand, need to develop important skills in searching and analyzing information as well as in communication and time management. In this paper, we propose the design of a collaboration script, following the "Group Investigation method", to support the tutors and students of a collaborative project-based course on 'DataBases'. We implemented this script using a compound e-learning collaborative environment based on MOODLE and LAMS, which have provided tutors with several tools and methods to involve in the learning process. The evaluation of the students' projects and the comparison with the corresponding projects of the previous academic year showed a better level of collaboration and performance of the students but also proved that the learning environment offered the tutors a more efficient way to guide their students in Collaborative Project-Based Learning.

Keywords: Collaborative project-based learning, collaboration script, group investigation method, LAMS, Moodle.

INTRODUCTION

Many tutors/educators, as a part of their courses within an academic semester, assign individual or group projects to their students. These projects – depending on the nature of the course – are usually complicated enough and require continuous support from tutors (Donnelly & Fitzmaurice; 2005).

Project-Based Learning (PBL) is an instructional (and curricular) learner-centered approach that empowers learners to conduct research, integrate theory and practice and apply knowledge and skills to develop a viable solution to a defined problem (Savery, 2015). It is an individual or group activity that goes on over a period of time, resulting in a product, presentation, or performance. It typically has a timeline and milestones, and other aspects of formative evaluation as the project proceeds.

Collaborative learning (CL) approaches seem to promote learning through the interactive engagement of students in activities, while at the same time getting them involved in a social learning experience. There has been evidence (Johnson & Johnson, 1998; Hake, 1998; Vogiatzaki & Avouris, 2010, Avouris et al, 2010) that such approaches have a positive effect on the learning outcome. In particular, Hake has reported the results of a wide-scale survey study that involved pre- and post-test data from first year courses in Physics. This survey involved over 6,000 students in the US. He compared performance in

this test of students of traditional and active engagement courses. The results of this large-scale study show a great advantage of the interactive engagement and, in particular, of the collaborative learning approach.

Free collaboration, with its unstructured interactions, does not necessarily by itself produce the interactions we want so as to promote learning. One way to enhance the effectiveness of collaborative learning is to structure interactions by engaging students in well-defined scripts of action. Technology - via the continuously expanding Learning Management Systems (LMSs) - offers the ability integrating new information and communication tools (e.g. multimedia, simulations, external representations, group awareness widgets and coordination tools) as useful for enhancing cognitive performance (Thompson, McGill, 2014).

LMSs like Moodle, LAMS, Blackboard, Collage, Sakai, etc. are online collaboration platforms that integrate a range of internet-based tools that allow learners to do things together online. This may include online conversations in forums and email lists, the co-creation of documents on wikis, file sharing and storing, etc. Such tools provide a range of services for designing, managing and delivering online collaborative learning activities in addition to authoring environments for creating sequences of learning activities. Most of the LMSs provide a lot of collaboration and communication tools to support information sharing and communication among learners in a course and, through these, enable collaborative learning. Some of them support unstructured collaboration spaces that group course participants exploit and offer an open interface for communication and sharing of knowledge and experiences (Talavera & Gaudioso, 2004).

A script is a sequence of phases and each phase can be described by attributes (Dilllenbourg, 2002). A collaboration script is a set of instructions prescribing how students should form groups, how they should interact and collaborate and how they should solve the problem at hand. The need for using scripts emerges from the fact that collaborative learning is a complex process where it is very difficult – if not impossible – for the instructor to consider all interacting parameters in order to foster productive learning experiences (Dillenbourg et al, 1995). Instead, it is suggested that the instructor guides the learners' interactions within the group by implementing an appropriate structure (O'Donnell et al, 1992). In this way, the probability of productive student-to-student and student-to-teacher learning interactions is increased. Scripting collaborative learning has commonly been reported to result in improved learning outcomes (Hertz-Lazarowitz & Miller, 1992; Weinberger et al, 2002; Kollar et al, 2005; Rummel & Spada, 2007).

Scaffolding collaboration can increase the probability of successful learning outcomes (Fischer et all; 2007). CSCL scripts embedded in (Dillenbourg & Jermann, 2007), or interpreted by (Hernandez-Leo et al., 2006c) e-learning environments aim to shape the way learners interact with each other to elicit fruitful interactions. The design of effective scripts is a non-trivial task that requires significant expertise in, and knowledge of, the possibilities and risks of structuring collaboration (Fischer et al., 2007).

Recent approaches (such as the design studio by Mor & Mogilevsky, 2013) consider the value and benefits (if not the inevitability) of using and combining multiple tools and design representations (Conole, 2008) for the elaboration of complex learning activities, such as projects in academic courses.

Students of the Computer Science Sector of the Department of Electrical and Computer Engineering of the University of Patras, Greece, attend, in the 8th semester as part of their undergraduate studies, the elective Course "Databases". The course includes both theory and lab sessions for engaging the students in "hands on" work. The course traditionally involved lectures on ERD designing, database schema designing and managing using SQL. Since the academic year 2005-2006, in order to encourage more

active student participation, tutors have been giving students collaborative projects on different subjects. The way they have worked all these years has been as follows: Students would choose a partner among their fellow students and a project subject among 15-20 possible projects subjects. Then, they would collaborate for a six-week period in order to create the requested deliverables which are: a Report with database ERD, SQL code of tables and queries, an application to run a database through it and the application User Manual. Students would use a Moodle environment as their usual LMS to work and case specific tools to handle the database. If the students of any group had questions about the project, they had to contact the course tutors to help them. In the final week of the semester, an oral presentation of all projects was organized.

From our teaching experience in previous academic years, and pre-mentioned work, we verified the necessity for structuring the learning and collaborative process more in order to help students achieve better learning results and tutors supervise the learning process more efficiently. For these reasons, we diagnosed the need for a collaborative learning environment, which would have characteristics and capabilities that support students and tutors. For students, the compound learning environment must: a) divide whole tasks in sub-tasks, b) manage their available time for each sub-task better, c) help them to finish all sub-tasks that have to be completed, d) scaffold their collaboration through synchronous and asynchronous communication tools or shared workspaces. Also, it would provide tutors with some capabilities like: a) monitoring and evaluating the cognitive process employed by the students, b) supervising students' collaboration in order to improve it, c) guiding and prompting the students synchronously or asynchronously.

In this general frame, we deemed it appropriate to use a compound collaborative environment consisting of Moodle, LAMS and other specific to the case tools to offer students and their tutors some of the pre-described capabilities. The experience of organizing, supporting and evaluating student projects during the last academic year 2012-13 and comparing student project grades with the previous year's ones, is the focus of this paper. The created collaboration environment enabled us to investigate whether Scripted Collaborative Learning would lead students to better cognitive results. Also, we were able to see the advantages and weaknesses of each of the used LMSs and discover if their integration covers one another's weaknesses. The rest of the paper is organized as following: Section II refers to the related literature, Section III describes the method used on the compound LAMS-Moodle environment, section IV the design of the script and the methodology and section V discusses the results of the whole experience for both students and their tutors.

RELATED LITERATURE

Jarvela et al. (2015) give an illustrative example using technological tools to support that successful collaboration in CSCL contexts requires targeted support for promoting individual self-regulatory skills and strategies, peer support, facilitation of self-regulatory competence within the group.

The Prieto et al. (2014) study suggests that there is no single "silver bullet" tool for editing learning designs or CSCL and that teachers appreciate different kinds of support, depending on the moment and the concrete task at hand. Their data also suggests that learning design and CSCL script tool designers should not neglect other features that are not necessarily related with the act of designing itself. Such features include the connection of the tool with the teachers' learning platform of choice, the cost of integrating the tool into the existing workflow/practice, with its different restrictions (and which may even be variable with time).

Carlos Alario-Hoyos et al. (2014) present GLUE! and GLUE!-PS, two alternative routes for the deployment of collaborative learning situations that respectively tackle the integration of multiple external tools in multiple Virtual Learning Environments (VLEs),

and the deployment of abstract learning designs generated within multiple authoring tools in multiple VLEs. To support their tool, they show an authentic CSCL situation, in which an academic course teacher who uses Moodle, needs drawing tools and collaborative text editors with more features than Moodle built-in tools have.

Ernie Ghiglione et al. (2009) show how using the LAMS Tool Contract provides a flexible architecture to incorporate learning activities to create elaborate learning designs using LAMS' highly visual environments.

Bower & Wittmann (2009) gauged the perceptions of sixty-eight teacher education students of each of these systems as frameworks for designing learning experiences. Their responses indicated that the majority of students appreciated that different tools were suitable for different purposes.

Masterman et al. (2009) investigate experienced teachers' initial perceptions of learning design as a conceptual framework for practice through its instantiation in either LAMSv2 or Moodle. In this study, the participants' perceptions of 'learning design' as a practice were examined based on experience designing in one or other of the tools, with a general consensus that such approaches were useful for structuring learning, catering to a range of abilities and motivating students.

Walker and Masterman (2006) have examined the issue of learning design reusability based on participants' use of either LAMS or Moodle, with attitudes towards reuse being more favorable than the extent to which designs were reused in practice.

The final report of the ALeD (Authoring Using Learning Design) project (Joint Information Systems Committee, 2007) concluded that LAMS and Moodle were both effective for designing and facilitating online learning where there is a strong emphasis on sharing, collaboration and reflection. However, all the aforementioned studies compared tools to each other, and no one reports on the benefits of their integrated use.

THE COMPOUND ENVIRONMENT AND METHOD

In order to achieve the objectives discussed in the introduction section, during the academic year 2012-13, we created a collaboration environment using Moodle, LAMS and application-specific external tools in the course site. In this way: a) students did not change their familiar Moodle environment, in which they had been doing their laboratory exercises; b) the LAMS environment gave us the ability to structure the whole process better, organizing the phases, and giving students the necessary directions and tools they needed. Also, via the LAMS Monitor environment, we could watch student progress in each phase and give suitable help when asked; c) if there were some questions from two or more students/student groups, we could upload general directions for them through the Moodle environment; d) LAMS provided students with the ability to use external tools, when its toolbar couldn't support task-specific activities (e.g. create UML flowcharts, ERDs, SQL tables and queries) necessary to design, create and manage a database.

LAMS

The Learning Activity Management System (LAMS -http://www.lamsfoundation.org/) is an e-learning system for authoring, managing and delivering online collaborative learning activities. It has the power to present in a complete and functional way different activity structuring techniques. It provides the appropriate support to develop a collaboration approach through shared workspaces, wiki editing, Q&A, multiple choice, voting activities and other synchronous and asynchronous communication tools, such as forums and chat rooms, where group members can exchange ideas while providing an open-source platform for designing, managing and delivering online learning sequences (LAMS International, 2009). It also includes a range of pre-installed plugins for web-conferencing, mapping exercises, image creation, spreadsheet tasks and more, which enable students to integrate a variety of new activities into their learning designs. These features allow LAMS to be effectively used to develop pre-service teachers' learning

design skills (Bower, 2008; Cameron, 2006, 2007; Kearney & Cameron, 2008). However, LAMS is not appropriate for sharing general directions to all project groups simultaneously.

MOODLE

The Modular Object-Oriented Dynamic Learning Environment (Moodle - http://moodle.org/) is a free source Learning Management System (LMS) with millions of users and courses around the world and, like LAMS, it also offers the ability to create chats, forums, wikis, online quizzes and disseminate resources. It does not come with the same range of pre-installed plugins as LAMS; however, it does have a strong development community offering hundred modules and plugins that can be installed at the administrator's discretion. Its main use is to present in the same environment all course materials ordered in units and ready for consultation with students (Dougiamas & Taylor, 2003). Nonetheless, the Moodle environment does not have the necessary tools to set the specific order/flow in which students complete the activities. Consequently, it is not recommended as reliable support for scripted learning.

The Group Investigation Collaboration Method

For the implementation of the proposed collaborating Environment, the Group Investigation Collaboration method (Sharan, S., & Hertz-Lazarowitz, R., 1980; Sharan Y., & Sharan, S., 1994) was used. We selected this collaboration method because, according to Sharan (Sharan, 1980; Tan, 2006), it is appropriate for Problem-Based Learning. Students form interest groups, within which they plan and conduct an investigation, and synthesize their findings into a group presentation for the class. The teacher's general role is to make the students aware of resources that may be helpful while carrying out the investigation.

It is based on the four main elements of the learning process, namely: 1) Investigation, 2) Interaction, 3) Interpretation, 4) Intrinsic motivation. During the employment of this method, groups work on similar problems using versatile approaches. The whole process leads to the active construction of knowledge.

In a Group Investigation context, student groups plan, conduct, and report on in-depth research projects. These projects provide opportunities for students to study a topic extensively and gain specialized knowledge about a specific area. Allowing students to select topics of special significance to them, to form interest groups and to carry out their own research can be very motivating. This method also helps students recognize that research does not always follow the same series of steps but is, instead, context-dependent. Students learn that good research is a logical, well-organized endeavor that differs from one discipline to another, from one project to another, and even from one researcher to another. When students complete a Group Investigation, they enhance their understanding of the importance of discovery. When they participate in peer and teacher review of their projects, they gain practical experience in both giving and receiving constructive criticism. Finally, because, in conducting the investigation, the group follows a series of steps and is working within a time frame, it discourages plagiarism, a phenomenon sometimes associated with conventional term paper assignment.

METHODOLOGY

Project Preparation and Execution

First, the tutors in the course announced 15 possible project themes in the Moodle Environment. The projects were optional and they contributed by 20% to the total grade of the course. Some typical examples of projects undertaken were: Hospital, Supermarket, Music Library, etc. One theme was open, so students could suggest the project theme they wanted.

The students had 5 days to choose a partner on their own as well as a project. We selected this group formation method because self-selected groups seem to work best in

small classes, who already know each other, especially when the collaboration time is not very long (Walvoord, 1986).

Then, the project problems were allocated to the groups and detailed instructions about projects and the way that they would be graded were given. Finally, 20 from a total of 37 students in the course took on projects. 16 students formed 8 pairs, while 4 students did their projects individually.

The Activity Flow of the Course

The proposed learning flow for the course consisted of four separate phases of computer-mediated collaborative problem-solving activities (table 1), irrespective of whether students worked in pairs or not. Each phase was organized according to the previously mentioned Group Investigation Collaboration method. As the underlying strategy is Project-Based Learning, the overall structure leads user activities to a global goal, which consists of individual phases and sub-tasks that are carried out using several tools of LAMS and external tools, when needed.

This activity had the objective of stimulating the students to work as a group for a considerable amount of time, of compelling them to get involved in organizing their activities and making optimal use of the available tools and resources, and of giving to the students the opportunity to deal with a complex problem that required much more advanced programming skills and knowledge than that introduced in the frame of the course.

Table 1. The 4 Phases of the Collaboration Script.

PHASES	Learning Objects	Tools	Deliverables
Phase A	ERD Logical diagram	Chat Forum Wiki Synergo DBDesigner	Report ERD (.synergo) Logical diagram (.xml)
Phase B	SQL tables and queries	phpMyAdmin	Report SQL
Phase C	Application Interface	PHP or Java	Application
Phase D	Testing & Documentation		Manual

The learning design of the course, according to the structure introduced in table 1, was implemented in LAMS, where we defined the tasks and the scheduling of the whole activity (Figure 1). The students, after the general directions that were given by their tutors, downloaded their project and began to work in four phases. Each phase was organized according to the Group Investigation method. Firstly, with a noticeboard LAMS tool, we gave specific directions to the students about what to do in each phase. In phase A, we additionally used a Mindmap LAMS tool to allow students to organize their concepts and ideas about the project theme. With the Chat, Forum and Wiki LAMS tools, we gave them the ability to collaborate with each other synchronously or asynchronously. If there were questions that could not be answered by the other member of the group, or if there were questions from students who worked individually, we could check them via the LAMS monitor environment, and give the requested help. When a similar question was

asked by more than one group/individual, we would upload the answer in the Moodle Environment, so that all students could see it. Finally, with the Submit Files LAMS tool, each group's members/individual could upload each phase deliverable.
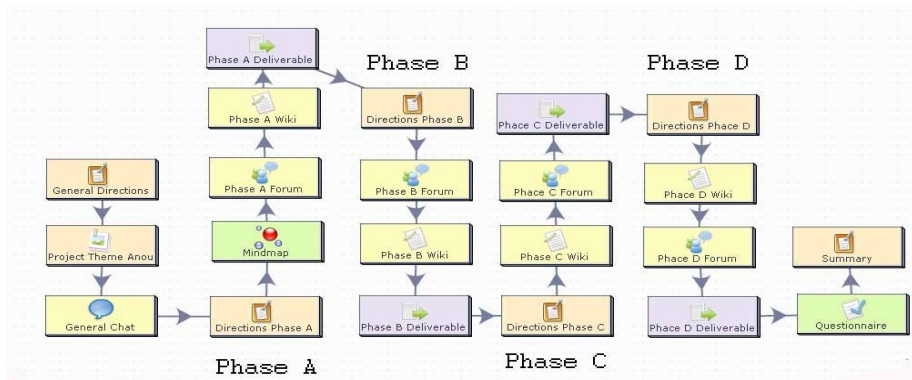
Figure 1. LAMS sequences in which the 4 different phases are obvious, each one designed according to the group investigation method.

Students had a six-week period for project work. With the LAMS monitor environment, we watched each group's/individual's progress in the LAMS sequence in order to offer appropriate help when asked. If someone delayed in an activity, we motivated him by giving the help needed for them to overcome any difficulties. Also, we kept a diary of the process in which we noted the detailed student activities, the time each one took to complete them and the kind of help we offered. This helped us to present our learning experience as described in the Results Section which follows.

After the end of the fourth phase, we gave students via the Survey LAMS tool an evaluation questionnaire for them to describe their whole experience. With this, we wanted to analytically explore the participants' experience and their personal beliefs about the proposed collaborative method and the supporting environment. The questionnaire had been authored following a multi-faceted approach, combining qualitative and quantitative data, and was constructed taking into consideration theoretical assumptions of multiple literature perspectives (Gillham, 2000; Oppenheim, 1992; Sapsford, 1999), in order to clarify certain goals. Qualitative data were recorded through follow-up observation data during the whole procedure and individual face-to-face conversations with some students who were randomly selected.

RESULTS

The students delivered their reports using the Submit Files LAMS tool, which is the last tool of each phase. Two students asked for three days extra time from the set project deadline, which was granted to them. In the final week of the semester, an oral presentation of all projects was organized. The students' final grades, for those who worked in groups, were based by 80% on the quality of the given solution and by 20% on the collaboration through the compound environment. We applied this grading method so as to motivate the students to use our proposed script.

The results were very encouraging. All group members/individuals ran almost all activities in their LAMS sequences and they had active participation, which helped them to elaborate on their projects.

As we can observe in Table 2, where we compare student grades in projects in the Academic years of 2011-12 and 2012-13, their mean grades increased significantly (mean difference 1.17). We think this happened due to the following: a) the whole project was split in 4 sections (phases), with specific instructions about each section's deliverable; b) all students could estimate better the whole time that was required for each section and schedule work according to their available time; c) the students had a supporting environment with synchronous and asynchronous activities, which gave them the ability to interact with each other and with their tutors. In this way, they could have their questions answered with less effort and more quickly than in the previous year. Also, we can see in Table 2 that Standard Deviation decreased considerably (Standard deviation difference=0.5). A possible interpretation for this finding is that the compound environment and the followed collaborative method helped weaker students to improve their knowledge and, consequently, their grades.

Table 2. Students' Project grades comparison.

Academic Year	Number of Students	Mean (1-10 scale)	Std. Deviation
2011-12	16	7.87	1.63
2012-13	20	8.70	1.13

In table 3, we compare the grades of the students who worked in groups with those of the students who worked individually. However, because of the rather small number of students who worked individually, we cannot reach safe conclusions.

Table 3. Students' Project grades comparison 2012-13.

Students	Number of Students	Mean (1-10 scale)	Std. Deviation
Worked in groups	16	8.90	0.83
Worked individually	4	8.00	1.73

All the students who took part in the projects completed our evaluation questionnaire. 18 were male and 2 female. All of them had been taught programming languages during their previous years of studies with most programming skills related to C, Java and JavaScript. Regarding their acquaintance with the course subject, most of them had no previous experience with designing, implementing and handling databases. 40% had not used any Database Management System before, 20% had used Microsoft Access, 20% Mysql and 15% SQL Server and 5% other. Student answers to our questions are shown in the following Table 4.

In the question of what they had liked more about the compound environment as concerns the collaboration between them and their tutors, the students answered: the ability for very constructive and direct help with the questions during the project, the step-by-step guidance during all phases that did not allow room for misunderstandings, the wiki LAMS tool, which allowed students/tutors to make collaborative edits to the content provided, and the forum LAMS tool, with which they could post their questions and receive answers from their partners/tutors.

Table 4. Student answers to our questionnaire.				
Which do you prefer more, collaborative or individual projects?				
Collaborative 65%			**Individual** 35%	
How satisfied are you with the help offered by your partner?				
Very satisfied 90%	**Satisfied** 10%	**Neutral** 0%	**Dissatisfied** 0%	**Very Dissatisfied** 0%
Did you ask for help from your tutors?				
Yes 75%			**No** 25%	
To what degree are you satisfied with the help given by your tutors?				
Very much 55%	**Much** 15%		**Neutral** 30%	
To what extent did your tutors help you when asked for help during the project period?				
Very much 33%	**Much** 42%		**Neutral** 25%	
Do you think Moodle alone was adequate to give you the necessary help?				
Yes 10%			**No** 90%	
The compound environment and the followed method helped you with your project.				
Strongly agree 15%	**Agree** 35%	**Neutral** 35%	**Disagree** 10%	**Strongly Disagree** 5%
How much did the compound LAMS-Moodle environment help in the direction of your being given the help you wanted by your tutors?				
Very Much 23%	**Much** 46%		**Neutral** 31%	
Do you think projects divided into separate phases are better for your time scheduling?				
Strongly agree 30%	**Agree** 45%	**Neutral** 15%	**Disagree** 10%	

In the following Figure 2, you can see the possible correlations between the students' answers to the previous questions and their project grades. We interpret the degree of any correlation by both the shape and color of the graphic elements. Any variable is, of course, perfectly correlated with itself, and this is reflected as the diagonal lies on the diagonal of the graphic. Where the graphic element is a perfect circle, then there is no correlation between the variables. The colors used to shade the circles give another clue to the strength of the correlation. The intensity of the color is maximal for a perfect correlation and minimal (white) if there is no correlation. Shades of red are used for negative correlations and blue for positive correlations.
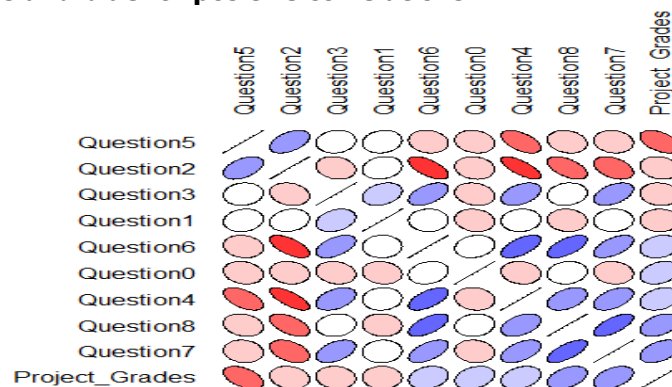

Figure 2. Statistical Analysis where you can see questions and Project Grades correlations.

As negative points of the environment, some student mentioned: collaboration time increased because they had to collaborate strictly via the offered tools; the mind map LAMS tool had synchronization problems; the Submit Files LAMS tool had only 1MB maximum upload file size and did not allow them to delete their older submissions. Because students selected their partners on their own, some of them preferred to collaborate face-to-face, in this way bypassing the Moodle-LAMS environment.

The two tutors that were engaged in the process as supervisors wrote their remarks on this learning experience in a draft report. Their main remarks were: a) LAMS proved to be an adequate tool to apply scripted learning, which enabled them to apply the pre-mentioned script exactly as they had designed it; b) the LAMS monitoring environment was excellent for analytically watching each student's progress and providing appropriate help when it was asked. In the following table 5, we can see the Students' and the tutors' asynchronous collaboration via the LAMS Forum tool. For example, in Group 1, Phase A, the tutor answers to 1 post by a student. The same happens in Group 1, Phase C. In Group 5, phase B, student 2 answers student 1's post, and the tutor answers student 2's post. The students with individual projects asked more times for face-to-face help than the students who worked in groups; c) the Moodle environment was suitable for giving general directions and uploading files, when tutors decided that something had to be announced to all project participants simultaneously; d) the LAMS monitoring environment needs to be enriched with an intelligent module for supervising the whole learning process.

Table 5. Student and tutors Posts in the LAMS Forum Activity.

		Phase A Forum	Phase B Forum	Phase C Forum	Phase D Forum
Group 1	**Student 1**	1		1	
	Student 2				
Teacher replies		1		1	
Group 2	**Student 1**	1			
	Student 2		2		
Teacher replies		1	2		
Group 3	**Student 1**		1		
	Student 2		1		
Teacher replies			2		
Group 4	**Student 1**	1	1		
	Student 2	1	1		
Teacher replies					
Group 5	**Student 1**		1		1
	Student 2		2		1
Teacher replies			1		
Group 6	**Student 1**		1		
	Student 2				
Teacher replies			1		
Group 7	**Student 1**	1		2	
	Student 2	1		2	
				Face to face help offered	
Teacher replies		2			
Group 8	**Student 1**			1	
	Student 2				
		Face to face help offered		1	
Teacher replies					
Individual 1		1		1	
Teacher replies		1		1	
Individual 2			1	1	1
			face to face help offered	1	1
Teacher replies					
Individual 3			2	2	
				face to face help offered	
Teacher replies			2		
Individual 4			1		
			face to face help offered		
Teacher replies					

DISCUSSION

This paper has attempted to be prove the importance of combining the tools two widely used LMSs offer and the structure that a CSCL script gives, in order for: a) students to achieve a better level of collaboration and finally better final grades in the course and b) for tutors to help them as much as possible.

Learning with the use of ICTs and the abilities they offer intrinsically appeals to students, thus leading them to increase their active participation. The new stance towards learning is to be move it from a purely individual and externally programmed endeavor (i.e. planned and executed with the aid of a teacher) to learning in and with groups in a problem-based or inquiry-based situation. This is the case not only in the classroom but also in distributed environments offered via LMSs, which are used widely for a range of purposes in Tertiary Education and offer many different abilities to tutors and students alike (Alharbi & Drew, 2014; Toland et. Al, 2014).

On the one hand, tutors need to get involved in procedures where they utilize rich media content and digital collaborative tasks, in a way that corresponds to their classroom needs and the contextual background of classroom community and offer chances of enhanced interaction. They increasingly see new information and communication technologies integrated into CSCL as useful for enhancing cognitive performance (Kirschner et al. 2014; Johnson & Johnson 1999) and stimulating knowledge construction (Stahl, 2004). Participant tutors' opinions evolved over time as they discovered both the LMSs tools and the activity of learning design, and as they carefully consider whether the benefits of using such an environment outweigh the cost of adopting it in their courses.

On the other hand, students need to get to grips with the new era communication and collaboration tools that seem to dominate the global marketplace and reclaim their features maximally. Students in CSCL environments have reported higher levels of learning (Hertz-Lazarowitz & Bar-Natan, 2002) and have been shown to make higher quality decisions, deliver more complete reports, participate more equally in the learning process (Fjermestad 2004; Janssen et al. 2007), and engage in more complex and challenging discussions (Jarvela et al., 2008) than when working alone. They have also reported higher levels of satisfaction compared to students in contiguous groups (Fjermestad 2004).

Qualitative and quantitative data gathered by the evaluation questionnaire at the end of the whole process indicated that both tutors and students had a positive stance towards the compound environment, which they found usable and user-friendly. The two tutors felt that the compound environment, as a web-based learning environment, fostered student interaction, team cooperation and had the potential to bring about educational change by means of student interaction and active involvement. Participant students confirmed this attitude, as could be seen from their answers.

One critical question was: "Does the compound environment offer all the necessary tools for the teaching of any course?".

Designing a general system with its materials, its examples, etc. to make it attractive for widely different teachers and subjects is not an easy task at all. Every course has its own particularities and it is practically impossible to design a general applicable environment that implements the original IMS-LD dream of "design once, deploy anywhere" (Prieto et al., 2011, 2013). Technical courses, such as Databases, in particular, need more tools than the two LMSs offer. For this reason, we used external tools such as DBDisigner, Synergo etc. In this regard, utilizing systems that deploy learning designs, regardless of the design representation (such as GLUE!-PS, see Prieto et al., 2013; Alario-Hoyos et al.,2014), might be of help.

Other functionalities that are also mentioned quite frequently in the literature and can be added to the environment in the future are: the ability of the system to work (all or a part of it) offline, the provision of initial templates to speed up design work, tools with an accessible vocabulary, group and resource instantiation automations, simplicity of use, etc.

A frequent statement stressed by the participant students was "Why choose online interaction when we can interact by using speech in the real world of the classroom or of our homes". It was argued that the limited time of the course does not give the opportunity for extensive peer interaction, nor can it foster the students' ability to retrieve informational schema and resources. Also, without the detailed guidance that the CSCL script offers, free collaboration, with its unstructured interactions, entails the danger of the students getting lost. Of course, face-to-face interaction remains an integral and irreplaceable part of the whole learning process. Blended learning can make the most of both face-to-face and e-learning approaches, expanding the borders of today's learning process. On the other hand, there were some statements that opposed this approach, noting that students already spend too much time on chats and online discussions, where common language regulations are rather violated.

Finally, we consider that the success of the environment is obvious from the data responses to the question "Would you like to use the same compound environment with the same or another script for a given project in another course", where 15 out of 20 students and both tutors agreed.

Some limitations in our project were the following: a) the relatively low number of students who took part in the project prevents our conclusions to be statistically generalizable. But in real conditions, almost always the number of students who select an elective course isn't very big; b) the fact that the two tutors who constituted the evaluation team composed of proponents of the proposed environment (which may have introduced biases); c) despite our efforts to minimize such effects, our study still was concerned with a single intervention of limited duration (one academic semester), which lacks the validity of a more longitudinal study of usage. However, these limitations are offset by the rigorous triangulation of techniques, data sources and informants performed in the analysis. Indeed, far from pretending to have the last word said in this direction of research, we have tried to discover emerging themes to be explored in future studies.

CONCLUSION AND FUTURE WORK

In this paper, we have tried to investigate if collaboration scripts applied via a compound LMS environment helped students and their tutors to achieve better cognitive results in a Collaborative Project-Based Learning course. In order to support them during a course on 'DataBases', we designed a collaboration script, following the "Group Investigation method", and we implemented this by creating a compound e-learning collaborative environment based on two of the most popular LMSs, namely, MOODLE and LAMS. The evaluation of the students' projects, the comparison with the corresponding projects of the previous academic year and the students' opinions in the distributed evaluation questionnaire showed that the integration of the two LMSs and the followed CSCL script provided both students and their tutors with more tools and methods that were not available in each single LMS and led to a better level of collaboration and finally better final grades for the students of the course. In a future work, the LAMS-Moodle environment could be expanded with the use of a tool like Glue (see relative literature section) in order: a) to enable the easier sharing and reuse of learning designs and b) to allow teachers to widen the array of tools they can choose from to enact their learning activities, enabling them to select external tools that they (or their students) might already be familiar with (e.g. Google Documents). Also, we want to use the same compound environment with different CSCL Scripts and different group formation methods. Finally, the extended LAMS and Moodle log file analysis will help to better understand the underlying collaboration mechanisms.

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THE FLIPPED WRITING CLASSROOM IN TURKISH EFL CONTEXT: A COMPARATIVE STUDY ON A NEW MODEL

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ABSTRACT

Flipped learning, one of the most popular and conspicuous instructional models of recent time, can be considered as a pedagogical approach in which the typical lecture and homework elements of a course are reversed. Flipped learning transforms classrooms into interactive and dynamic places where the teacher guides the students and facilitates their learning. The current study explores the impact of flipped instruction on students' foreign language writing skill which is often perceived as boring, complex and difficult by English as a Foreign Language (EFL) learners. The study compares flipped and traditional face-to-face writing classes on the basis of writing performances. Employing a pre- and post-test true experimental design with a control group, the study is based on a mixed-method research. The experimental group consisting of 23 English Language Teaching (ELT) students attending preparatory class were instructed for fifteen weeks through Flipped Writing Class Model while the control group comprising 20 ELT preparatory class students followed traditional face-to-face lecture-based writing class. Independent and paired samples t-tests were carried out for the analyses of the data gathered through the pre- and post-tests. The results indicated that there was a statistically significant difference between the experimental and control groups in terms of their writing performances based on the employed rubric. It was found that the students in the experimental group outperformed the students in the control group after the treatment process. The results of the study also revealed that the great majority of the students in the experimental group held positive attitudes towards Flipped Writing Class Model.

Keywords: Flipped classroom, flipped learning, foreign language writing.

INTRODUCTION

Being one of the productive skills, writing in a foreign/second language is attached great importance as learners are expected to reach an adequate proficiency level in written communication. Within this context, contemporary language learning and teaching methods encourage communication, therefore writing skill needs to be practiced in language classes as much as possible. For this reason, research on second language writing has gained recognition as a new field of research in recent years (Matsuda & De Pew, 2002; Silva & Brice, 2004). While research on second language writing has showed an increase, quantity of research on foreign language writing is still limited. However, in the last few years, research on foreign language writing has started to gain importance and has found a place in the literature (Ekmekci, 2014). The reason for this is that writing in English as a foreign language (EFL) context is assumed to be more difficult than writing in English as a second language (ESL) context. The distinguishing factors between EFL and ESL writing context are explained as the ESL and EFL learning environments, contrasting characteristics of each group of learners, strong emphasis on English language writing and research in the ESL context, and different teaching approaches in ESL and EFL instruction (Reichelt, Lefkowitz, Rinnert, & Schultz, 2012, cited in Ekmekci,

2014, p.1). Apart from the hardship in writing associated with the EFL context, the other problem rising in foreign language writing classes may be related to students' negative attitudes towards writing. Sharples (1993) indicated that the nature and complexity of writing in a foreign language context may demotivate the students, lead them to discouragement, and result in negative attitudes. Development of positive attitudes towards writing is an integral part of writing development (as cited in Ekmekci, 2014, p. 2).

Considering the above-mentioned disadvantages foreign language writing teachers may encounter in classes where students have limited opportunities to practice the target language, teachers should be encouraged to revise their styles of instruction to minimize difficulties and try to create more enjoyable, motivating, and self-reliant classes. Within this context, it is recommended that foreign language teachers integrate technology into the classroom (Purcell, Buchanan & Friedrich, 2013). As asserted by OECD report (2015), educators and learners should be provided with learning environments which support 21st-century skills to be successful in tomorrow's world. In this sense, integration of todays' students' Information and Communication (ICT) skills into learning process will probably yield better results in terms of language learning and production.

Being aware of the need to minimize the disadvantages in foreign language writing classes, foreign language teachers and researchers have been looking for new ways of providing writing instruction to make students better writers and improve their writing skills. Some researchers focused on students' perceptions and attitudes of foreign language writing instruction. For instance, upon analyzing 50 EFL students' composition, Rushidi (2012) concluded that writing is not attached so much importance by the students as speaking is, but different genres of writing can be used to help students improve their writing skills. Consequently, writing was no longer considered an intimidating process. McCarthey and Garcia (2005) stated that students' writing practices and attitudes toward writing were influenced by home backgrounds and classroom contexts. Kobayashi and Rinnert's (2002) findings on students' perceptions of first language literacy instruction and its implication for second language writing highlighted the L1 and L2 writing relations. The writers' aim was to clarify the gap between L1 instruction and its effects on L2 performances (as cited in Ekmekci, 2014, p. 6).

With regard to the new ways of instruction, several researchers (Arslan & Kizil, 2010; Cumming & Riazi, 2000; Disli, 2012; Hashemnezhad & Zangalani, 2012; Mirlohi, 2012; Pooser, 2004; Sun, 2010, cited in Ekmekci, 2014) have identified different methods of writing instruction to make writing courses more enjoyable, easier, interesting and motivating. The techniques they identified included processing instruction, launching web sites specifically for writing instruction, using blogging software, online writing, and employing computer-assisted writing activities. There were an adequate number of studies employing technology in writing classes, but the flipped writing class model has not been emphasized in the literature. For this reason, the current study introduces a relatively new method in EFL writing classes and tries to uncover potential benefits of flipped instruction by comparing it with the traditional face-to-face instruction.

FLIPPED LEARNING

Flipped learning is a relatively new instructional method which emphasizes effective use of class time by changing the traditional tasks of teachers and students inside and outside the classroom. In flipped learning, students' roles as passive lecture listeners change to active participants in classroom activities (Baepler, Walker & Driessen, 2014; Davies, Dean & Ball, 2013; O'Flaherty & Phillips, 2015). They are expected to watch pre-recorded lecture videos or study notes the teacher provided them at home before coming to class. They can review videos at their own pace and pause to take notes or review an important point. In the classroom, students engage in active learning by studying in groups or

individually. The teacher is there to provide individualized help for troubleshoot and give feedback when needed. Students have a chance for additional practicing and support. The teacher's presence ensures that the students will be guided and helped whenever they are confused.

This method is called Flipped as it takes the presentation or lecture part which is traditionally done in the classroom and has placed that as pre-class work. In the flipped model, what is traditionally homework is done in the class where students can get immediate feedback and support as they try to apply what they have learned (Anderson, 2012). Internet connection may be a problem for some students. In order to overcome such problems, when teachers create the information to be used outside of class, they can easily put it on a CD for students to take home or students can download it to their memory cards directly. This will allow the students to watch the videos and follow the materials via their smart phones, tablets, or computers. A flipped classroom is actually one way of employing blended learning to facilitate how students can access information and get the maximum benefit by being fully involved in the learning process (Anderson, 2012, as cited in Ekmekci, 2014, p. 56-57).

Actual implementation of flipped learning dates back to 2007 when two chemistry teachers in Woodland Park, Colorado, Jonathon Bergmann and Aaron Sams began recording videos and screen casting in order to compensate for the lessons their students missed because of competitions and other events. They created videos of their lectures and posted them online for their Chemistry and Advanced Placement Chemistry classes during 2007-2008 school year. The instructors required the students to take notes on the videos and come to class with one thoughtful question to ask and share. After the teachers flipped their classroom, they reported that students began interacting more in the class and time could be used more efficiently and flexibly. They found that this new technique allowed them to spend much more time with students and to provide them with immediate feedback when needed.

The flipped classroom is one of the blended learning approaches which has been recently recognized as an alternative instructional strategy. It is described by Educause (2012) as

> '..... a pedagogical model in which the typical lecture and homework elements of a course are reversed. Short video lectures are viewed by students at home before the class session, while in-class time is devoted to exercises, projects, or discussions. The video lecture is often seen as the key ingredient in the flipped approach, such lectures being either created by the instructor and posted online or selected from an online repository' (p. 1).

A pre-recorded lecture could be a podcast, other audio format, or a video. However, flipped learning is generally identified as including video lectures that can be accessed and viewed easily anywhere and anytime, which proves the ubiquitous nature of flipped learning. Bergman and Sams (2012) state that teacher-created videos that students watch are not the crucial point in flipped classrooms. Flipped learning is not about how to use videos in lessons, but about how to best use in-class-time with students. The ideas behind a flipped classroom are based on such concepts as active learning and participation, student involvement, blended course design, and course podcasting. The flipped classroom is a kind of workshop in which students can ask questions about lecture content, evaluate their skills, and interact with each other through hands-on activities. The role of instructors in flipped classrooms is to guide and advise students during the class hour (Educause, 2012).

Table 1. Comparison of Class Time in Traditional versus Flipped Classroom

Traditional Classroom		Flipped Classroom	
Activity	*Time*	*Activity*	*Time*
Warm-up activity	5 min.	Warm-up activity	5 min.
Go over previous night's homework	20 min.	Q&A time on video	10 min.
Lecture new content	30-45 min.	Guided and independent practice and/or lab activity	75 min.
Guided and independent practice and/or lab activity	20-35 min.		

According to Bergman and Sams (2012, p. 15), in the traditional model, students having completed their homework at home come to the class with a set of questions in their minds. After the beginning warm-up, teachers have to allot almost 20 minutes to deal with their homework related questions. At least 30 or 45 minutes is spent presenting the new content, and only 20 or 35 minutes is left for guided and independent practice. On the other hand, in the flipped classroom, after a 5- minute warm-up activity, because students having watched the related video-lecture at home, they can ask their questions about the new content and the teacher has about 10 minutes to answer questions. The remaining 75 minutes is allocated to guided and independent practice and/or lab activity. As evidenced by the table, flipped classroom provides students with more time to practice using extensive hands-on or problem-solving activities and exercises.

White (2012, as cited in Ekmekci, 2014, p. 58) provides an example of a flipped math class by focusing on the main differences between standard and flipped classrooms and what students are expected to do at home and at school.

Table 2. A Comparison of Standard and Flipped Math Class (White, 2012)

	At school	At home
Standard classroom	Student listens to teacher introduce new math topic	Student goes home and tries to do homework, often unsuccessfully and without the opportunity to get questions answered in a timely manner.
	At home	**At school**
Flipped classroom	Student watches brief video explanation of new topic online, or reads new material to be discussed in class the next day.	Student works on "homework" problems, with teacher answering questions or providing clarifying follow-up as necessary.

(Source: http://hybridclassroom.com/blog/?p=819)

As is seen in the table, expectations from the students about what to do at home and at school are reversed in the flipped class. In the flipped learning model, students get more chances to practice and do follow-up activities in-class-time after watching the videos created by the teacher. This leads to active learning, the creation of a student-centered, autonomous learning environment and provides opportunity for increased student and the teacher interaction.

Teachers in the flipped classrooms are defined as efficient, reflective, and masters at relationships. They are efficient because they can use time effectively. Much of the time is

devoted to classroom practice, thus increasing collaboration between students. They are reflective as they constantly monitor themselves and this fosters their teaching skills in terms of content and pedagogy. Students' success is accordingly affected positively. Teachers are also defined as masters at relationships since flipped learning enables them to build close interaction between students and parents (McCammon, 2013, as cited in Ekmekci, 2014, p. 67).

Relevant Studies

Studies on flipped classroom are limited, but studies on flipped language learning classrooms are much more limited. Very few studies investigate the impact of flipped learning on students' achievements and attitudes in foreign language classes. Basal (2012) introduced the implementation of a flipped classroom in English Language classes and offered some suggestions. After applying the flipped model in 2012-2013 fall semester in Foreign Languages Education Department of Yildiz Technical University in the "Advanced Reading and Writing I" course, he concluded that the attitudes of the majority of the students towards using a flipped learning model were positive. The researcher used students' excerpts of reflections to support his conclusion.

In another study similar to Basal's, Nicolosi (2012, as cited in Ekmekci, 2014, p. 73) focused on grammar teaching through flipped classroom techniques. The researcher emphasized the misunderstandings of flipped classroom by explaining that flipped classrooms are not all about watching videos at home and doing homework in class, but it involves a dramatic mentality change both in the delivery of instructional and in the students' learning process. Upon implementing flipped grammar lessons, the researcher revealed that the flipped method gave her a chance to become more aware of students' metacognitive abilities. She also added that the flipped model provided the students with teacher support when needed.

Likewise, Hung (2015) investigated the impacts of flipping the classroom on English language learners' academic performance, participation levels, and learning attitudes. Developing three different formats for flipped teaching, the researcher found that the structured and semi-structured flipped lessons enable learners to get better outcomes, to develop better attitudes, and to devote more effort to the learning process. More recently, Bauer-Ramazani, Graney, Marshall & Sabieh (2016) attempted to define and describe the flipped learning and investigated the possibilities to promote language acquisition in the context of Teachers of English to Speakers of Other Languages (TESOL). They also reported the possible benefits and challenges of the new method.

Perez and Riveros (2014) reported on the challenges and successes teachers and learners experienced during two semesters in a Colombian higher education institution where flipped classrooms were used. The findings of the study revealed that both students and teachers adapted to new environments and tools, optimized available materials, and developed resourcefulness. Students' success was attributed to self-efficacy, self-regulation, personalized tutoring, and constant interaction with tutors. In another study, Huang and Hong (2015) investigated the effects of flipped English classroom on students' ICT and reading comprehension. The results indicated that students' ICT and reading comprehension skills improved significantly subsequent to flipped learning treatment process.

METHOD

This study is a mixed methods research in which the researcher applies both quantitative and qualitative data collection instruments. The quantitative model used in this study is a pre- and post-test true experimental design with a control group. The reason for choosing true experimental design is that there is random assignment of the subjects in the study. As for the qualitative model used in this study, the researcher makes use of semi-structured interview for obtaining necessary data about the efficiency of Flipped Writing Classroom model and the attitudes of the experimental group towards the new model.

Participants

The population of the study consists of students attending English Language Teaching (ELT) Preparatory Class at School of Foreign Languages, Ondokuz Mayis University in the fall semester of the 2013 – 2014 academic year. The sample of the study is composed of two groups attending the ELT Preparatory Class. One of these classes is assigned as the experimental group randomly and the other one constitutes the control group. The average level of the students is B1 (intermediate) in accordance with the descriptions of Common European Framework of References for Languages (CEFR). Experimental group consists of 23 students. 20 females and three males constitute this group. Control group is composed of 20 students, 16 of whom are females while four of whom are males. 17 students in the experimental students are graduates of Anatolian High School, while the remaining six are of Anatolian Teacher Training High School. Likewise, in the control group, seven students are graduates of Anatolian Teacher Training High School, while ten students are of Anatolian High Schools. Only one student reports that she graduated from a General High School, while two students graduated from a High School abroad.

Data Collection Process

As data collection instruments, scores on the argumentative paragraph rubric and responses on the semi-structured interview were used in the study. Disli's (2012) argumentative essay rubric was modified and adapted by the researcher. The adapted rubric consists of six dimensions; a) organization and structure, b) relevance and content, c) lexical range/word choice, d) grammar/sentence structure, e) mechanics, and f) overall section which evaluates the whole paragraph. The components of the rubric were determined according to the argumentative paragraph checklist students used for peer feedback and ideas emphasized in teacher-created videos. Cronbach's Alpha of the rubric in pre-test was calculated as, 863 *(N: 43), and,* 954 (N: 43) in post-test, which were acceptable values for implementation. To ensure the reliability and *face validity* of the rubric employed, two experts who were PhD candidates attending ELT PhD program in Gazi University and Hacettepe University were consulted and the components and items in the rubric were revised over time in accordance with the feedback obtained.

As the pre-test of the study, subjects in the experimental and control group were asked to write an argumentative paragraph about a topic they would choose from the three topics provided by the researcher. Subsequent to fifteen weeks' treatment through Flipped Writing Class Model, students were asked to write an argumentative paragraph again about the same topics provided in the pre-test. That constituted the post-test of the study. In the study, the preferred interview type was a semi-structured format and interviewees were encouraged to comment on open-ended pre-prepared guiding questions. Within this context, seven pre-prepared guiding questions were posed to the students in the experimental group after the treatment of Flipped Writing Class. The follow-up interview responses were recorded and transcribed by the researcher.

Treatment Process and Data Analysis

The students in the experimental group were introduced the Course Management System (CMS), Edmodo, which enabled them to follow the course requirements and to see the shared links by the teacher. The experimental group consisting of 23 ELT prep students were instructed for fifteen weeks (one semester) through Flipped Writing Class Model in which the typical lecture and homework elements of a course were reversed. The students viewed the teacher-created videos at home as homework and in-class time was devoted to exercises and paragraph writing practices. The control group consisting of 20 ELT prep students were instructed through a traditional lecture-based writing class. The same syllabus which was aligned with the pre-selected course book was followed by both groups. The writing lessons of both groups were offered by the researcher himself. At the end of the fifteen weeks of instruction, both groups were given the same post-test to determine the difference between and with-in the groups. The paragraphs written by the students in each group in the post-test were evaluated by three raters on the basis of the argumentative paragraph rubric.

The scores given by three raters using the argumentative paragraph rubric for each student were calculated by averaging the points and entered in Microsoft Excel and then transferred to the SPSS 20.0 software. In order to determine the significance level of pre-tests and post-tests between the experimental and control groups, *independent samples t-test* was employed (between-groups statistics). *Paired samples t-test*s were also utilized to analyze within-group data (within-group statistics). As Dornyei (2007) points out, *independent samples t-test* is used to compare the results of two independent groups whereas Paired samples t-test is used to compare two sets of results from the same group.

As for the qualitative data analysis, strategies like categorizing, coding, and interpreting were used. Qualitative data which were gathered through semi-structured interview were first recorded and transcribed by the researcher. The transcribed data were categorized in accordance with the content of the interviewees' responses. For more detailed information about the participants, data collection, analysis, and treatment process, please see Ekmekci (2014).

RESULTS AND DISCUSSION

Findings and Discussion about Pre- and Post-Test Scores of the Experimental and Control Groups' Students

Prior to the flipped writing class treatment process, it was required to make sure that the experimental and control groups did not differ significantly in terms of writing proficiency. In order to ensure this, the same pre-test was administered to both groups in the first week of the fall semester. The scores were analyzed through independent samples t-test in SPSS 20.0 software. The below table presents the statistical analysis of the pre-test:

Table 3. Comparison of the Experimental and Control Groups' Pre-Test Results

Group	N	Mean	SD	df	t	p
Experimental	23	42,02	6,57			
				41	-,680	,500
Control	20	43,40	6,61			

*p>,05

The analysis of the results of the pre-test indicates that the significance level is 0,500 (p>0,05). This result means there is not a statistically significant difference between the experimental and control groups with regard to proficiency in writing. That was an expected result since the level of both groups was accepted as B1 by the school administration. It is noted that the mean score of the control group is slightly higher compared to the score of the experimental group. After the treatment process which lasted for fifteen weeks, the same questions in the pre-test were addressed to the students in the experimental and control group as the post-test of the study and they were evaluated through argumentative paragraph rubric scored by three raters. The average post-test scores were analyzed through independent samples t-test. The following table presents the results of the post-test:

Table 4. Comparison of the Experimental and Control Groups' Post-Test Results

Group	N	Mean	SD	df	t	p
Experimental	23	71,49	6,39			
				41	6,01	,000
Control	20	58,30	7,99			

*p<,05

As shown in the above table, the significance level is ,000 (p<0,05), which means that there is a statistically significant difference between the post-test scores of the students in the experimental and control groups. It means that students exposed to the flipped learning environment outperformed the students in the traditional writing class in terms of writing proficiency.

Pre- and post-test scores of the experimental group were statistically analyzed through paired samples t-test to ensure the efficacy of flipped writing class model on writing proficiency. The relevant table is presented below:

Table 5. Comparison of the Experimental Group's Pre-Test and Post-Test Results

Experimental	N	Mean	SD	df	t	p
Pre-Test	23	42,02	6,57			
				22	-21,083	,000
Post-Test	23	71,49	6,46			

*p<,05

As the table above makes it clear, the significance level is ,000 (p<0,05) which means that there is a statistically significant difference between pre- and post-tests of the experimental group. This indicates a remarkable progress in writing proficiencies of experimental group's students.

It was required to analyze the control group's pre- and post-test scores in order to determine their achievement in the traditional lecture-based writing class. With this aim, within-group analysis of pre-and post-test scores of control group was carried out through paired samples t-test. The related table is given below:

Table 6. Comparison of the Control Group's Pre-Test and Post-Test Results

Control	N	Mean	SD	df	t	p
Pre-Test	20	43,40	6,61			
				19	-8,126	,000
Post-Test	20	58,30	7,99			

*p<,05

As indicated in the table above, there is a statistically significant difference between the pre- and post-test scores of the students in the control group. The significance level is ,000 (p<0,05). This means that the traditional writing class has also a considerable effect on students' writing proficiency. This progress verifies the fact that traditional writing class had influence on students' writing performances; however, this influence was not as strong as in the experimental group's scores.

Findings and Discussion about the Semi-structured Interview

In the semi-structured interview, the students were posed the question 'Did you like using CMS (Edmodo)?' so as to learn their attitude towards CMS. The responses were categorized as positive, negative, and undecided after the content analysis. The relevant graph is presented below:

Graph 1. Students' Responses about their Satisfaction with CMS (Edmodo)
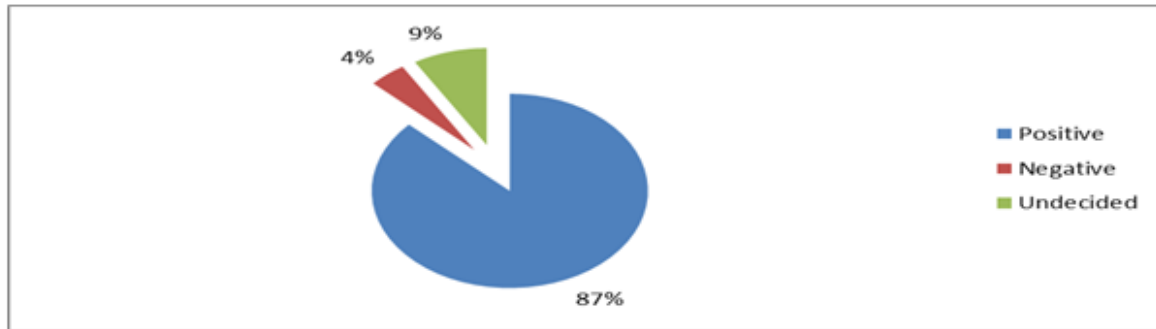
As the above graph indicates, the great majority (87%) of the students stated that they enjoyed using CMS. Only 4% of the students were unsatisfied with CMS. Some of the students' responses are as follows:

> Student A: "Yes, I it was like Facebook. Reading my friends' comments about the videos was enjoyable."
> Student B: "Yes, the teacher shared a lot of useful links in Edmodo. We were able to download all materials easily."
> Student C: "Yes, I liked it. Thanks to Edmodo, I knew what the next lesson would be about beforehand."
> Student D: "I'm not sure. There may be better system to follow the course"
> Student E: "Yes, I downloaded Android application of Edmodo on my smartphone. I was able to follow Edmodo everywhere."

Concerning the students' attitudes towards the video lectures, the researcher included the question 'Did you enjoy the videos uploaded in YouTube?' in the semi-structured interview. The answers in the interview were categorized as positive, negative, and undecided. The following graph indicates the results:

Graph 2. Students' Responses about their Satisfaction with Video Lectures
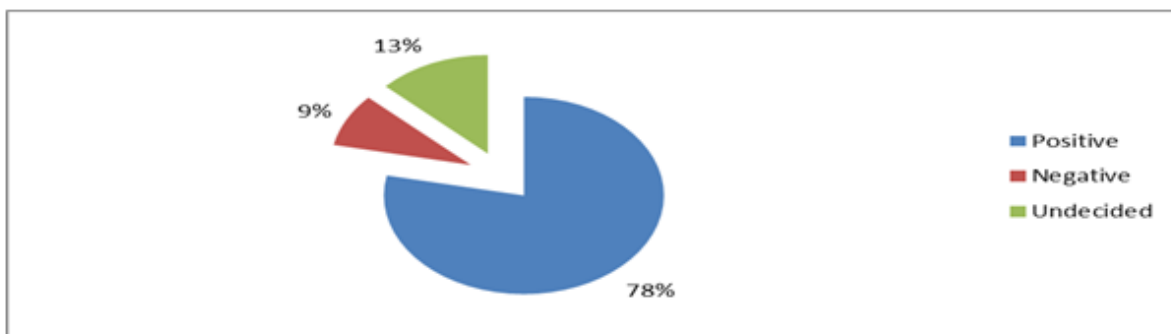
As it is clearly seen in the graph above, 78% of the students reported that they enjoyed the video lectures while 9% of them stated that they did not enjoy. Furthermore, 13% of the students reported that they were not sure about it. Some of the answers of the students are as follows:

> Student F: "Yes, I really liked the videos in YouTube. They were very informative and enjoyable"
> Student G: "Yes, they motivated me to write."
> Student H: "Yes, watching my teacher at home was really interesting."
> Student I: "Not really, I was bored when watching the videos."
> Student J: "Yes, but they may be a little bit shorter."

These findings, by and large, verify the fact that the great majority of the students in the experimental group are in favor of the flipped writing class.

In the semi-structured interview, the researcher addressed the questions "Do you think you have learnt how to write better in Flipped Writing Class?" and "What are the pros and cons of Flipped Writing Class?" For the first 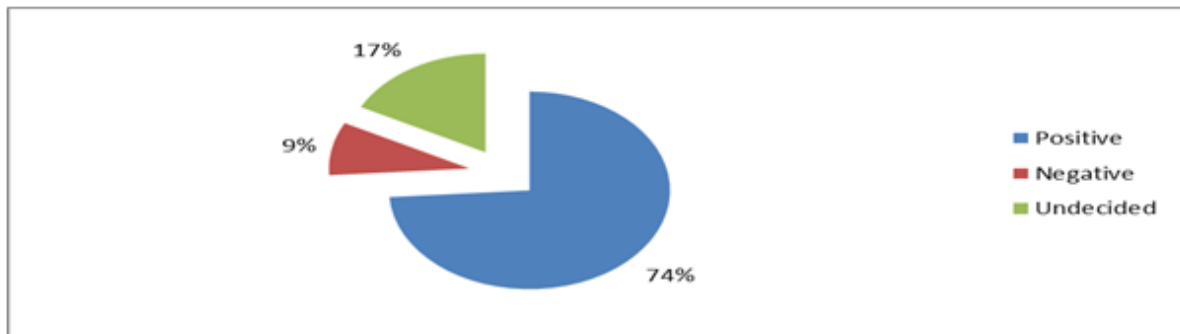question, the responses of the students were categorized as positive, negative, and undecided. The relevant graph is presented below:

Graph 3. Students' Responses about the Efficiency of Flipped Writing Class

As demonstrated in the above graph, 74% of the students reported that they learnt how to write better in flipped writing class. Only 9% of the students held negative opinion about flipped writing class model. Some sample responses are presented below:

> Student K: "I think I have learnt better as the videos are detailed."
> Student L: "Yes, I learnt better, but it was useless while writing descriptive paragraph."
> Student M: "I learnt how to write better thanks to flipped writing class. When I watched the videos, I remembered the detail more."
> Student N: "Yes, I do. Watching the videos again and again is beneficial for us."
> Student O: "I'm not sure about if it improved my writing or not"

In order to get a further idea about flipped writing class, the researcher addressed the second question which was related to pros and cons of learning. The responses were categorized on the basis of dominance of pros or cons. The below graph indicates the details:

Graph 4. Students' Responses on the basis of Pros and Cons of Flipped Writing Class
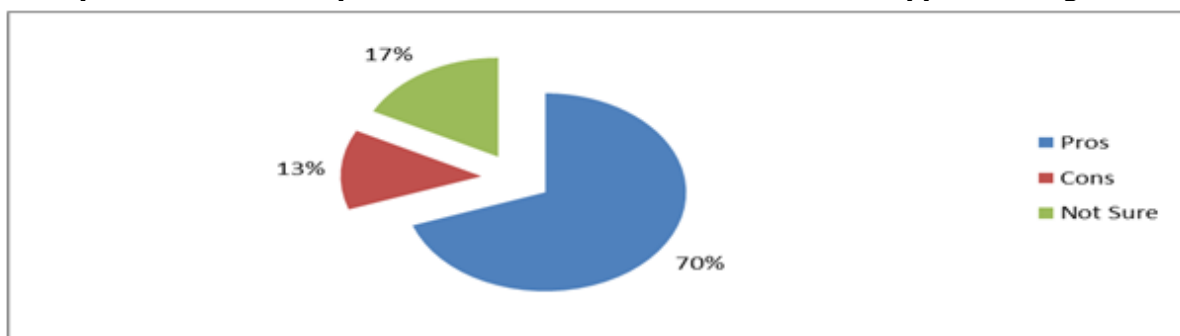
The above graph makes it evident that responses of 70% of the students were pros-dominant while 13% were cons-dominant. Furthermore, 17% were not sure about it. These results reveal that flipped writing class has more advantages than the disadvantages in the eyes of the students. Some of the responses are as follows:

> Student P: "Pros: we have more time to practice in the class. I feel my writing skill is improved with flipped class. Cons: I can't say there is a con."
> Student Q: "Pros: more active, based on students, up to date. Cons: sometimes boring"

Student R: "Pros: it is beneficial. Students are active. It is enjoyable. Cons: It takes a lot of time to prepare for the lesson."

Student S: "Pros: You can watch the videos whenever you want. Cons: No cons."

Student T: "Pros: It seems to be beneficial. Cons: Slow internet connection. Videos are too boring. It takes time."

The other question posed to the students was *"If you had a chance, would you prefer Traditional or Flipped Writing Class?"* in the follow-up interview. The responses of the students were categorized on the basis of students' preferences as Flipped Class, Traditional Class, and Not Sure. The relevant graph is presented below:

Graph 5. Students' Responses about their Preferences of Flipped versus Traditional Class

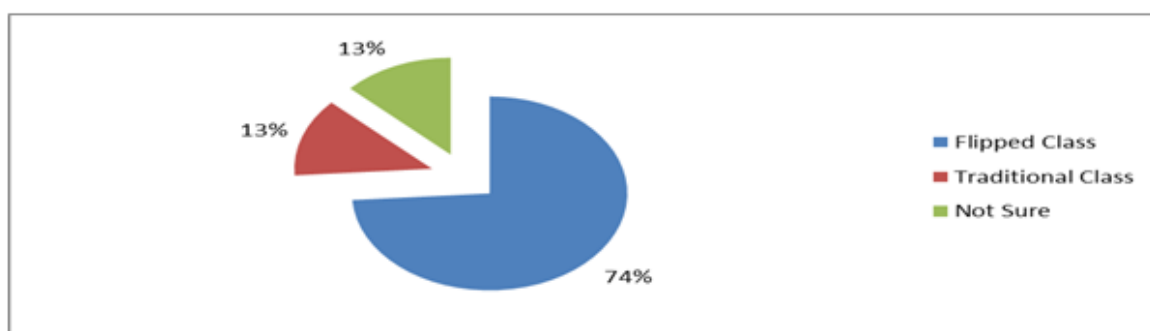As shown in the graph above, 74% of the students reported that they would prefer the flipped class to the traditional one. 13% were in favor of the traditional class while 13% were not sure about it. Some sample responses are as follows:

Student U: "If I had a chance, I would prefer the flipped class, because it is more enjoyable and funny"

Student V: "I would definitely prefer flipped class., because I can watch my teacher via my smartphone. I can watch the teacher even on the tramway while coming to the school. It is very beneficial."

Student W: "I would prefer the traditional class. Face to face learning is better."

Student X: "I can't decide. I think both of them are useful."

Student A: "I think I would prefer the flipped one, because I could watch the lesson anytime I want."

In the semi-structured interview, the researcher also asked the students two more questions "Were there any problems you encountered during Flipped Writing Class? What are they?" and "Do you recommend any changes in the Flipped Writing Class model to improve learning?" The reason why these questions were posed to the students is that Flipped Writing Class is not without problems as in almost all learning environments. It is believed that if the problems are detected and eliminated as much as possible, the efficacy of any learning and teaching method can be fostered. The core source for determining the problems in a new learning environment is without doubt the students who have received the treatment. For these reasons, the first question asked students whether there were any problems they faced in Flipped Writing Class was responded by the students in the follow-up interview. The responses of the students were categorized as slow internet connection, time-related problems, paragraph writing in class, no problems. The percentage of each category is presented in the graph below:

Graph 6. Students' Responses with regard to Problems Encountered in the Flipped Class
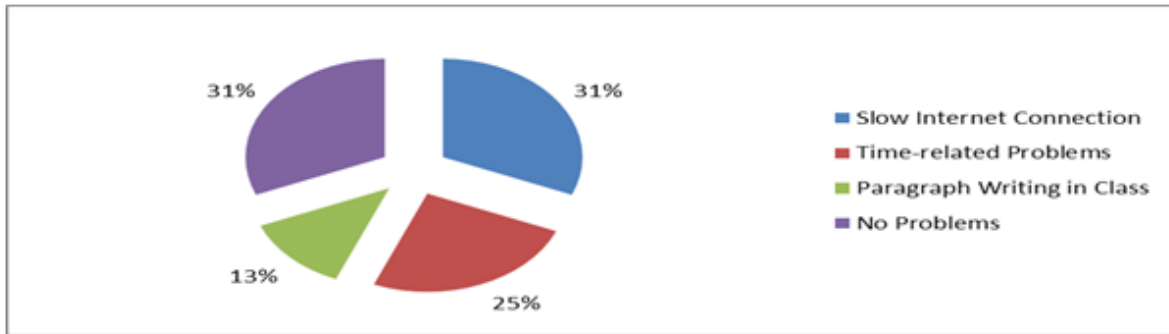
As the graph above makes it clear, 31% of the students reported that slow internet connection was one of the problems in Flipped Writing Class. In fact, some precautions against this problem were taken by the researcher at the beginning the semester. Students were recommended to download or copy the videos before the lesson; however, only a few students came to the researcher's office to get them. In addition, some students tried to open the videos via the internet connection provided by their GSM operators. Since the videos were high-definition in quality, some students may not have opened them. Furthermore, 25% of the students stated that watching video lectures took much time. This problem may be eliminated by shortening the duration of the video lectures or decreasing the number of videos. However, considering the time allotted to lectures in traditional lecture-based classrooms, the duration of the video lectures is relatively shorter.

As for the problem about paragraph writing in the class, 13% of the students reported that writing the paragraphs in the classroom made them nervous and prevented them from focusing on the words choice. However, when the close interaction between the teacher and the students themselves and the pros of providing individual conferences are considered, these problems seem to be recoverable. Lastly, 31% of the students reported that they did not encounter any problems during the treatment process, which is a plus for the research.

The second question about the suggestions of the students was responded in the semi-structured interview as well and the answers were categorized as videos-related suggestions, content-related suggestions, and no recommendation. The relevant graph is presented below:

Graph 7. Students' Responses about their Suggestions for Flipped Writing Class
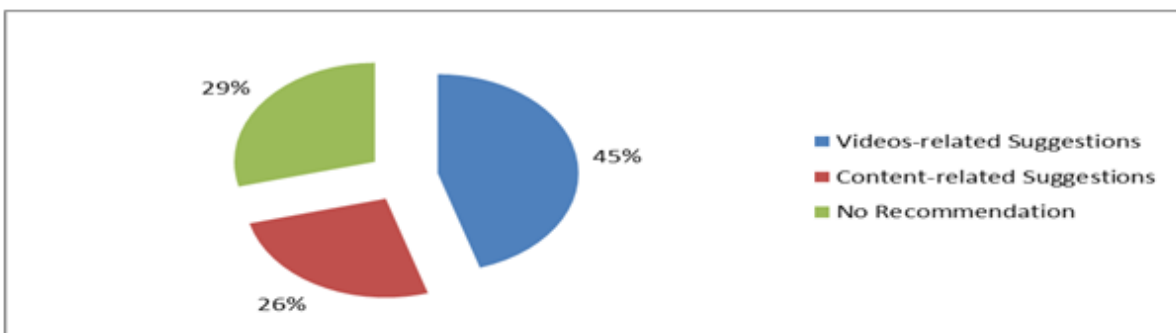
As is evident in the graph above, 45% of the students provided suggestions about the videos. Some reported that the videos should be shorter while some suggested the videos should be funnier. Three students reported that videos may be created by native speakers or at least some videos may include native speaker lecture sections. Likewise, four students suggested the videos to be less in number. It can be inferred from the

suggestions of the students that especially native speaker-related recommendations can be integrated into the video lectures as a separate section.

As for the content-related suggestions, 26% of the students suggested that more sample paragraphs can be analyzed in the video lectures. In addition, they stated that too many writing practices sometimes cause boredom in the class. Lastly, 29% of the students had no suggestions for the Flipped Writing Class. For more detailed information on the quantitative and qualitative findings, please see Ekmekci (2014).

CONCLUSION

In the context of this study, the analyses of the findings prove that Flipped Writing Class Model improves students' writing proficiency more than the traditional lecture-based writing instruction. First of all, it can be concluded that employing flipped learning in writing classes is an effective way of instruction for improving writing skills of EFL students. Both quantitative and qualitative data confirm that Flipped Writing Class Model improves students' writing proficiency. When both groups' mean post-test scores are compared, it can be inferred that contribution of Flipped Writing Class Model to writing performances is greater than that of the traditional lecture-based model.

Another conclusion that can be drawn from the study is that Flipped Writing Class Model is in line with the tenets of constructivist perspective in that it supports and encourages independent and collaborative learning. Since the students are expected to write their paragraphs and do the exercises inside the class, they need to interact with both the teacher and themselves. Particularly the pillars of social constructivism overlap the classroom applications of the Flipped Writing Class Model. Social constructivism puts a special emphasis on collaborative learning in which students learn from their peers and teachers. As in the case in the context of this research, in-class time is completely devoted to student to student and student to teacher interaction. This study has also proved that learning is personalized through Flipped Writing Class Model. It has been observed during the treatment process that almost each student has their own pace of learning and this new model has provided them to explore their needs and styles. Moreover, the study confirms that Flipped Writing Class Model provides more flexible learning environment, anytime or anywhere learning, for learners' needs. The study indicates that the students in the flipped class have had the chance of learning not only in the borders of the classroom but also everywhere the required technology has allowed.

The qualitative results especially prove that Flipped Writing Class Model is more enjoyable than traditional lecture-based writing classes. The results of the attitudinal questionnaire confirm a great deal of enjoyment in favor of flipped classroom. This does not mean that traditional classes are always boring and not interesting, but the results clearly indicate that flipped class model motivates the students more in terms of their eagerness to write paragraphs. Negative attitudes cited in the literature towards writing have been also found to be changed via Flipped Writing Class Model to a great extent.

The other conclusion that can be drawn from the study is that learner autonomy is supported in Flipped Writing Class Model as well. The reason for this can be attributed to students' taking on responsibilities for their own learning. In the context of the present study, each student has been assumed responsibilities for watching the video-lectures as homework. It is believed that this can help them to be more autonomous learners.

As for the advantages concerning the feedback, the study indicates that the students could get more immediate feedback together with individual conferences, oral teacher feedback, and written comments thanks to Flipped Writing Class Model. As the philosophy behind the flipped classroom makes it clear, flipped learning is not just the recording of video-lectures. It is more than that. In-class time can be used more effectively and profitably by dealing with each student individually. The students have had the

opportunity of receiving individual feedback by means of individual conferences, oral and written feedback. In brief, flipped model has been proved to provide more peer, individual, and teacher feedback.

The fifteen weeks treatment process makes it evident that Flipped Writing Class Model is totally student-centered. The role of the teacher is a guide or facilitator rather than an authority. Students determine the pace of the lesson. In addition, the flipped model provides active learning environment since the videos can free the teachers and leave the class time for engaging and hand-on activities. In the context of this study, it has been observed that almost all of the students have been active during the class activities working in groups, helping each other, and interacting with the researcher. This active classroom environment has been even moved to outside the class via CMS where the students have had the opportunity of synchronous interaction between themselves and the researcher.

The study has also yielded similar results with most of the current studies and research in the literature. The positive attitudinal findings about flipped learning by several researchers (Wilson, 2013; Johnson, 2013; Basal, 2012; Smith, 2013; Bergman & Sams, 2013) overlap the findings of the current study in that the students hold positive attitudes towards flipped learning environments. Likewise, Davies, Dean, and Ball's (2013) findings about the students' satisfaction with flipped learning have also revealed similar results in favor of flipped learning with the findings in the study. As for the achievement dimension, the study is in line with the findings of Mason, Shuman, and Cook (2013); Schwanki (2013); Baranovic (2013); and Bergman and Sams (2013) in that flipped learning increases the students' success to a certain extent.

The study is limited to two groups of students attending the ELT preparatory classes offered by a state university in Turkey. It is also limited to one semester of treatment process for Flipped Writing Class. In addition, the treatment process is limited to the randomly-assigned experimental group in EFL context in Turkey.

To sum up, Flipped Writing Class Model has proved to improve students' writing proficiency and had a positive impact on students with regard to foreign language writing skill. Further research can be conducted to determine the efficacy of the flipped model in improving reading skill or reading and writing skills together. It is believed that the new model will contribute much to foreign language writing classes if applied delicately.

AUTHOR'S NOTE: This article has been partly produced from the author's PhD Dissertation entitled *Flipped Writing Class Model with a Focus on Blended Learning*.

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EVALUATION OF VIRTUAL LABORATORY PACKAGE ON NIGERIAN SECONDARY SCHOOL PHYSICS CONCEPTS

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ABSTRACT

The study evaluated accessibility, flexibility, cost and learning effectiveness of researchers-developed virtual laboratory package for Nigerian secondary school physics. Based on these issues, four research questions were raised and answered. The study was a quantitative-based evaluation research. Sample for the study included 24 physics teachers, 35 computer experts and 29 physics students who evaluated the package using a questionnaire and physics achievement test. Data gathered were analyzed using descriptive statistics including mean and standard deviation. Findings from the study revealed that the package was adjudged accessible to students within the school (average mean response of 2.98 out of 5), the flexibility of the package was rated low (average mean response of 2.35 out of 5), and the package, though expensive to develop (total amount spent = $587.50) was considered profitable considering its unquantifiable educational benefits. Also, there was improvement in the achievement scores of students after learning the physics concepts using the package with mean gain score of 33.45. Based on these findings, it was recommended that, developers of learning packages such as virtual laboratories should ensure high flexibility of the packages in order to improve students' access to such on mobile devices and internet, and government should assist schools financially by providing needed funds for the development of contextually relevant learning packages as their benefits to students' learning of physics concepts are enormous.

Keywords: Accessibility, achievement, cost, evaluation, flexibility, physics, virtual laboratory.

INTRODUCTION

Advancement brought to teaching and learning by media and telecommunication technology cannot be over-emphasized. The rapid development in computer accompanied by ease of use, flexibility, storage effectiveness, suitability, reliability, versatility and interactive nature of the technology as an instructional medium for individualized instruction, have attracted educators more than any other medium ever developed as instructional delivery mode (Onasanya, 2004; Sadik, 2003).

As computers become more prevalent in education, students' familiarity with the technology has enabled the development of virtual reality tools (Kew, et al., 2003). In science and engineering education, virtual laboratories have emerged as alternative or supplementary

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tools of the hands-on laboratory education, for instance, using them for preparing for the real laboratory task (Mahmoud & Zoltan, 2009). Virtual laboratory is an interactive environment without real laboratory tools meant for creating and conducting simulated experiments (Babateen, 2011; Harry & Edward, 2005). It provides students with tools and materials set on computer in order to perform experiments saved on CDs or on website and it has been proven to improve students' performance in science based subjects globally (Babateen, 2011; Nunn, 2009). For instance, Murniza, Halimah, and Azlina, (2010) and Mahmoud and Zoltan (2009) found that virtual laboratory instruction improves students' academic achievements in science-based subjects.

There exists a danger that multimedia and other emerging technologies are being used in teaching and learning process simply because they are novel and available without an appropriate conceptual framework to guide their development and selection, hence, intended objectives may not be achieved (Bates, 1995). Facilities in many conventional physics laboratories in Nigerian schools are inadequate and where they are adequate, the laboratory is only opened to learners during the school working hours.

Students need adequate access to new technologies which increase flexibility of learning (Bates, 2000). This entails provision of adequate computers and/or network access, consideration of the varied needs of different groups of learners. There is improvement in student's accessibility to learning technologies in Nigeria because most schools are now well equipped with adequate and functional computers which according to Farida and Ezra (2005) are the basic requirement for facilitating access to computer-based learning activities. This was also observed and stressed by Kasozi (2003) that computers have increasingly become both exercise books and textbooks for students and this makes learning through technology easier. Barbour and Reeves (2009) were of the opinion that for virtual laboratory to meet the educational needs, it must provide a high level of flexibility in order to ensure freedom from constraints of time and place which hinder access.

Bates (1995) considered cost as an important determinant for selecting technologies. Cost is often the first issue considered by institutional decision-makers and administrators while making decision on the choice of technologies to be selected in teaching and learning process. It is likely that new technologies will be of high cost but since such increase pedagogical effectiveness, they will therefore be considered to be profitable (Bates, 2000). In spite of the high cost of developing learning packages, students taught using such technologies are worth the money spent on their development (Bartolic-Zlomislic & Bates, 1999). Although the cost of developing and utilizing learning packages can be expensive, the pedagogical values of such packages outweighed their cost implications. Once the package has been developed, it can be installed on computers, reproduced or uploaded on the internet and can eliminate the need for physical sets of expensive equipment; it can be employed to supplement conventional laboratory instruction; it can be stored permanently and used repeatedly, it can be used for individualized learning and for revision purposes, thus enhancing learning and understanding; conventional laboratory injuries can also be avoided among several other benefits (Manjit, et al., 2003).

PURPOSE OF THE STUDY

The purpose of the study was to evaluate a virtual laboratory package on physics concepts for Nigerian secondary schools. The accessibility, flexibility, cost-effectiveness and learning effectiveness of the package was evaluated by physics teachers, computer experts and physics students in Federal Government Colleges in South-western states of Nigeria.

Research Questions

- ➢ **Do physics teachers consider the virtual laboratory package on selected physics concepts accessible to Senior Secondary School II (SSII) physics students in Nigeria?**
- ➢ **Do computer experts consider the virtual laboratory package on selected physics concepts flexible for learning secondary school simple pendulum, Hooke's Law and momentum experiments?**
- ➢ **What is the cost structure of developing virtual laboratory package on selected physics concepts?**
- ➢ **Is the virtual laboratory package on selected physics concepts cost-effective in teaching and learning of secondary school simple pendulum, Hooke's Law and momentum experiments?**
- ➢ **Is there any improvement in the mean achievement score of physics students taught simple pendulum, Hooke's Law and momentum experiments using virtual laboratory package?**

RESEARCH METHODS AND MATERIALS

The study was a quantitative-based evaluation research. The investigation involved the use of researchers' adapted questionnaire to elicit needed information from physics teachers and computer experts who evaluated a virtual laboratory package in terms of accessibility and flexibility. Furthermore, to determine the learning effectiveness of the package, a physics achievement test was administered as pretest and posttest on secondary school students before and after performing physics experiments through the package. The researchers determined the cost effectiveness and cost implications of the package.

Participants

The population for this research consists of all secondary school physics students, physics teachers and computer experts in Nigeria. Purposive sampling technique was employed to select 24 physics teachers, 35 computer experts from five co-educational Federal Government Colleges in southwest Nigeria. The experts were purposively selected because of their relevance to the evaluation task and because of equivalence of their schools in terms of physics laboratories, computer laboratories, being public schools, being from the same geo-political zone, being co-educational schools, having enrolled students in SSCE physics for a minimum of ten years, availability of ICT staff who are computer experts, availability of physics teachers and students' exposure to computer-based learning. In addition, intact class of 29 SSII physics students in one randomly selected College was used to determine the learning effectiveness of the package.

Five research instruments, Virtual Physics Laboratory Package (VPLP), Physics Teachers' Evaluation Questionnaire (PTEQ), Computer Experts' Evaluation Questionnaire (CEEQ), Cost Analysis Instrument (CAI) and Physics Achievement Test (PAT). VPLP was developed by the researchers using Adobe Flash CS6, Actions script 3.0, Adobe Fireworks CS6, Box2D and CamStudio software. The package is meant for performing three SSII physics experiments (simple pendulum experiment, Hooke's Law experiment and momentum experiment). The entrance menu of the package consisted of introduction/student's registration edifice, list of practical lessons (Lessons 1, 2 & 3) and exit button. The main menu is divided into three sections, namely, lesson note section, where the learner is able to study the content for the experiments; Video section, where the learner is able to watch tutorial of how to use the package; and laboratory section where the learner is able to perform the experiments virtually.
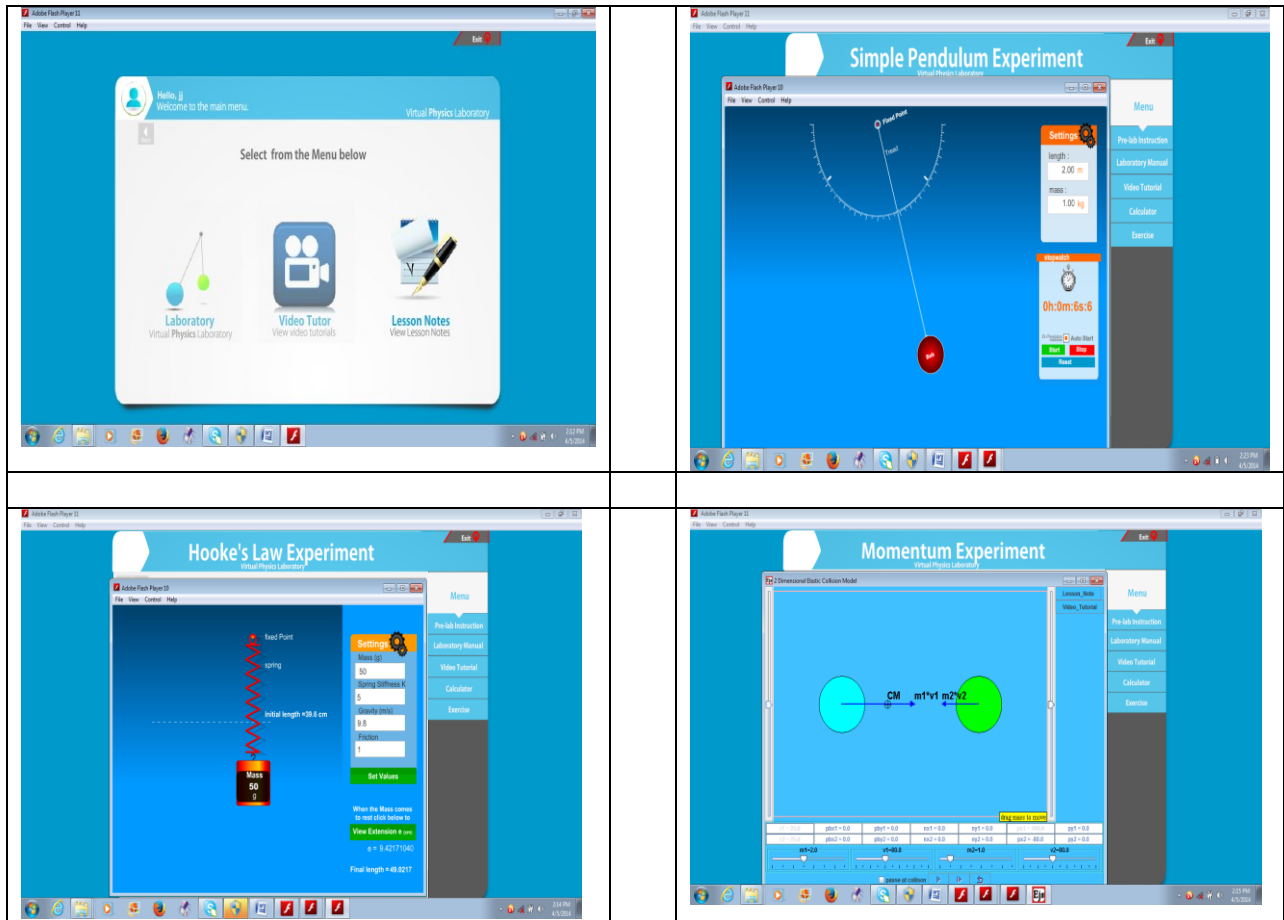
Figure 1. Screenshot of virtual laboratory package

PTEQ and CEEQ were adapted from Atsloom (2009) and they were respectively employed to elicit responses from physics teachers and computer experts based on their evaluation of VPLP in terms of students' accessibility to the package and the flexibility of their access. The questionnaires were divided into two sections (Sections A & B). Section A was designed to collect demographic information of the respondents. Section B was designed using the 4-point scale (namely, 1 as Strongly Disagree, 2 as Disagree, 3 as Agree and 4 as Strongly Agree).

CAI was adapted from Gambari (2010). It was a table showing the activities, rate and the expenditure involved in the development of the package. It was used by the researchers to determine the total cost of developing the virtual physics laboratory package. There were 10 activities in the table specifying the amount spent on each of the activities. PAT consists of 30 multiple-choice objective items on the physics concepts treated and it was administered to the students in the experimental group before and after the virtual laboratory package has been administered.

Data Collection and Analysis
The researchers and two trained research assistants administered the research instruments to the participants. The virtual laboratory package was installed on personal computers of participants (experts) and given a copy of the questionnaire to fill based on their observations. Similarly, the package was installed on personal computers of SSII students,

thereafter, the researchers conducted an orientation to familiarize them with the objectives of the study as well as steps to be followed in using the package. Immediately after the orientation, physics achievement test was administered followed by the administration of the virtual laboratory package which lasted for two weeks before the earlier administered achievement test was administered as posttest.

A four-point rating scale of Strongly Agree (SA, 4 points), Agree (A, 3 points), Disagree (D, 2 points) and Strongly Disagree (SD, 1 point) was used in weighing responses to items in the questionnaire. Responses on each questionnaire item were analyzed according to frequencies and mean rankings. First of all, total responses in each scale category (frequency) of every item were tabulated. Next, the number of points allocated to each category was multiplied by the frequency of each category (n). Lastly, the sum of these scores was divided by the sum of the frequency for each category (ΣN).

$$\text{Mean} = \frac{[4 \times N(SA)] + [3 \times N(A)] + [2 \times N(D)] + [1 \times N(SD)]}{\Sigma N}$$

A mean response below 2.50 was considered disagreement while a mean response of 2.50 and above was considered as agreement. The total cost of developing the package was computed and used to answer research questions three and four. Responses to questionnaire items meant for answering research questions one, two and five were analyzed using mean and standard deviation.

The Scale
The instruments were validated by two computer experts, two physics experts and four educational technology experts. Based on their suggestions, some items of the questionnaire were re-worked while some were removed. A pilot study was carried out in a school within the study area but that was not used for the main study. Five computer experts, five physics teachers and 20 SSII physics students were employed. The reliability of PTEQ and CEEQ were determined and Cronbach's alpha used to measure the internal consistency of the instruments yielded 0.90 and 0.93 values respectively. Also, the reliability coefficient of 0.95 was obtained for PAT using Kudar Richardson (KR-21) formula. Hence, the instrument were considered reliable.

FINDINGS

Accessibility of Virtual Physics Laboratory Package (VPLP) to students was evaluated by 24 secondary school physics teachers while 35 computer experts evaluated the flexibility of the package. Also, the researchers determined the cost implications of developing and utilizing the package in learning the selected physics concepts while 29 physics students evaluated the learning function of the package.

Table 1 helps to provide answers to the first research question. The results of data illustrate that the mean score for items 1 through 5 ranged between 2.58 and 3.62 and were therefore agreed by the respondents.

Table 1. Mean response of physics teachers' evaluation of students' accessibility to virtual physics laboratory package

S/N	Statement	N	SA	A	D	SD	Mean	St. Dev.	Decision
1	There is a computer laboratory in my school	24	15	9	0	0	3.62	1.12	Agree
2	Computers in the laboratory are functional	24	9	10	3	2	3.08	0.58	Agree
3	All SSII physics students in my school have access to computer laboratory	24	8	10	4	2	3.00	0.50	Agree
4	The number of computer systems in the computer laboratory can accommodate every SSII physics students in my school at once	24	8	6	4	6	2.66	0.16	Agree
5	Students can access virtual physics laboratory package with or without network connection	34	6	7	6	5	2.58	0.08	Agree
	Average Mean						**2.98**		

Table 1 shows the responses of computer experts on the flexibility of virtual physics laboratory package to SSII physics students in Nigeria. The table reveals that the mean response of physics teachers to each of the five items is above 2.50 while the average mean of the responses to the five items is 2.98. This indicates that physics teachers agreed that virtual physics laboratory package is accessible to SSII physics students in Nigeria.

Table 2 helps to provide answers to the second research question. The results of data illustrate that the mean score for four out of the five items ranged between 2.20 and 2.30 and were therefore disagreed by the respondents.

Table 2. Mean response of computer experts' evaluation of the flexibility of virtual physics laboratory package

S/N	Statement	N	SA	A	D	SD	Mean	St. Dev.	Decision
1	The adapted virtual physics laboratory package can run on different operating system platforms	35	8	11	10	6	2.60	1.04	Agree
2	The adapted virtual physics laboratory package has features that can allow online accessibility	35	7	7	10	11	2.30	0.20	Disagree
3	The adapted virtual physics laboratory package has features that can make it accessible on mobile devices	35	5	8	12	10	2.20	0.30	Disagree
4	The adapted virtual physics laboratory package allows learners to input values since inbuilt values are not constants	35	6	7	13	9	2.30	0.20	Disagree
	Average Mean						**2.35**		

Table 2 shows the evaluation of responses of computer experts on the flexibility of virtual physics laboratory package. The table reveals that the mean response of computer experts to each of the four items is below 2.50 except item 1 (ability of the package to run on different operating system platforms) with a mean response of 2.60. With an average mean of 2.35 for the four items which is below 2.50, the table reveals that computer experts disagreed that the package has features that can ensure its accessibility online, on mobile devices and the possibility of users to manipulate and input values of their choice. Hence, they disagreed that the virtual physics laboratory package is of high flexibility.

Table 3 helps to provide answers to the third research question and its implication assists in providing answers to the fourth research question.

Table 3. Cost analysis of developed virtual physics laboratory package

S/N	Activities	Rate	Amount in Naira (N)	Amount in U.S. Dollar ($)
1	Type-setting of physics laboratory manual (10pages)	N50/page	N500.00	$2.50
2	Type-setting of lesson note (24pages)	N50/page	N1,200.00	$6.00
3	Purchase of software for simulation and conversion (2 CD)	N300 each	N600.00	$3.00
4	Simulation and animation of tools (3 experiments)	N25,000each	N75,000.00	$375.00
5	Recording and editing of video tutorial in VPLP	-	N7,000.00	$35.00
6	Modification of VPLP after initial evaluation	-	N20,000.00	$100.00
7	Editing of laboratory manual and lesson note after initial evaluation	-	N200.00	$1.00
8	Editing of video tutorial in VPLP after initial evaluation	-	N2,000.00	$10.00
9	Transportation and recharge cards	-	N6,000.00	$30.00
10	Miscellaneous	-	N5,000.00	$25.00
	Total		N117,500.00	$587.50

From Table 3, the sum of five hundred and eighty-seven U.S dollars ($587.50) was spent in developing the virtual physics laboratory package meant for learning three secondary school physics experiments (simple pendulum, Hooke's law and momentum experiments).

The virtual laboratory package can be considered to be cost effective. Once the package has been developed, it can be reproduced on compact disc (CD) or uploaded on website of any secondary school in Nigeria for students to download and use. The package can enable students to perform experiments which otherwise require high level physical or technical skills; it can also eliminate the need for physical sets of specialized and expensive equipment. The package can be stored permanently and used repeatedly. It can be used for individualized learning and for revision purposes, thus enhancing learning and understanding; conventional laboratory accidents can also be avoided if virtual physics laboratory package is used among several other benefits (Manjit, Selvanathan & Ramesh; 2003).

In spite of the high cost of developing the package, students taught simple pendulum, Hooke's law and momentum experiments are worth the money spent on the package (Bartolic-Zlomislic & Bates, 1999). Also, the availability of the virtual laboratory package in

schools can help reduce the costs of some physical lab equipment as the package can replace some physical lab settings required for performing physics experiments (Campbell, et al., 2004). The benefits of the package are therefore unquantifiable and incomparable with its cost.

Table 4 helps to provide answers to the fifth research question. The results of data illustrate that the mean gain score of students was 33.45 and this shows that there was improvement in the students' achievement after being taught using virtual laboratory package.

Table 4. Mean achievement scores of students taught physics using virtual laboratory package

Treatment	N	Pretest Mean	Posttest Mean	Mean Gain Score
Virtual Laboratory	29	25.89	59.34	33.45

Table 4 shows that the mean score of students was 25.89 while at posttest, after the virtual laboratory package had been administered, their mean score was 59.34. The mean gain score of 33.45 obtained implies that the improvement in the mean score of the students recorded at posttest was caused by the virtual laboratory package. This implies that virtual laboratory package improves physics students' achievement in simple pendulum, Hooke's Law and momentum experiments.

DISCUSSION

The result of the analysis of students' accessibility to the package revealed that SSII physics students had access to the package. This finding is in line with the recommendations of Bates (1995) that users of learning technologies must have adequate access to it before effective learning can take place. This finding also agrees with the finding of Bates (2000) that students need adequate access to learning technologies because they improve flexibility of learning.

Result of the analysis on flexibility of virtual physics laboratory package indicated that the package has low flexibility. This finding is not in line with the recommendations of Bates (1995) that learning technologies requires high flexibility. This finding also contradicts the recommendation of Barbour and Reeves (2009) that virtual laboratory should provide a high level of flexibility in order to ensure freedom from constraints of time and place which hinder access.

It can be deduced that students have access to virtual physics laboratory package within the school because these schools are well-equipped with adequate and functional computers which according to Farida and Ezra (2005) are the basic requirement for facilitating access to computer-based learning activities. This was also observed and stressed by Kasozi (2003) that computers have increasingly become both exercise books and textbooks for students and this makes learning through technology easier. Students that have computers at home (with or without internet facilities) will also have access to virtual physics laboratory package outside the school because the package is available on compact disc and can also be downloaded online. However, flexibility of the package was low because it is not possible for learners to perform the selected experiments on the internet neither can they use the package on small screen mobile devices.

The result of the breakdown of cost analysis of developing and modifying the package indicated that VPLP is expensive to develop. This finding does not contradict the observation of Bates (1995) and the finding of Bates (2000) that the development of new learning technologies is usually of high cost but since such increase pedagogical effectiveness, they

will therefore be considered to be profitable. It also agrees with the earlier finding of Lambert and Williams (1999) that one-way technologies such as print, audio or video cassettes and computer-based learning/multimedia have high initial production costs but lower costs subsequently.

It can be deduced from this finding that though the development of VPLP is expensive, its pedagogical values outweighed its cost implications. The package can enable students to perform sophisticated experiments which otherwise require high level of physical or technical skills; it can eliminate the need for physical sets of specialized and expensive equipment; it can be employed to supplement conventional laboratory instruction; it can be stored permanently and used repeatedly (Manjit, et al., 2003).

In spite of the high cost of developing the package, students taught simple pendulum, Hooke's law and momentum experiments are worth the money spent on the package (Bartolic-Zlomislic & Bates, 1999). The benefits of the package are therefore unquantifiable and incomparable with its cost.

The result of the analysis of the achievement scores of students at pretest and posttest (before and after exposure to VPLP) indicated that there was a significant improvement in the performance of students after learning simple pendulum, Hooke's law and momentum experiments using the package. This finding agrees with the earlier findings of Murniza, et al. (2010), Mahmoud and Zoltan (2009) who found that virtual laboratory instruction improves students' academic achievements in science-based subjects.

CONCLUSION

Result obtained from the data gathered indicated that physics students will be able to access virtual laboratory package in Nigerian secondary school having functional computer laboratories but flexibility of their access to the package on internet and mobile devices will be low since the package does not support usage on such platforms. Also, though it was expensive to develop virtual physics laboratory package yet, the package is still profitable considering its' unquantifiable benefits to students.

The major implication of this study for Open and Distance Learning is that the flexibility, accessibility and cost effectiveness of virtual laboratory package will enable learners acquire practical physics knowledge on any electronic devices without stress irrespective of time and space if the recommendations made are put into use.

RECOMMENDATIONS

> Based on the major findings of this study, the following recommendations were made:
> Developers of learning packages such as virtual physics laboratory package should ensure high flexibility of the packages. This will enable and improve students' access to such packages on mobile devices and internet;
> Government and school administrators should assist schools financially by providing fund needed for developing contextually relevant learning packages and for training physics teachers on the development of such packages, as their benefits to students' learning of physics concepts are enormous;
> Physics teachers should expose students to virtual learning strategies to promote students' autonomy to knowledge acquisition, discovery learning and student-centered instructional approach; and

> Students should endeavor to explore the opportunities offered by virtual physics laboratory package. The package can be utilized for revision purpose as well as for individualized learning.

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ASSESSMENT OF STUDENT LEARNING IN VIRTUAL SPACES, USING ORDERS OF COMPLEXITY IN LEVELS OF THINKING

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ABSTRACT

This paper aims at showing a new methodology to assess student learning in virtual spaces supported by Information and Communications Technology-ICT. The methodology is based on the Conceptual Pedagogy Theory, and is supported both on knowledge instruments (KI) and intelectual operations (IO). KI are made up of teaching materials embedded in the virtual environment. The student carries out IO in his/her virtual formation process based on KI. Both instruments of knowledge and intellectual operations can be mathematically modelled by using functions of increasing complexity order. These functions represent the student's learning change. This paper main contribution is to show that these functions let the student go from a concrete thinking to a formal one in his/her virtual learning process. The research showed that 47% of the students moved from a concrete thinking level to the formal thinking level.

Keywords: Conceptual pedagogy, virtual assessment, mathematical functions, complexity orders, virtual learning, ICT.

INTRODUCTION

Assessment of student learning supported by ICT is one of the essential issues in the virtual teaching-learning process. The importance of the student learning assessment requires ensuring real student really learns during the process, which involves ensuring the student progress in thinking levels. Most of the studies in education focus on evaluating student learning, but very few are focused on exploring assessment in ordder to achieve an increase in the student thinking level. This increase means the student improves their thinking structure going from a concrete thinking to a formal one.

Based on the above mentioned, this paper presents a new methodology with a theoretical support integrated in educational sciences, computer science and mathematic, in order to assess the advance of the student in their thinking levels. The theoretical foundations are realized in a model to assess the student learning by using complexity orders in thinking levels. The model is applied to a course supported by ICT, and results show advance levels in the student learning oscillating in advance range of [42.22%; 56.11%] at different levels of thought.

LITERATURE REVIEW

The literature regarding student learning assessment in virtual spaces may be classified as follows: 1) Models taking into account the personalized student assessment in the virtual environment based on their previous knowledge. Research which studies the time frequency of reading forums and posting in the virtual platform (Gomez-Aguilar, Hernandez-García, García-Penalvo, & Theron, 2015). Models that unlike the personal assessment of the student seek to improve the assessment of teams of students, which is equivalent to collaborative cooperative assessment (Gomez-Aguilar et al., 2015). Models

for assessing the impact of virtual training after the student complete their training process. This assessment is done in the professional workplace within a company site or by distance work -teleworking, in order to demonstrate virtual education effectiveness (Navimipour & Zareie, 2015; Van Nuland & Rogers, 2015). 2) Pedagogical methodologies supported by blended learning (BL) where the student learning is improved. 3) Use of systems for assessing student learning such as: adaptive and intelligent systems, where technology and science are integrated through the Learning Management Systems (LMSs), (Dolenc & Abersek, 2015; Sanchez-Santillan, Paule-Ruiz, Cerezo, & Alvarez-García, 2016). Systems taking into account the frequency of use of plattform resources and search for behaviour patterns in the student learning (Sun, Tsai, Finger, Chen, & Yeh, 2008). 4) Virtual learning assessment guidelines and frameworks represented by: AMEE guide 32: e-Learning (Ellaway & Masters, 2008), which is a theoretical and practical guide for teaching, learning and assessment in medicine virtual education. Quality approaches of virtual education in European universities (Dondi & Moretti, 2007). Framework with pedagogical support which contains techniques of student learning assessment at virtual level in Europe (Granic, Mifsud, & Cukusic, 2009).

THEORETICAL FOUNDATIONS OF THE MODEL FOR ASSESSING STUDENTS' LEARNING IN VIRTUAL SPACES USING COMPLEXITY ORDERS

Conceptual foundations of virtual learning assessment by complexity orders in thinking levels achieved by students are supported by: Education Sciences, Computer Sicences and Mathematics.

Supporting sciences above mentioned are studied at a theoretical level and are applied in the study at a practical level in an integrated way, which validates that in the teaching-learning process of any discipline when the cognoscent subject goes from a concrete thinking to a formal one, both Social Sciences (Education) and Natural Sciences (Mathematics-Computer) are integrated in the process.

Education Sciences

Education Sciences support the research of the assessment of virtual learning student taking into account the theory of Cognitive-Genetical Psychology and the theory of Dialectic Psychology, regarding ICT. The integration of both theories allows the inclusion of both the student cognitive process (Piaget) and the student behavior process (Vygotsky) in relation with the other in the virtual space (Tierney, 2013). The cognitive development stages in the Genetical Psychology are base don Piaget's theory. According to this, the knowledge initial structures condition the subject learning, that is, the more elaborated the knowledge instruments asimilated by the subject, the better the individual intelectual operations (Montealegre, 2016; Lourenco, 2016 ; Kitchens & Barker, 2016; Sweeney et al., 2016).

A virtual space based on ICT generates possibilities of assessing and valorate the knowledge initial structures before interacting with the virtual course, and of constant monitoring of the student learning stages depending on the change of both the knowledge instruments and the intellectual operations carried out by the virtual student in order to achieve their learning. The possibilities of building knowledge instruments in virtual spaces supported by ICT are limitless. Without being exhaustive, some of the knowledge instruments in virtual spaces are content pages (Drissi & Amirat, 2016b), learning objects (Kalleb et al., 2016), forum, chats, blogs, schedules, e-mail, programming projects, collaborative cooperative projects (Henrikson, Lumpe, Wicks, & Baliram, 2016 ; Lockyer, Agostinho, & Bennett, 2016; Oprea, 2016), authomatic actors that operate on remote virtual laboratories (Castillo, 2016), or logic arithmetic processing of operational software or of final user which the virtual student can operate at distance.

Knowledge insruments in virtual spaces in terms of learning objects or virtual microworlds as knowledge instrument based on ICT may have effects on audio, vision, touch, and smell. This requires more elaborated intellectual operationsby the student

with base on the knowledge instruments in order to achieve cognitive adaptation and assimilation states, according to Piaget.

Subject adaptation in their internal (subject)-external (virtual environment) cognitive relation depends on the concepts of assimilation and accommodation. Subject adaptation in a virtual space is understood in two senses. Firstly, the subject has to adapt to the environment, that is, if the subject cognitive structures are not adapted to the informatics and communication dynamics of the present and future world. Their cognitive structures will remain static and they will no be a competitive subject for society. Secondly, the virtual space has to adapt to the subject (adaptative hypermedia), that is, if the knowledge object in the virtual space is adaptative, this condition favors both the assimilation and accommodation of information in the student preexistent knowledge structures (Truong, 2016; Drissi & Amirat, 2016a; Jeong, 2016).

Thus, in cognitive adptation it is necessary taking into account that assimilation and accomodation are never presented in a pure way. This is supporte din the fact:

> Assimilation can never be pure, because by incorporating new element into its earlier schemata intelligence constantly modifies the schemata in order to adjust them to new elements. Conversely, things are never known by themselves, since this work of accomodation is only possible as a function of the inverse process of assimilation. (Piaget, 1952c, pp. 6-7; quoted by Flavell, 1998, p. 69).

Based on the student adaptation to the virtual space and considering assimilation and accomodation in the student brain, the stages of the student cognitive development have two periods, according to Piaget: the first, preparatory or prelogic; and the second, the advanced or logic. The former starts from the student's sensoriomotriz and preoperational stages in order to get the concrete and formal stages in the logic period (Labinowicz, 1987, p. 60).

Having as bases Piaget's concepts realted to knowledge structures and the student intellectual operations when interacting with the virtual space, the Conceptual Pedagogy (Samper, 2006), regarding the Genetic Cognitive Psychology, is the foundation of the base theoretical framework to assess the student virtual learning by complexity orders in order to take the student in their formative process from a concrete thinking (prelogic) to a formal thinking (logic). The Conceptual Pedagogy principles are shown below.

Conceptual Pedagogy

The rational being is supported by its knowledge structure based on memory and intelligence. The memory is responsible for storing the representation of reality, and in it there are the problems referring to the real or imaginary world; for its part, the intelligence needs the language to be able to solve the problems, generating in this way the symbolic intelligence, or what is equivalent, the intelligence in the higher.

The different taxonomies of educational objectives, be they cognitive, affective or psychomotor, allow the organization of the objectives in scales or orders of complexity, classifying them from the simplest to the most complex, the latter located in the rating scales that make up levels of complex thinking or complex thinking skills that require the simple thinking skills. In this sense,

> The possible objectives to use in: Bloom's cognitive taxonomy are: Memorize, understand, implement, analyze, synthesize and evaluate (...). In Krathwolil's affective taxonomy are: perception, or be aware of the stimulus; response, when the student is ready to respond to the stimulus; valuation, when the student begins to accept a value; organization, as the individual internalizes the value and characterization, this is the highest level of affective learning in which

> *the values guide and control the behavior of individuals (...). In Slopson´s psycho-motor taxonomy are: perception, when the learner perceives by means of the senses; provision, occurs when the student demonstrates willingness by some kind of action or experience of physical, mental or emotional nature; response addressed, emphasis on the skills that are components of more complex skills; mechanisms, answers learned that become habits; complex response, when the individual can carry out an act which is considered complex in the pattern of movements required; adaptation, the alteration of the basic responses to apply them in new situations and creation, at this level the student creates something new or new ways of handling (...). (Villarini, 1988, pp. 13-17).*

The superior intelligence to achieve objectives in the different classifications of learning objectives, such as: judge or evaluate, in Bloom's cognitive taxonomy; to characterize in Krathwolil's affective taxonomy; or creation in Slopson's psycho-motor taxonomy requires language clauses to interrelate reality - thought - and - intelligence, and thus be able to solve the problems through the syntagmatic and paradigmatic axis characteristic of clauses.

Based on that "instruments of knowledge and the intellectual processes make up an individual structure of thought" (Zubiría, 1994, p. 16), then it is inferred that the human intelligence, in their relationship with the language, is composed of the instruments of knowledge and intellectual operations or processes. "Knowledge tools are formed within the scientific disciplines" (Zubiría, 1994, p. 16), and from the simple to the complex; according to the theory of language, they are notions, clauses, concepts and categories. Intellectual operations make up the subject's structure of thought, and based on the instruments of knowledge, they are notional, propositional (propositionalize, exemplify, decode and encode), conceptual, and categorical. This generates the notional, propositional, conceptual, formal and categorical levels of thinking (Zubiría, 1998, p. 81).

It is important to highlight that knowledge instruments are disciplinary and, to belong to a discipline context, they are formal theories and practices to support a knowledge discipline contained in the virtual class within tele training platform; for its part, intellectual operations are transdisciplinary and "are developed through a directed practice " (Zubiría, 1994, p. 16); this practice corresponds to the actions of teaching, learning and assessment process of the virtual class. Based on the above mentioned, this research seeks to identify, in the process mentioned, the interrelationship that exists between the virtual teaching and the virtual learning (Kirshner, 2015), aiming at building a model to assess student learning in depth, that is with respect to their levels of thinking or their development from prelogical thought to logical thinking.

Intellectual operations, when run in the human brain, make up an order of increasing complexity in the subject structure of thought, as follows. First, the notion of the lower order relates the triad image - word - object; for example, the image of a house in the brain of the subject represented syntactic and semantic by the word H-O-U-S-E, and the physical object of the reality or the home. Second, the propositions, if p = it is snowing, then q = the house is a good refuge (if p → q). Third, concepts, the house is a place where humans live. Fourth, higher order categories, which work with hypothetical propositions independent of its content; for example the category of the transitive law in mathematics, defined as: If A is greater than B and B is greater than C, then A is greater than C; specifying the content, if the house has 500 m2, the house B has 200 m2, and the house C has 100 m2, it has to be the house A is greater than the B, but as the house B is greater than the C, then it is concluded that the house A is greater than the C.

The knowledge tools learned in the virtual course through the intellectual operations allow forming the student's structure of thought during the teaching-learning process when using the course supported by ICT. Therefore, the mentioned structure covers the

cycle of the student's five conceptual elements: Engagement, Exploration, Explanation, Elaboration, and Evaluation (Zanaty & Eisaka, 2015), in whose development through the course the student progresses according to their level of commitment from a phase of exploration of notions to a specific level until they reach a stage of evaluation or development of categories at the formal level of the theories and practices related to a discipline of knowledge.

Once developed the foundations of the Genetic Cognitive Psychology and related to the Conceptual Pedagogy, the theory of the Dialectic Psychology will be developed as a basis to consider that the subject does not depend anymore on its biological development for their learning, but they learn depending on the historical and social context in which they develop. In this regard,

> *The development of man is completely liberated from its earlier dependence on the biological changes inevitably slow, which are transmitted in inherited form. The historical-social laws become the only ones that direct from that moment the development of man. (Leontiev, 1972, pp. 404-405, cited in Montealegre, R., 1992, p. 12).*

Then, from the mental function in its action of individual organization of the human intellect, it is precisely the society framed in its history which has enabled, allows and will allow the development of humankind; then the more organized theories and practices of any human knowledge are the product of historical and social actions of humn being, which cannot be ignored in their human development, not only because they determine its current development, but because from them in its present state their future will be developed, both of itself as human being and that of humankind.

The human being intellect, built from the external activity, requires a bridge of communication so that the activity of the external material allows the operation of the mind in its function of organization of the intellect subject, as Vygostky says:

> *(...) the psychic processes, formed on the basis of the subject external and material activity, are mediated by special "instruments", the so-called stimuli-signs that Vygostki defined as any stimulus artificially created by man that constitutes a means by which he dominates (assimilates) his own conduct or another´s. (Vygostky, 1931, cited in Montealegre, R., 1992, p. 12).*

The stimuli-signs mentioned by Vygostky have to be interpreted as the "instruments", "tools", "links" or "bridges" of communication between the external material social-historical and the internal material of the mind of the subject, which can be concretised in the fact that "stimuli-means" mediate "natural" and immediate processes to be included in the behavior as intermediate links; by this psychic activity is transformed (...)." (Montealegre, 1992, p. 12).

The student communication with the virtual space binds an interrelationship between virtual course tools (or the external material of knowledge) and intellectual operations in the mind of apprentice subject (or the material internal in the student intellect). Based on this, the virtual education-learning process cannot be done without the interaction with the other (professor, colleagues, virtual community), an interaction of a social nature, multilingual, open, and asynchronous given the technological conditions for the operation of the stimuli-media contained in the virtual course. It is medium because it is confirmed that virtual course contents supported by ICT are communication bridges containing professor and virtual classmates' interpersonal codes in an area of knowledge. They are stimuli, because these interpersonal codes become stimuli to achieve student learning to virtual level. Learning that should be necessarily located at a level of thought of the pupil. That is, or the student has a concrete thinking level, or on the contrary the student

progresses to a level of formal thinking, with relation to the codes (knowledge instruments) containing in the virtual course in an area of knowledge.

Then, it is of the utmost importance to stress that the student enters a virtual course with some preconceptions, which are the result of knowledge acquired prior to entering the virtual course, or what is equivalent, knowledge based on the previous subject experience before interacting in the virtual course. This knowledge represents the experience with relation to the learning of the virtual lecture. It is therefore intended in the course that there is student conceptual progress, where the knowledge acquired through experience (concrete, or dependent on the context in which the student has developed) be different from the abstract knowledge (formal, context independent of that of the course), which it is intended that the student will acquire when interacting with the virtual course (Rata, 2015).

Foundations of the Computer Science and Mathematics

Once developed the foundation of Cognitive-Genetical Psychology, Dialectic Psychology and the Conceptual Pedaggy, it will be developed the theory of Computer Science and Mathematics as the basis for the creation of the integrated Educative-Matemathical Model to assess learning by complexity orders in levels of thinking.

The Computer Science is based on the Algoritmia, which is the basis for software construction. The software running on machines in electronic data processing is supported in the algorithms. An algorithm is a set of logical-mathematical rules used to carry out useful calculations for the user, using hardware (computer). The very virtual space supporting the formative process with ICT is a set of algorithms (software) that running on a teletraining platform (hardware) supports the process of virtual education-learning. The algorithm to be a set of rules has a runtime and uses a storage space (computer memory). The execution time of an algorithm based on the number of input data (n) is represented by the function $T(n)$. This time can be simple, that is the algorithm representative of the sequential search in which $T(n) = n, \, linear \, function$, where a key X of a set of data is looked for. This type of algorithms is useful for the user because the response time of the algorithm to run on the computer is fast, even for large values of n. The time in its delay in response to the user can be complex as it is the case of the recursive algorithm of the Tower of Hanoi, in which its time is represented by $T(n) = 2^n - 1, \, increasing \, exponential \, function$ (Pouw, Mavilidi, van Gog, & Paas, 2016). In this case the algorithm response times are high, and therefore the algorithm is not useful to the user. The foregoing implies that there are simple algorithms and difficult algorithm to design that consume a lot of time to respond to the user. Such is the case between the algorithm of the sum of two integer (simple algorithm) and a facial recognition algorithm depending on brain waves registered through an electroencephalogram (complex algorithm) (Stanley, 2013).

The type of simple (linear) or complex (exponential) algorithms, taking into account the algorithm running time, is a basis for defining the concept of algorithm Complexity Order (or Big - Oh notation $O(n)$) . An algorithm complexity order is defined as: Be (n) , the running time of an algorithm measured as a function of the size of input data (n). It is said to $T(n)$ have order of f(n), if there are two positive integers $c, n_o \in N$, such that, for all $n \geq n_o$ it is met $T(n) \leq c * f(n)$. Or $f(n)$ is the upper bound of $T(n)$ (Brassard & Bratley, 1996)

Mathematically, it is expressed as:

$$O\big(f(n)\big) = \{ \big(T(n), f(n)\big) \colon N \to R^{\geq 0} \, such \, that \, \ni (c, n_0) \in R^{\geq 0} : \, \nabla \, (n \in N)[T(n) \leq c * f(n)]\}$$

Then, based on the complexity order, it is established a time relationship between the functions of low performance in its delay time and the high-performance features in its delay time. That is to say, in the sequential search it is met $T(n) \cong O(f(n) = n)$ *or polinomial*, while in the Tower of Hanoi is met $T(n) \cong (f(n) = 2^n,$ *that is exponential*.

The relationship between the algorithmic complexity order and knowledge instrument of a discipline is direct. This is justified by the fact that the lower complexity order ($O(n) = n$) which corresponds to the notional and propositional language knowledge instruments of a discipline, the lesser degree of difficulty in student learning. For its part, to greater algorithmic complexity order $O(n) = 2^n$, which corresponds to concepts and categories knowledge instruments, there is a greater degree of difficulty in student learning. This degree of difficulty is reflected in the intellectual operations that are performed by the student in their interaction with the virtual course. In this regard, it is required that through the knowledge instruments (stimuli-media, according to Vigostky), in their formative process, the student will be able to go from notional and propositional intellectual operations (prelogical thinking, according to Piaget) to conceptual and categorical operations (logical thinking, Piaget).

Then, taking into account the concepts of the Science of Education (Genetic Cognitive Psychology, Piaget; The Dialectic Psychology, and the Theory of Conceptual Pedagogy) and of Computer Science and Mathematics (complexity order in Algoritmia $O(f(n))$ and the theory of mathematical functions $(T(n), f(n))$, it is feasible to design a mathematical function to assess student learning in formation processes in virtual spaces supported by ICT.

CREATION OF THE INTEGRATED EDUCATIVE-MATEMATHICAL MODEL TO ASESS LEARNING BY COMPLEXITY ORDERS IN LEVELS OF THINKING

The model to evaluate the virtual learning supported by ICTS for orders of complexity in levels of thinking integrates the Education Sciences, Computer Science, and Mathematics, based on the theoretical constructs which are interrelated in a logical way and organized in the model to theoretical-practical level, according to the following stages (Figure No. 1):

> - **Vygostky´s Dialectic Psychology** brings to model the interaction with the other through knowledge instruments contained in the virtual course and in the mind of the cognoscente subject, depending on which the teaching-learning process is carried out supported by course didactic for the virtual teaching in order to achieve student learning.

> - **Piaget's Genetic-Cognitive Psychology** is another model foundation to substantiate the student thinking development states to interact with the virtual course through knowledge instruments. Then, it is intended that by interacting with the virtual course the student in their processes of development of thinking, goes from a prelogical stage to a logical one; i.e. that they improve their concrete thinking structure to a formal thinking organization.

> - **The Conceptual Pedagogy** in the framework of Genetic-Cognitive Psychology brings to the model the instruments of knowledge of the virtual course, which belong to a discipline. These knowledge instruments are those that allow the development of the Conceptual Pedagogy in the virtual course, because when using the didactic activities in the teaching-learning process, these instruments are converted into stimuli-media during the process. These stimuli-media enable the consistent integration of the concepts of Dialectical Psychology and Genetic Cognitive Psychology through the Conceptual pedagogy. In the

integrated concrete analysis, the stimulus of content or a forum in the virtual course becomes an environment to learn with the other (Vygostky) at the social level. Then, based on the stimuli-media of the virtual forum as an instrument of knowledge, the student makes intellectual operations. These intellectual operations being transdisciplinary and executed with the teacher or virtual tutor guide are those that enable the student thinking development (Piaget) from a concrete stage (prelogical) to a formal level (logical).

➢ The Education Science is integrated to the Computer Science to support the model using from the latter the concept of algorithm. The algorithm, as a set of logical-mathematical rules that perform processes of calculations in a computer being encoded in a programming language, is parallel as comparison simil to processes of intellectual operations performed by the student's brain to interact with the virtual course.

➢ The algorithm has a delay time $T(n)$ in the computer depending on the number of input data n to be processed; for its part, the student's brain a time delay in its learning on the basis of the number of stimuli-media it receives in the virtual course teaching.

➢ The algorithm delay time $T(n)$ to give a useful result to the user can be classified into a complexity order $O(n)$, that is there are linear (n) and exponential a^n con $a > 1$ complexities; at the same time, the student intellectual operation can be also classified in a complexity order at the level of their learning, from prelogical level prelogico or simple mental operation (notional) to logic level or complex mental operation (categorial).

➢ Knowledge instruments (KI) in the framework of the Conceptual Pedagogy contained in the virtual course are the base of the virtual teaching. These knowledge instruments or stimuli-media go in their level of complexity from the simple (concrete) to complex (abstract) in relation to the stimulation of the student thinking level. The above in the model leads to identify for knowledge instruments that: i) The notion is concrete within a discipline (bit in Computer Science). The proposition is based on the notion (the bits are used to form byte). The concept presupposes the learning of the proposition on the basis of the notion (1 byte = 8 bits). And finally the category, the information is stored in bytes in a computer (Letter to = 0100 0001, encoded in ASCII - American Standard Code for Information Interchange).

➢ The intellectual operation (IO) performed with knowledge instruments in the Computer Science and during the development of the virtual course, allows the student thinking development goes from a concrete stage or notional operation (understanding the bit) to a categorial operation or the understanding that the letter A in ASCII is stored on your computer in bits and represents a unit of information.

➢ The Education Science brings to model the KI and IO based on the Conceptual Pedagogy. It is integrated to the Computer Scienceg with the Algoritmia within the model to identify a low complexity level under represented by a polynomial function $T(n) = n \cong O(n)$. This complexity level is parallel to the notional and propositional intellectual operations made by the student in the virtual course.

➢ For its part, the exponential complexity order $T(n) = 2^n \cong O(2^n)$ related to the algoritmia is parallel to the categorical and conceptual intellectual operations, in which the student has already acquired an abstract thought in thir thinking levels.

- ➤ **It is in the virtual course where the fundamental theories of the model (Educational and Computer Science) are specified in the virtual educational practice. The practice of the sustenance theories to the evaluation of e-learning within the context of Algorithms and Complexity class (steps 12 to 15 of the model) is made in the model.**

- ➤ **The virtual course presents two types of algorithms as KI in the virtual content: the first, the sequential logic (A1) and the second, recursive logic (A2). This KI is the notion that allows the notional operation in the subject mind.**

- ➤ **Based on the notional operation, the virtual tutor guides the student in the propositional operation. This is made concrete in the clause. Is the sequential logic algorithm better than the recursive logic algorithm to generate the Fibonacci numbers? Or what is equivalent, is the time of the $T_1(n)$ algorithm better than the time of the algorithm $T_2(n)$?.**

- ➤ **The proposition within the model leads to a conceptual elaboration. From this conceptual elaboration, the student concludes that the time $T_n(n) = n$ is better than the time $T_2(n) = 1,6^n$. This is proved because if $n = 100$, then $T_1(n) = n = 100$ is better that $T_2(n) = 1,6^{100} = 258224987808690858965,5919172003$.**

- ➤ **Based on the conceptual operation, the student can clearly differentiate two disjunt categories of problems that are: (i) The polynomial problems or those whose algorithms are represented by polynomial performance times $(n) = n$, and the exponential or those algorithms whose performance times are represented by exponential functions $T(n) = a^n , con\ a > 1$.**

- ➤ **The mathematical part of the model is integrated through a two variables-mathematical function. This feature assesses the student's learning progress. The student's learning assessment in virtual spaces by complexity orders in thinking levels makes interact in the columns of the model table (Table No. 1) (Assessment of Virtual Learning - AVL): Knowledge instruments (KI) of virtual course, through the student's intellectual operations (IO), on the basis of the functions of evaluation (Val(KI) and Val(IO)), to assess a formative dimension (Di (Di= Cognitive)) related to a learning objective (Lo). For its part, the table lines take into account the complexity level (CL) from the low level to the high level.**

- ➤ **The mathematical function of virtual learning assessment in abstract thinking is expressed as AVL(KI,OI) = F[Knowledge Instruments, Intelectuall Operation].**

- ➤ **The mathematical function of learning assessment in the model is made concrete in function of the parameters α associated with the notions, β correlated with the propositions, δ in relation to the concepts, and ρ corresponding to the categories. This mathematical function is explained below based on the conceptual pedagogy theory.**

Taking into account the model built, the increasing complexity order of intellectual operations based on the KI is used to assess the student learning in virtual space through the creation of the following concrete mathematical function designed based on the abstract function mentioned above (AVL(KI,OI)), which is discussed in relation to the dimensions of formation of the virtual student and the fulfillment of the virtual course learning objectives.

Be KI the set of Knowledge Instruments of a particular area of knowledge composed of notions (α), propositions (β), concepts (δ) and categories (ρ) presented in the virtual

space and whose respective specific weights in scale range are α=10, β=20, δ=30, and ρ=40 for a total of 100.

Be OI the set of Intellectual Operations composed of a notional (α), propositional (β), conceptual (δ) and categorial (ρ) opeations, result of the student interaction in the virtual space to interact with knowledge instruments, which are assessed at the level of student learning objectives and are assigned a weight in the scale interval as following: the notional intellectual operation, 10 (α); the propositional, 20 (β); the conceptual, 30 (δ); and finally the categorical, 40 (ρ).

The specific weights assigned to the parameters (α, β, δ, ρ) in the closed interval scale [0;100] should represent in their allocation the level of complexity of both the knowledge instrument in teaching and the intellectual operation in student learning. Therefore, in the assignment made α<=β<=δ<=ρ.

The assessment of the student virtual learning - AVL of is in function of both the assimilation of the knowledge instruments through the virtual space and the development of intellectual operations by means of the exercising directed did from the virtual space based on the knowledge instruments.

Therefore, the assessment of virtual learning – AVL is equal to:

$$AVL(KI, OI) = F\ [Knowledge\ Instruments, Intelectuall\ Operation] = F[KI; OI]$$

$$AVL(KI, OI) =$$
$$F[(notions(10), propositions(20), concepts(30), categories(40));$$
$$(notional(10), propositional(20), conceptual(30), categorical(40))]$$

Schematically, the mathematical function can be represented in Table No. 1.

Table 1. Assessment of Virtual Learning – AVL

Complexity Level (CL)	Knowledge Instruments KI→	Value of the Knowledge Instruments	Contents of the virtual environment ↔	Intelectuall Operation ← OI	Value of Intelectuall Operation	Dimension	Learning Objective	Assessnent of Virtual Learning AVL= F(KI,IO)
1. Low	Notion	10		Notional	10	Cognitive Emotional Psychomotor	Memorize Describe Perceive	
2. Medium	Proposition	20		Propositional	20	Cognitive Emotional Psychomotor	Undestand Answer Provide	
3. Medium	Concept	30		Conceptual	30	Cognitive Emotional Psychomotor	Analyze Organize Respond	
4. High	Categorie	40		Categorical	40	Cognitive Emotional Psychomotor	Evaluate Characterize Create	

- ➤ The function $AVL(KI, OI)$ when applied in the virtual course generates two learning states: The predictive and the evaluative. The assessment of virtual learning in its relationship with the content of the virtual course is therefore a two-dimensional function. The function in the X-axis represents the knowledge instrument, and on the Y-axis the intellectual operation.

- ➤ The predictive function associated to the X axis predicts the students learning justified by: (i) The student must meet the precondition to interact with the virtual space through the knowledge instrument, or value associated with the x-axis. ii) Based on compliance with the precondition, it is expected that the student achieves the learning with the intellectual operation, associated with

> **the Y-axis, which corresponds to the interaction-with-virtual-course postcondition.**

> ➢ **For its part, the evaluative function (associated with the Y axis) serves to demonstrate the students learning, which corresponds to the values achieved by the student in such a state. The evaluative state is made concrete when resolving the learning assessment questions in each of the learning modules of the virtual course. Questions in which the student makes the notional, propositional, conceptual and categorical operations related to the respective knowledge instruments developed by the student in the virtual course.**

The aforementioned predictive function not only predicts the student learning but that places student learning in the knowledge interval scales of Bloom's Taxonomy, in the case that the dimension being assessed is the student cognitive dimension. This induces that to be structured the virtual course in their content through the knowledge instruments in the notional, categorial, conceptual and propositional scales, the student learning level accordingly passes from a specific learning (notional thought) state to a formal learning one (thinking in complex).

The function $AVL(KI, OI)$ must be understood in relation to the development dimensions of the virtual student and the fulfilment of the vrtual course learning objectives. In this regard, taking into account the Table No. 1, the cognitive dimension inserted in the developed model and related to Bloom's Taxonomy i) involves the action of memorizing that at least the student has learned the notions (concrete) of a knowledge discipline for which it is necessary that the student memorizes at least the notions related to a theme of the virtual class within the training discipline. If the student in the function $AVL(KI, OI)$ does not reflect a change from the predictive state to the evaluative one in the model, the student remained in the concrete thinking and therefore the training objectives were not met, that is, they did not even memorize the notions of the virtual module, ii) the understanding cognitive action of Bloom's Taxonomy cannot be done if as requirement it does not have learned the specific notions of a virtual module that within a class serve to learn a discipline. Then, one understands when intellectual operations of relationship among a set of propositions are done, i.e. the proposicionalizing intellectual operation to assess the status of truth of a set of propositions. iii) in the development of the cognitive dimension compliance with the objective of analyzing in the conceptual intellectual operation requires both notions and the correct understanding of propositions with the aim of achieving the learning of the concept to be taugth the virtual course module. iv) in the cognitive dimension, assessing a concept within the learning of a discipline is located in the highest range of thinking in Bloom's Taxonomy. Then, if from the predictive learning state to the evaluative learning state the student improved in the function $AVL(KI, OI)$, it can be concluded that the student has progressed in their thinking level.

The change in the student thinking structure (AVL_s) from concrete to abstract is assessed for a student through the comparison of the result of the predictive learning state to the evaluative learning state, based on the equation $AVL_s(KI, OI) = \sum(\alpha, \beta, \alpha, \rho)$. If the result of the equation when substracting the predictive learning state from the evaluative learning state is greater than zero (0), then the student improved their thinking structure. But if the result of the equation is less than or equal to zero (0) the student has not progressed in their thinking structure.

The assessment equation of the virtual course (AVL_c) in each one of the notional, propositional, conceptual or categorialthinking levels is $AVL_c(KI, OI) = \sum_{i=1}^{i=s}(\alpha_i, \beta_i, \delta_i, \rho_i)$, being s the number of students of the virtual course. Therefore, if the sum of the results of all the students of the virtual course in the evaluative state minus the sum of all the

result of the virtual course in the predictive state is greater than zero (0), then the s students improved in their structure of thought on the thinking level.

APPLICATION OF THE MODEL

Student learning assessmentl by complexity orders in thinking levels was applied in the Algorithms and Complexity - A&C course, supported by ICT within the Blackboard platform. A&C course is a class at the undergraduate level of the Engineering and Computer Science program at the Universidad del Norte. It is structured in a set of virtual modules supported by ICT with embedded learning objects. The modules developed in the course are: Computers, Complexity and Intractability; Recurrence Equations; Divide and Conquer; Greedy Algorithms; Dynamic Programming; Backwards Return - Backtracking; the Shortest Route Problem; and Theory of Graphs.

This paper presents the model application results regarding the contents of the first class module (Computers, Complexity and Intractability) taken by twenty-eight (28) students. In Table 2, these results are shown indicating the type of knowledge instrument (KI).

The results of the predictive function (X-axis) when students navigate knowledge instruments imply that the platform makes a tracking of students' navigation when they visit each one of the topics of the virtual module and assigns a travel value in accordance with the thinking level category the knowledge instrument was designed, whether this was notional, propositional, conceptual or categorical. Therefore, each action of virtual teaching (Content, Learning Objects, forums, emails, blogs, collaborative projects, and so on) as educative stimulus-media at the level of an instrument that contains a knowledge to be learnt by the student, should carry a pedagogic sense intention that lead to the student learning the virtual space, with respect to notional, conceptual, propositional or categorical thinking levels. In this sense the virtual course is focused on the student thinking levels from the design phase.

The assessment instrument design in the virtual course, for the achievement of the results of the evaluative function (Y-axis) in its valuation content of the student learning process should correspond to the respective instruments designed by thinking level category. That is to say, a notional knowledge instrument of a virtual content must necessarily be the design of an assessment in the same scale of thinking level, in this case, notional.

The correct design of the prediction and assessment functions of virtual learning made necessary that a set of six (6) judges (expert in both virtual training and in Computer Science) validated knowledge instruments to be taught in the virtual formative process.

The result of judges' valuation with regard to the knowledge instruments are shown in Table 2. The value of student interaction with the virtual module is the integer part of the average of the topics contained in the category. In this sense in Table 2, there are six categorical topics (Complexity Classes: 7.1-7.6; for a value of 240 points. Then, student entire route to study the categorial knowledge instrument 240/6=40 or maximum score the student can achieve in the predictive function).

Table 2. Results of the knowledge instrument assessment in thinking levels (Computers, Complexity and Intractability module)

		KI			
		10	20	30	40
Kowledges Instruments: Computers, Algorithms and Intractability		10	20	30	40
Objectives					
Structure Concept					
Conceptual Synthesis					
Theme 1: Computers, algorithms and solving problems using computers.					
4.1.Algorithms and solving problems computationally tractable	N	10			
4.2.Definition of problems: parameters and statements	N	10			
4.3.Defining algorithm	N	10			
4.4.Features to select and prioritize an algorithm.	N	10			
4.5.Limitations to the efficiency of an algorithm.	P		20		
4.6.Criteria for improving an algorithm.	P		20		
4.7.Characterization and classification algorithms.	P		20		
4.8.Examples of drill and practice (interactive game).	P		20		
4.9. Complexity Análisis.	CO			30	
4.10.Calculating the run time of an algorithm.	CO			30	
4.11.Notation and asymptotic approximation of the runtime of an algorithm.	CO			30	
4.12.Big Oh (O(n)) Notation	CO			30	
4.13.Grapher asymptotic functions (Big O).	CO			30	
4.14.Definition of Omega notation.	CO			30	
4.15.Definition of Theta notation.	CO			30	
4.16.Asymptotic notation with various parameters.	CO			30	
Theme 2: Methods for measuring the running time of an algorithm.					
Theme 3: Benchmarking.					
6.1.Definition	N	10			
6.2. Benchmarking uses.	P		20		
6.3.Factors to be taken into account in the interpretation of a Benchmarking.	CO			30	
Theme 4: Complexity Classes.					
7.1.Complexity classes P, NP space.	CA				40
7.2.Tractable and intractable problems.	CA				40
7.3.NP complete problems	CA				40
7.4.Interactive Test (Labyrinth).	CA				40
7.5.Interactive Test 2 (Pay attention).	CA				40
7.6. Learning Object.	CA				40
Electronics addresses suggested by thematic areas	CO			30	
Symbology: N= Notions, P=Propositions, CO=Concepts, CA=Categories					

Education Science

1. Dialectic Psychology

3. Conceptual Pedagogy

2. Genetic Cognitive- Psychology

7. Knowledge instruments (KI):
Notional, Propositional.

Conceptual, Categorial

8. Intellectual Operations (OI):
Prelogical:
Notional, Propositional
Logical:
Conceptual, Categorial

Computer Science

4. Algorithm

5. Algorithm time
$T(n)$

6. Complexity Order $T(n) \cong O(n)$

Algorithmics

9. Complexity Level (CL) – Low

$T(n) \cong O(n), polinomial$

10. Complexity Level (CL) – High

$T(n) \cong O(2^n), exponential$

11. Virtual Course: Algorithm & Complexity
Notion: Algorithm (Ai (i=1 , and i=2)):
   Algorithm to generate the Fibonacci series
A1:
Function Up Fibo(n)
    Fibo← 1
    One_back ← 1
    For i = 3 to n do
        Two_back← One_back
        One_back ← Fibo
        Fibo ← Two_back + One_back
    Next i
     Return Fibo
end Up Fibo

12. $Notional: T_1(n) = n$

A2:
Funcion Fib (n): nat;
    Si (n=0) o (n=1) ent.
        Num_Fib ← n
    Sino
        Num_Fib ← Fib (n-1) + Fib (n-2)
    Fin - si
Fin Funcion Fib;

12. $Notional\ T_2(n) = 1,6^n$

13. $Propositional: Is\ T_1(n) better\ than\ T_2(n)$

14. $Conceptual: Yes, T_1(n)\ is\ better\ than\ T_2(n)$

15. $Categorial: T_1(n) \cong O(n), T_2(n) \cong (1,6^n)$

16. Mathematical funtion to assessment   e-learning
Table No. 1

CL	KI	Val(KI)	VC	IO	Val(IO)	Di	Lo	
Low	Notion	α (10)	$\leftrightarrow$	Notional	α (10)	Cog	Me	
Medium	Proposition	β (20)	$\leftrightarrow$	Propositional	β (20)	. . .	Un	
Medium	Concept	δ (30)	$\leftrightarrow$	Conceptual	δ (30)	. . .	An	
High	Categorie	ρ (40)	$\leftrightarrow$	Categorical	ρ (40)	Cog	Eval	A

CL = Complexity Level
KI = Knowledge Instruments
Val(KI) = Value of Knowledge Instrument — V
VC = Virtual Course
IO = Intellectual Operation
Val(IO) = Value of the Intellectual Operation
Di = Dimension — L
Lo = Learning Objective
Cog = Dimension Cognitive
Me = Memorize
Un = Understand
An = Analyze
Eval = Evaluate

17. AVL (KI, OI) = F [Knowledge Instruments, Intelectuall Operation] =
F [KI;OI]

18. AVL (KI, OI) =
F [(notions (α), propositions (β), concepts (δ), categories (ρ));
(notional (α), propositional (β), conceptual (δ), categorical (ρ))]

19. Application states of the function $AVL(KI, OI)$

- 20. Predictive (during interaction with the virtual module)
- 21. Evaluative (after the interaction with the virtual module)

Figure 1. Integrated Educative-Matemathical Model to assess learning by complexity orders in thinking levels

ANALYSIS OF THE MODEL APPLICATION RESULTS

Table 3 shows the results of the Computer, Complexity and Intractability module for a simulated sample of 28 students. The predictive function of the notional knowledge instrument (scale [0.0; 10.0]) when the students developed the virtual course contents gave an average of 4.5. The evaluative function posted on average in the notional scale, 6.4. The value of the increase in the notional learning is 42.22%. Then, 60.71% (Figure 2) of students succeeded in consolidating their notional thought, that is those students for whom the Y value is greater than the X value (Table 3, Δ=1) when learning the virtual topic concepts.
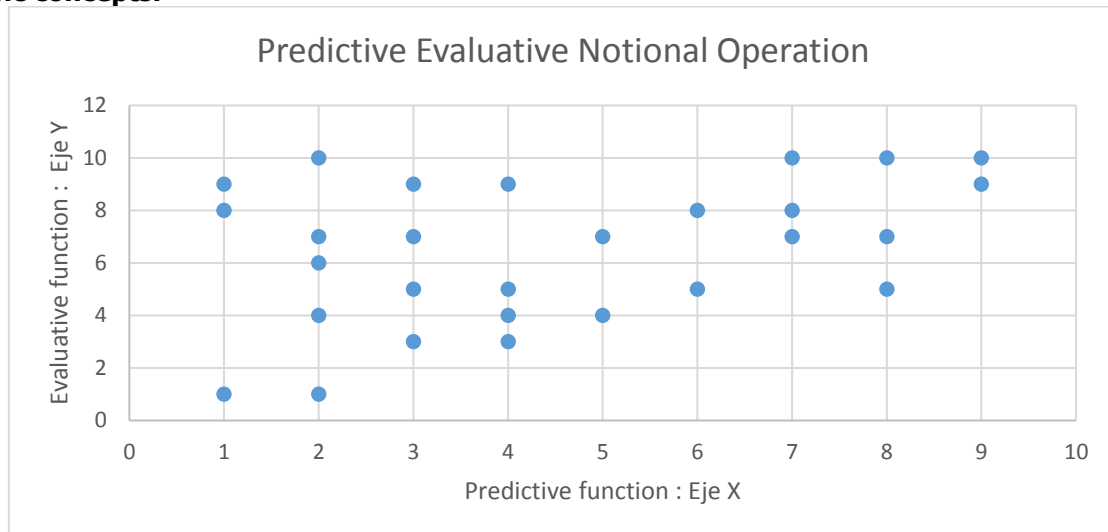

Figure 2. Progress in the notional thinking

The propositional thinking went from 7.29 to 11.11 in the scale [0.0; 20.0] with an increase of 52.40 per cent in the learning of the propositions developed in the virtual module; and 71.43% (Table 3, Δ=1) of students moved in their propositional thinking, i.e. 20 out of 28 students improved their thinking level with the propositional instruments presented in the Blackboard platform (Figure 3).
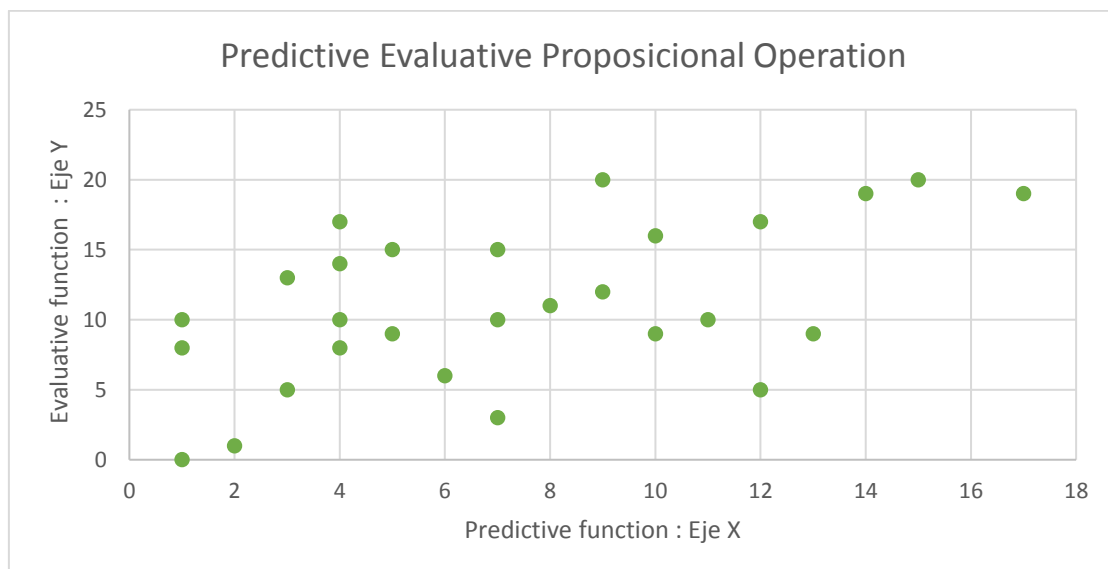

Figure 3. Progress of student thinking in the propositional scale

Table 3. Results of the model application in the virtual module "Computers, Complexity and Intractability"

No.	Predictive base on Knowledge Object				Evaluative in function of Intellectual Operation								
	Notional	Propositional	Conceptual	Categorial	Notional	Δ	Propositional	Δ	Conceptual	D	Categorial	Δ
1	5	10	5	25	4	0	9	0	5	0	26	1
2	6	1	15	15	8	1	10	1	28	1	37	1
3	2	8	9	10	1	0	11	1	30	1	15	1
4	7	5	22	19	10	1	15	1	27	1	30	1
5	8	11	18	21	7	0	10	0	19	1	27	1
6	4	12	24	15	9	1	17	1	25	1	35	1
7	3	13	15	25	3	0	9	0	28	1	36	1
8	2	2	5	8	4	1	1	0	4	0	8	0
9	1	4	7	9	8	1	17	1	25	1	20	1
10	9	9	27	17	10	1	20	1	30	1	40	1
11	7	1	13	18	7	0	0	0	10	0	15	0
12	4	4	8	22	3	0	8	1	18	1	39	1
13	5	9	12	25	7	1	12	1	30	1	40	1
14	6	15	24	13	5	0	20	1	28	1	25	1
15	8	3	15	12	10	1	13	1	23	1	33	1
16	3	7	26	19	9	1	10	1	29	1	34	1
17	4	6	23	22	4	0	6	0	26	1	37	1
18	2	4	5	5	6	1	10	1	8	1	17	1
19	2	17	9	12	10	1	19	1	19	1	23	1
20	1	3	12	18	9	1	5	1	25	1	25	1
21	4	5	1	4	5	1	9	1	7	1	6	1
22	1	7	12	8	1	0	3	0	11	0	4	0
23	2	10	17	30	7	1	16	1	27	1	32	1
24	3	14	21	35	5	1	19	1	30	1	39	1
25	7	4	9	12	8	1	14	1	23	1	17	1
26	8	7	17	13	5	0	15	1	22	1	19	1
27	9	12	18	27	9	0	5	0	18	0	38	1
28	3	1	3	6	7	1	8	1	10	1	9	1
$\overline{\overline{X}}$	4,50	7,29	15,31	16,61	6,40	60,71	11,11	71,43	22,00	82,14	25,93	89,29

The predictive conceptual state in the interval [0.0;30.0] recorded a value of 15.31 and spent to 22.00, with an improvement in average of 43.69% of conceptual thinking, and 82.14% (Table3, Δ=1) of students moved in its structure of conceptual thinking; that is, 23 students out of 28 were able to advance conceptually (Figure 4).
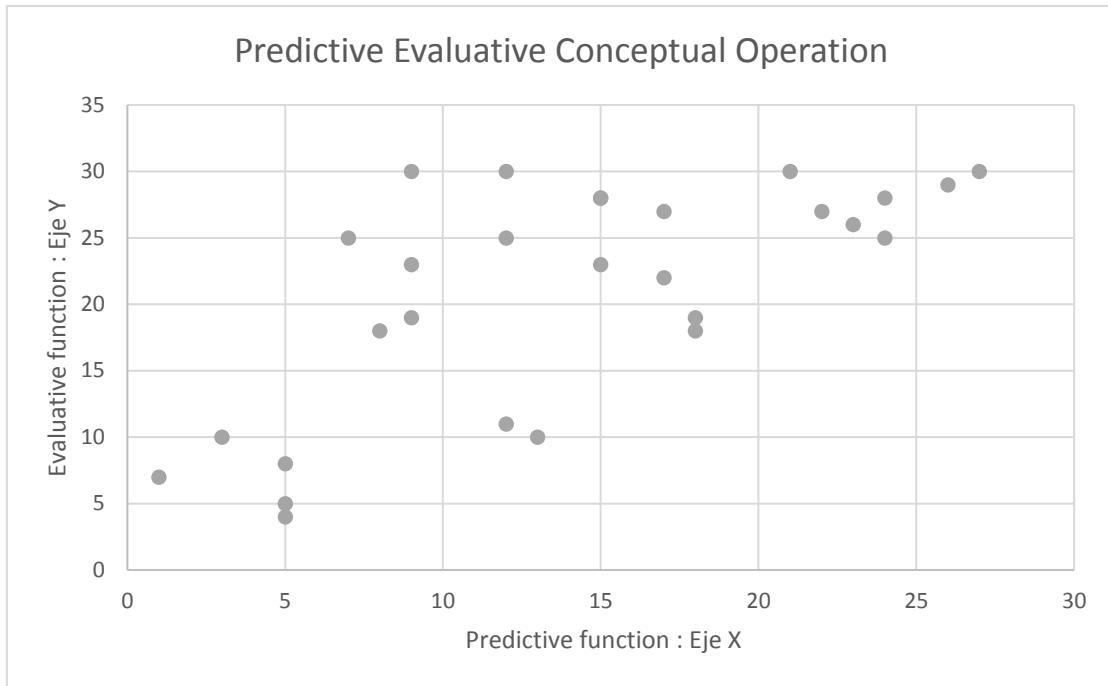
Figure 4. Progress of conceptual thinking

The predictive function of the X axis for the categorial thinking designed in the closed interval [0.0; 40] recorded a value of 16.61. For its part, the evaluative function of the Y axis, which assesses the student categorial thinking, gave as result 25.93. This increase amounts on average to an increase of 56.11% of the categorial thinking. Then, the evaluative function (on the Y axis) gave as results that 89.29% (Table 3, $\triangle=1$) of students were able to advance in their thinking structure; i.e. 25 out of 28 students get advance in their categorial thinking structure (Figure 5).
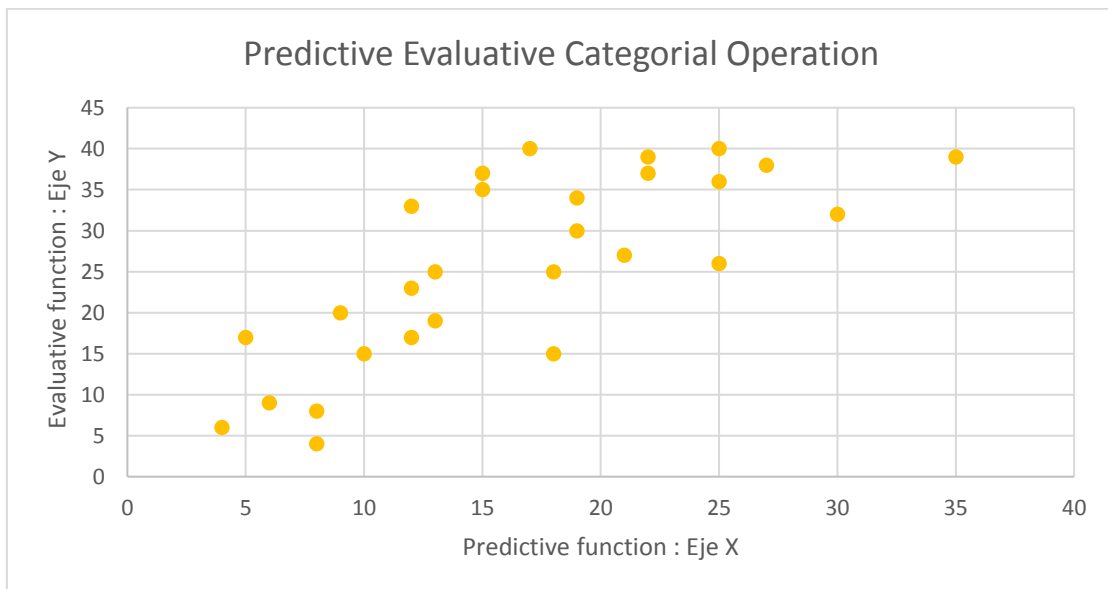

Figure 5. Progress of categorial thinking.

The confirmation of the model functionality in terms of ensuring the advancement in the student thinking structure generated by the use of the knowledge instruments presented in the virtual module is validated in the graph in Figure 6, which shows that the majority of the points appear located in the diagonal above the graph, points that correspond to the notional (█), propositional (█) , conceptual (█) and categorial (█) scales.
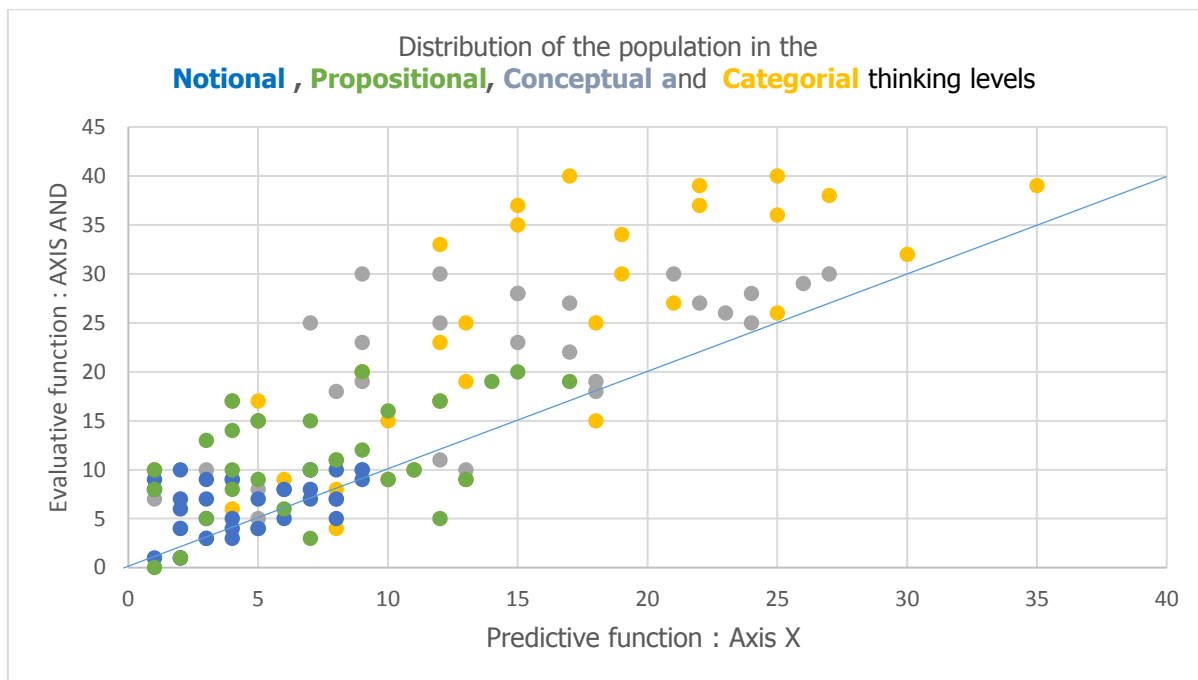
Figure 6. Results of the distribution of the A&C course by thinking levls applying the model

The advantages of this model in relation to each student individual learning process are: i) the discrimination of the student in their thinking level in the predictive state; this implies that, for instance, the student number 8 (Table 3) has very low levels of prelogical thinking (2 of 10 in the notional thought and 2 of 20 in the propositional thought); which complemented by the fact that their predictor levels in the conceptual thinking (5 of 30) and in the categorical one are low (5 of 30 and 8 of 40, respectively) induces that the student is not going to be successful in their evaluative performance in the course; in fact this student failed to progress in their categorial thinking. This means that the student does not have a formal thinking structure required for the virtual class level. ii) For its part the discrimination allows identifying that high score levels in the predictive function, ensure the student good performance. Such is the case of student 24 for whom their predictive values are: notional, 3 of 10; propositional, 14 of 20; conceptual, 21 of 30; and categorial, 35 of 40. This implies the student is going to have a status of success in the evaluation function; and of course, the student registered, in the evaluative function, values in notional, 5 of 10; propositional, 19 of 20; conceptual 30 of 30; and categorial, 39 of 40. This allows concluding the student has a formal thinking structure with regard to the learning taught in the virtual course.

FUTURE RESEARCH

Taking into account that the research was focused on locating the thinking level in which the student is in the virtual course, according to Piaget, and performing didactic actions that, within the framework of the Conceptual Pedagogy, enable the student thinking level improvement. The action proposals for future research are: (i) To analyze the behavior of the predictive function with respect to the good design of the virtual course materials. ii) To adapt the virtual course in accordance with the student thinking level prior to interact with the virtual course; this implies the need to design specific knowledge instruments according to the student thinking level; i.e. the application of a customized training process within the Conceptual pedagogy framework.

CONCLUSIONS

The contributions fundamentals of the research of the student's learning assessment in virtual spaces using complexity orders in thinking levels are:

➢ Without making an exhaustive list, previous studies assessing learning levels are represented by: Surveys student, where the student is asked in a Likert scale, whether in the development of the learning activity s/he applied or not critical thinking, concluding that students "strongly believe that they exercised deeper levels of thinking" (Al-Mubaid, Abukmail, & Bettayeb, 2016). Forums in which it is expressed qualitatively that alumni can reach high levels of thought structured in an appropriate manner the management and discussion in the forum (TIBI, 2016). Consultation processes through the Internet in order to increase information literacy, which if goes beyond just consulting Google and copying, achieves high levels of thought (Sorghum, Bartol, Dolničar, & Boh Podgornik, 2016). Using virtual reality platforms (RV) such as 3D VR English language in order to evaluate student learning on Bloom's Taxonomy scales, concluding that students improved in developing higher and more complex levels of thinking (Chen, 2016). Active learning represented by Problem-Based Learning (PBL) and Project-Based Learning (PjBL) which connect students with higher levels of thinking, concluding that PjBL is the best methodology to teach Engineering and to develop the professional skills required by the industry in the twenty-first century (Nikam, 2014). Then, based on the aforementioned studies it must be taken into account that they are significant contributions to assess levels of student thinking; but none of them integrates science education with computer science and mathematics in order to place the student in a particular level of thought and taking her/him to a formal thought by means of a set of knowledge tools (KI) and intellectual operations (IO).

➢ The construction of the model of the learning assessment process allowed integrating in a coherent way the theories of the Sciences of Education with the Computer Science and Mathematics, evidencing the model conceptual underpinning in both the educational section and in the computational part. The educational part composed of formal theories such as Genetic Cognitive Psychology, Dialectic Psychology, and the Conceptual Pedagogy. The mathematical-computational part is supported by the Theory of Complexity Analysis and the theory of Mathematical Functions.

➢ The model allows validating the design effectiveness of educational materials contained in the virtual platform, because it entwines the materials for the virtual learning with the assessment processes in a biunivocal way (1 to 1). This implies that if historically students fail to advance in their thinking level with an educational content which represents a virtual knowledge instrument, this does not serve as didactics for virtual learning process, and therefore it must be changed.

➢ The predictive function related to the virtual course knowledge instruments helps ensure high results in the evaluative function. Qualitatively it means that if students study the virtual contents adequately, it is expected a good performance in the virtual assessments. This is confirmed quantitatively because 89.29% of students participating in the research were able to advance in their categorial thinking.

➢ The model based on predictive and evaluative functions enables to locate the student group progress in thinking scales. Research results show that the advances achieved in the scales are 60.71% in the notional, 71.43% in the propositional, 82.14% in the conceptual, and 89.29% in the categorial. Thus, the previous results validate that high advance values (>50%) in notional and

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propositional thinking levels, will ensure the student success in conceptual and categorial thinking levels.

➢ The model serves to place the learner at the level of concrete or abstract thinking at the end of their virtual learning. The results show that about 89% of the virtual student population succeeded in consolidating their formal thinking structure (Piagetian logic level). This formal thinking is related to the Algorithms and Complexity subject, where the competencies of abstract reasoning and numerical capacity are essential to the good performance of the student in the virtual course.

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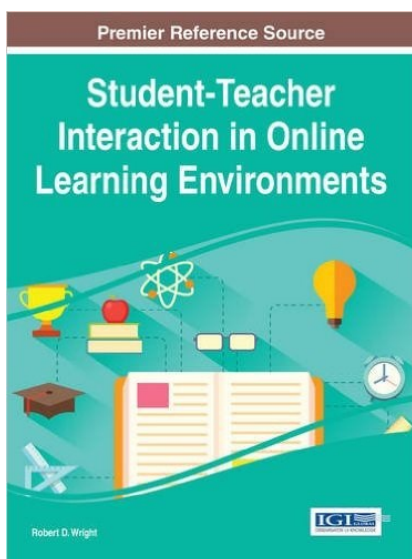
BOOK REVIEW

STUDENT-TEACHER INTERACTION IN ONLINE LEARNING ENVIRONMENTS
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ISBN	978-1-4666-6461-6 (Hardcover) 978-1-4666-6462-3 (ebook) 978-1-4666-6464-7 (print&perpetual access)
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As online learning environments do not lend themselves to face-to-face interaction between teachers and students, it is essential to understand how to ensure healthy social presence in online learning. This book provides a useful selection of both commonly used and recently developed theories by discussing current research and giving examples of social presence in latest Online Learning Environments (OLEs). The book examines how the appropriate use of technological tools can relate instructors, peers, and course content. The reports on successful implementations are reinforced with research involving pre-service teachers. Both experienced and inexperienced educators will benefit by being informed about the effective use of many valuable tools exemplified here. The last six chapters present an array of new models that support social presence, and demonstrate how traditional paradigms can be used to create online social presence. They further showcase how innovative works can be successfully aligned with the instructional standards. The book presents valuable observations, rigorous studies, and practical applications of theories refined and put into best practices. The materials offered here can serve as great resources for online educators, inducing new ideas, stimulating inspiration for action, and perhaps validating personal techniques and practices used in the OLEs. Edited by the leading experts in the field, this book specifically focuses on the practical and theoretical aspects of Student-Teacher Interaction in various instructional contexts at multiple levels of application, along the lines of social presence, online presence, digital identities, inclusive/multicultural curriculum design, CoI framework, and innovative methods. As such, the book provides an in-depth overview of Student-Teacher Interaction in OLEs, with experiences from the field helping readers have a clear understanding about how to improve it, allowing a multifaceted perspective on its promises and challenges. The book synthesizes a wide range of findings, opinions, and recommendations of researchers, scholars, and practitioners, centering on the key issues regarding the current status, possibilities,

concerns, and limitations of Student-Teacher Interaction in OLEs. These core issues are elucidated and discussed in detail in three sections and 17 chapters, as follows:

Section 1
Theories, Conditions, and Emerging Best Practices
Chapter 1: Social Presence in Culturally Mediated Online Learning Environments
Providing educators with the information needed to apply culturally responsive teaching in OLEs and adopting a pragmatic approach, this chapter discusses the role of culture in instructional design, teaching strategies, the creation of knowledge, and student performance. It offers solutions to the problems of cultural differences and misunderstandings and demonstrates the way cross-cultural concerns can affect presence in OLEs. In particular, the Table on page 11 exemplifying the various instructional design models that include culture is very useful. The cultural aspects of instructional design, instructional strategies, knowledge creation, and learning outcomes are analyzed, and further studies on culture within OLEs are suggested.

Chapter 2: Examining Design Pattern Strategies as a Means to Achieve Social Presence in the Online Classroom
This chapter demonstrates the way instructional design patterns are used to create a comfortable OLE and to promote student-teacher interaction. Design patterns are deployed to enhance differentiated design, to foster learning-oriented social networking, and to create web-design structures that help diminish students' feelings of isolation. The authors show how design pattern languages can be converted into design pattern libraries to promote social interaction. They outline the steps of creating Web-design structures in overcoming impediments to engagement in OLEs, and make suggestions on working out proper solutions to challenges involved in the design of interactive OLEs. Table 2, which shows the flexible means of social interaction pattern, and Table 3, displaying the collaborative online writing design pattern are especially helpful resources for novice designers.

Chapter 3: Increasing Research Students' Engagement through Virtual Communities
This chapter exemplifies how the graduate-level research students' needs can be addressed by using the Researcher Development Framework to provide graduate students with a sense of community. The authors outline the steps of building a virtual community and implementing blended learning activities that increased students' engagement and interaction. Their framework also helped students have a stronger sense of community as they were able to receive prompt assistance from staff and faculty members, to share experiences with peers, and to receive better support in overcoming research project problems. The schematic models on page 57 and 59 are particularly enlightening.

Chapter 4: Cultural Inclusivity in Online Learning
As in Chapter 1, which tries to engage multicultural students with a meaningful social presence, this chapter discusses the ways to make online courses more inclusive. This chapter details how the Community of Inquiry model can be utilized to create curricula, course management, and communication strategies that foster social interaction and to build a multicultural framework that helps students establish robust ties with their instructors and peers. This approach lays out the factors to be considered in the development of culturally inclusive learning environments in OLEs. The Appendix on page 88 showing the strategies for promoting cultural inclusivity is particularly helpful.

Chapter 5: Fostering Interaction and Social Presence through eCollaboration
This chapter discusses the fundamental theories and design frameworks that apply to the development of course interaction and social presence in OLEs. It presents current research and collaborative models that bring solutions for online student attrition and show the way eCollaboration improves social interaction between students and instructors, enhances teaching presence, and allows students to develop their 21st century learning skills. Table 3 about the elements of "social presence," Table 4 about the elements of "cognitive presence," and Table 5 about the elements of "teaching presence" provide

excellent guidance on the subject of presence. Table 6 on page 108 provides further help by presenting the types and examples of eCollaboration activity structures.

Chapter 6: The Value of Social Presence in Developing Student Satisfaction and Learning Outcomes in Online Environments

This chapter uses Moore's Transactional Distance Theory to explain why feelings of isolation occur in the OLEs. This theory is utilized as a tool to address the feelings of isolation that afflict the OLEs. It allows educators to develop effective strategies, sound instructional methods and LMS communication tools to create social presence by reducing feelings of isolation.

Chapter 7: Building Social Presence through Engaging Online Instructional Strategies

This chapter presents the "Online Steps to Complex Cognition" educational model with five stages of online learning whereby social presence is increased at each stage. High levels of social presence enable students to use critical discourse and contribute to learning as they establish mutual trust and respect with their teachers and with other learners. The authors show how social presence can be cultivated when the instructor assumes the role of facilitator in the learning process. They also describe some effective strategies to develop social presence among learners, and how strategies for creating more challenging discussions can improve learning outcomes by leading to better interaction between students, instructors, and peers. The Appendixes on page 154 and 155 on "online steps to complex cognition model" and "metacognitive process" are great resources for instructional designers.

Section 2
Technology and Student-Teacher Interaction
Chapter 8: Bridging the Social and Teaching Presence Gap in Online Learning

This chapter provides a comprehensive discussion of how technology shapes student-teacher interaction. It provides an in-depth analysis of the effective methods and procedures that create and harness social presence in online learning. Moving beyond the limits of LMSs, the chapter demonstrates the way technology can be used to support engaged learning. The author offers a thorough look at the best practices that provide innovation in the establishment, development, and support of social presence in OLEs. She explains how bringing students and teachers together as human beings can remove the distance barrier in distance learning.

Chapter 9: Digital Identity, Social Presence Technologies, and Presence Learning

This chapter examines how Web 2.0 technologies how have been used to foster student-teacher interaction and to support presence learning through the creation of digital identities. After reviewing four social presence technologies, the author then presents a series of projects demonstrating how digital identity, presence learning, and presence pedagogy are mediated by these technologies. He elaborates on the use of social presence technologies for content delivery, instructional program deployment, and the creation of virtual meeting spaces to support synchronous and asynchronous course interaction. He also examines some specific case studies using Facebook, Twitter, and Second Life to improve presence pedagogy. The chapter is concluded by an overview of the future trends with potential to influence social presence technologies and learning.

Chapter 10: Pre-Service Teachers Engaging with Twitter as a Professional Online Learning Environment

Presenting findings of a research project, this chapter details the development of pre-service teachers' skills to use Twitter as an effective OLE. It also relates the value of providing such training by describing how the experience not only created stronger personal ties amongst the participants but also showed them how to create stronger ties with their prospective students. The chapter also documents the progress in students' ability to professionally engage with Twitter and demonstrates how their confidence increase as they learn to participate and critically think about the use of social media as an effective OLE. The chapter also describes how teachers "can make connections, share

ideas, collaborate, and follow through on innovative learning and teaching practices that inspire themselves and in turn their students." Table 5 listing the pedagogical decisions made to integrate Twitter provides a very valuable guideline for course designers and practitioners who wish to integrate Twitter into their teaching.

Chapter 11: Leveraging Web 2.0 for Online Learning

This chapter shows how Web 2.0 technologies can be tapped into to create collaborative social learning environments for students and teachers. After a thorough evaluation of readily available Web 2.0 technologies, the chapter discusses the optimal ways to promote interaction in distance learning, and offers examples of how they may best be applied to online learning. The chapter concludes with a look towards some of the emerging technologies in this quickly evolving part of modern-day education. Figure 1 on page 239 is very helpful in that it clearly shows the interactions among the factors involved in OLEs.

Section 3
Establishing and Supporting Student-Teacher Interaction
Chapter 12: Strategies for Establishing and Sustaining Social Presence in the Online Learning

This chapter details the necessary steps and elements for the creation and support of social presence in distance learning. It shows that an atmosphere of sharing and support can be created by cultivating a community of inquiry (CoI). The authors provide instructors with detailed plans for creating and maintaining social presence in the online learning environment. By using certain instructional strategies to develop a CoI, faculty members are able to attain student success. A series of demonstration videos, accessed by mobile devices scanning the QR codes appearing throughout the chapter, complements the content with additional resources for incorporating some of the more technical strategies. These QR code links to the videos are very helpful for the reader.

Chapter 13: Technology Readiness and Social Presence in Online Higher Education

This chapter offers an overview of the Community of Inquiry (CoI) framework, explains the three components of teaching presence, social presence, and cognitive presence, and provides the details of the CoI survey instruments. The chapter explores students' willingness to use technology and its possible influence on their perceptions of social presence. These are complemented by a description of the technology readiness index, an overview of the nature of its quantitative elements, the implications for online education, and suggestions for future studies. Showing the interplay among the constructs and components of the community of inquiry (p.271), of the social presence (p.273), and of the technology readiness (p.280), the Figures 2, 3, and 4 are immensely helpful resources as well.

Chapter 14: Creating a Culture of Engagement

This chapter presents faculty development programs that equip instructors with the strategies, theories, and knowledge to make sound decisions about improving student-teacher interaction through the use of appropriate technology. It details how a quality faculty development program can facilitate student-teacher interaction by providing instructors with effective teaching strategies, adult learning theory, and information on how online technologies can be used properly. Addressing faculty beliefs/attitudes that are vital for the application of social presence strategies in online learning, the chapter discusses many different concerns expressed by both veteran and novice online instructors. Listing the strategies for educators as leaders, Table 1 on page 305 provides an excellent guidance for curriculum designers.

Chapter 15: Using a Distributed Learning Environment Model to Foster Learner-Educator Interaction

This chapter presents a new model geared towards helping educators develop and assess interaction in an online course while keeping students as the focus of the learning process. The *Distributed Learning Environment Model* is designed to foster interaction while integrating assessment. The chapter provides strategies and tools to assist educators in

designing interactive distributed learning environments of their own. The *Distributed Learning Environment Model* helps educators to create, deploy, and evaluate interaction in an online course by keeping the student at the center of the learning process. The authors begin with a brief overview of learning technology as it exists today then move forward with descriptions of the model's elements along with instructions on how to use the model to facilitate the design of courses that improve interaction while incorporating assessment. The distributed learning environment model on page 327 and the assessment rubrics on page 332 and 339 are quite helpful resources.

Chapter 16: Planning, Designing, Implementing, and Managing Social Presence in Online Programs and Online Classes

Drawing upon childhood experiences and observations, Dr. Patel discusses social presence in terms of the dynamics and forces working within individuals, as well as the interactions taking place between them. He analyzes how online class sizes, faculty workloads, learning management systems, social presence measurements, and faculty development can affect an institution's distance-learning efforts. Dr. Patel's discussion of course-level social presence details how proper syllabi, instructional design, and techniques for implementing social presence can help instructors create effective student-teacher interaction in OLEs. By examining the epistemological and psychological frameworks regarding social presence, and analyzing the contemporary social presence models, he describes a valid and efficient approach for the creation, refinement, implementation, and support of social presence in OLEs.

Chapter 17: The Human Element MOOC

This chapter documents and details the development and implementation of a large enrollment Massive Online Open Course that focused on humanizing online learning. Describing participants' experiences while immersed in learning within the CoI model, the chapter demonstrates how course leaders can model instructor presence and integrate technology with a human purpose while supporting the formation of both social and cognitive presence among the participants.

CONCLUSION

Besides holding the oft-cited potential of causing some negative learner feelings like isolation, Online Learning Environments (OLEs) provide innumerable opportunities for learners to interact with peers and instructors. By bringing together important research about enhancing online social presence of teachers and students from multiple theoretical and practical perspectives, and from various institutional contexts/educational levels including considerations of addressing cultural inclusivity, and introducing new and creative applications of improving the online social interaction of learners/instructors, this book makes a remarkable contribution to the field by filling an important gap. This book is also an impressive guide for practitioners since it provides many field-tested implementations of various frameworks (such as CoI) in OLEs regarding digital/social presence with plenty of examples, rubrics and figures. It also helps readers form a clear vision about the future of online social interaction technologies, especially in higher education. As such, this book serves as an invaluable reference for educators/curriculum designers who seek to gain deeper insights into the current status and future potential of Student-Teacher Interaction in OLEs, and for those interested in addressing social interaction needs and isolation problems of learners in their online programs.

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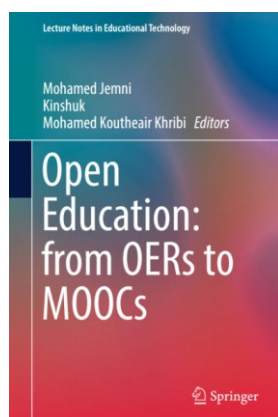
BOOK REVIEW

OPEN EDUCATION: FROM OERs to MOOCs
Edited by Mohamed JEMNI, KINSHUK & Mohamed Koutheair KHRIBI

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The specific focus of this edited book is to point out the core policies, initiatives and international practices of Distance Education in connection with open and free accessed resources. The book aims to provide a roadmap for the existing and possible opportunities for new technologies and educational paradigms within the scope of lifelong learning. Concisely, the book addresses Open Education through the potential of Open Educational Resources (OER) and the new trends of Massive Open Online Courses (MOOCs).

To designate the issues mentioned above, the book covers 17 chapters:

Chapter 1
New Models of Open and Distributed Learning by Stephen Downes
In Chapter 1, the author looks into the evoluation of new educational trends and technological developments in social learning, personal learning, and MOOCs. The chapter displays new models of open and distributed learning, based on the notions of free share and open access.

Chapter 2
Survey and Reflection of Open Education Policies by Junfeng Yang and Kinshuk
Chapter 2 is about the concept of Open Education (OE) in general. OE's different dimensions, educational perspectives, overall and specific policies and the critical analysis for those policies from various countries and regions are all examined closer. Shortly, the chapter illustrates the OER movement with its sustainable development approaches, production, distribution and promotion.

Chapter 3

Educational Design for MOOCs: Design Considerations for Technology-Supported Learning at Large Scale by Stylianos Sergis, Demetrios G. Sampson and Lina Pelliccione

Chapter 3 observes MOOCs within the scope of "Massiveness" and "Openness" concepts. The *Massiveness* dimension is discussed according to learner analysis, teaching strategy and assessment method, selection and/or development of educational resources, participant performance monitoring and feedback provision, participant cultural diversity, participant motivation, and *Openness* dimension with regard to open curriculum, open learning, open assessment and open platform. The considerable differences between cMOOCs and xMOOCs are emphasised in this chapter. In addition, the ADDIE-based educational design considerations framework (EDCF) for MOOCs is explained in detail.

Chapter 4

Toward Empowering Open and Online Education in the Arab World Through OER and MOOCs by Mohamed Jemni and Mohamed Koutheair Khribi

Chapter 4 guides readers to a discussion of the ongoing efforts of the Arab League Educational, Cultural and Scientific Organization (ALECSO) to promote effective use of ICT in education. The concepts namely open learning, mobile technologies, and cloud computing are also discussed within this chapter.

Chapter 5

MOOCs in Taiwan: The Movement and Experiences by Stephen J.H. Yang, Jeff C.H. Huang and Anna Y.Q. Huang

Chapter 5 embraces the MOOCs movement and initiatives in Taiwan. MOOCs are perused in relation to Higher Education, K-12 Education, Lifelong Learning. The core mission of MOOCs is all explained from the perspectives of the Ministry of Education and the volunteers who come from various universities, K12 schools, and private sectors.

Chapter 6

Yet Another Perspectives About Designing and Implementing a MOOC by Sie Wai Chew, I-Ling Cheng and Nian-Shing Chen

Chapter 6 scrutinizes the methods for the development and design of MOOCs. In this connection, the chapter reveals interactive video lectures used for on-campus learners. All those above mentioned aspects are covered in relation with the assessment of learners' performance, administration and credibility of MOOCs.

Chapter 7

A Critical Look at MOOCs by J. Michael Spector

In Chapter 7, the concept of MOOCs with respect to their origin, types, goals, and impact is deliberated. A critical look at MOOCs is also provided within an instructional point of view. In this regard, both existing and possible impacts of MOOCs are discussed in this part as well.

Chapter 8

How to Evaluate the Sharing Effects of Open Educational Resource Projects: An Openness Maturity Analysis Framework by Ronghuai Huang, Yongbin Hu and Xiaolin Liu

Chapter 8 probes OER projects that are highly valued by teachers, policymakers, and stakeholders. The chapter intentionally focuses on a framework of openness maturity of the projects by analyzing the development process of OERs.

Chapter 9

Intercreativity and Interculturality in the Virtual Learning Environments of the ECO MOOC Project by Sara Osuna-Acedo, Divina Frau-Meigs, Lucía Camarero-Cano, Adeline Bossu, Raquel Pedrosa and Darco Jansen

In this chapter, a new MOOC model called sMOOC (social MOOCs) is introduced to the readers. This new model, as a part of European project entitled "ECO project", is based on constructivist and connectivist pedagogical theories.

Chapter 10

Towards Fostering Quality in Open Online Education through OER and MOOC Practices by Ebba Ossiannilsson, Zehra Altınay and Fahriye Altınay

Chapter 10 provides a possible insight on both OER and MOOC practices that foster open and online education quality. The chapter deals with the concept of technology in education as well. It is also mentioned in this chapter that a roadmap for institutions is built up for better international cooperations in higher education, student and staff mobility, mobile learning, and the strategic management of internationalization.

Chapter 11

How OER Enhances MOOCs—A Perspective from German-Speaking Europe by Martin Ebner, Anja Lorenz, Elke Lackner, Michael Kopp, Swapna Kumar, Sandra Schön and Andreas Wittke

Chapter 11, provides proof for the need of OER and MOOCs in Germanspeaking Europe. The current state of OERs and MOOCs in German-speaking Europe are broadly discussed within various dimensions such as participation, cooperation with partners, creativity, the impact of the courses, and the sustainability of the content.

Chapter 12

Open Learning: 'Communication and Mobile Learning' at Spanish University by Sonia Santoveña Casal and Alejandro Silva

This chapter reports a study namely "Communication and mobile learning" that is conducted within "Elearning, Communication and Open-data: Massive Mobile, Ubiquitous and Open Learning (ECO)" Project of the European Commission. The learning model effectiveness is analyzed in a broad sense.

Chapter 13

MOOCs: A Viable Business Model? by Yves Epelboin

Chapter 13 highlights the essentials for a successful MOOC. The emerging models are also elaborated in detail in order to conceive a financing model between MOOCs' creators and providers.

Chapter 14

Quality Frameworks for MOOCs by Darco Jansen, Jon Rosewell and Karen Kear

Chapter 14, particularly focuses on the existing and newly emerging practices for the quality assurance of MOOCs. The chapter has also explored the key issues for assuring the quality of MOOCs.

Chapter 15

Using Linked Data to Blended Educational Materials with OER—A General Context of Synergy: Linked Data for Describe, Discovery and Retrieve OER and Human Beings Knowledge to Provide Context by Nelson Piedra, Janneth Chicaiza, Javiera Atenas, Jorge Lopez-Vargas and Edmundo Tovar

In this chapter, the OER integration with face-to-face classrooms is exemined within the scope of blended learning. A high quality education that is aimed to be reached by any one, any time and any place is also indicated.

Chapter 16
Designing Massive Open Online Learning Processes: The sMOOC Pedagogical Framework by Francis Brouns, António Teixeira, Lina Morgado, Santiago Fano, quilina Fueyo and Darco Jansen
Chapter 16 proposes an approach for MOOC design that has already been evaluated in EU-funded project called Elearning, Communication and Opendata: Massive Mobile, Ubiquitous and Open Learning (ECO). The ECO sMOOC model has also been presented to the readers.

Chapter 17
Innovative OER Model for Technology-Enhanced Academic and Entrepreneurial Learning by Nenad Stefanovic and Danijela Milosevic
The final chapter 17, introduces an OER model and a web platform that is aimed to be created for meeting both current and future educational needs. This technology enhanced model unifies individuals, educational institutions, and companies.

CONCLUDING THOUGHTS

In all, the book stands as a must have resource for those who are interested in Open Education in general; and Open Educational Resources and Massive Open Online Courses in particular. Throughout those 17 chapters, the book provides multiple perspectives to explore and dig a little deeper into OERs and MOOCs. Considering the wide affect of Open Education, it is thought that the publication of this book is timely and responses many critical questions about OERs and MOOCs.

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