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Dear TOJDE Readers,

Welcome to Volume 19, Number 3 of TOJDE,

There are 13 articles and 2 book reviews in July 2018 issue. 32 authors write the articles from 11 different countries. Bulgaria, Ghana, Indonesia, Iran, Netherlands, Nigeria, Republic of Macedonia, South Africa, Spain, Turkey and Turkish Republic of Northern Cyprus are the countries.

ARE FREE INTERNET TECHNOLOGIES AND SERVICES THE FUTURE OF SYNCHRONOUS DISTANCE LEARNING? is the title of 1st article. Dr. Zoran KOTEVSKI and Aleksandar MILENKOSKI are the authors. In this study the authors elaborate the deployment of a synchronous distance lecturing solution based on free audioconferencing and screen sharing networking technologies, and they discuss the benefits gained in the context of cost, functionalities, effectiveness and users’ satisfaction.

The title of the 2nd article is QUALITY ASSURANCE THROUGH EXPERIENTIAL LEARNING IN A DISTANCE EDUCATION CONTEXT: THE VIEWS OF MAJOR STAKEHOLDERS. Dr. Kofi Poku QUAN-BAFFOUR and Dr. Akwasi ARKO-ACHEMFUOR are the authors of this article. This paper use the qualitative research approach to explore the views of major stakeholders from two Provinces in South Africa on quality assurance of experiential learning for teacher trainees in distance education. The findings indicate that all the major stakeholders involved in providing experiential learning in the UNISA teacher training program support the idea of collaboration as the basis of quality teacher training.

The 3rd article is written by Dr. Toni MALINOVSKI, Dr. Vladimir TRAJKOVIK and Dr. Tatjana VASILEVA-STOJANOVSKA. IMPACT OF DIFFERENT QUALITY OF SERVICE MECHANISMS ON STUDENTS’ QUALITY OF EXPERIENCE IN VIDEOCONFERENCING LEARNING ENVIRONMENT is the title of the article. According to the authors, videoconferencing technology is a successful tool for expanding possibilities for collaborative and distance learning, while bridging the distance between the teacher and students, providing time and cost savings. Thus, this study evaluates the impact of different Quality of Service mechanisms utilized in the infrastructure on students’ Quality of Experience in videoconferencing learning environments.

The 4th article’s title is USE OF AUGMENTED REALITY IN SOCIAL SCIENCES AS EDUCATIONAL RESOURCE. Dr. Purificacion TOLEDO-MORALES and Dr. Jose Manuel SANCHEZ-GARCIA are the authors. This study investigates the effects of the use of Augmented Reality (AR) on the academic performance of students, as well as perceptions that are following the use of this new technology resource. In the end, the process of teaching and learning is perceived as positive, incentive and facilitator in the acquisition of knowledge.

The 5th article, titled STUDENTS’ REFLECTIONS ON VOCABULARY LEARNING THROUGH SYNCHRONOUS AND ASYNCHRONOUS GAMES AND ACTIVITIES, is written by Dr. Hatice KARAASLAN, Nurseven KILIC, Gamze GUVEN-YALCIN and Abdulkadir GULLU. In this study, the goal is to enhance students’ vocabulary learning performance by using synchronous and asynchronous games and activities that will activate and maintain intrinsic motivation in an effort to teach parts of speech and collocations over a period of eight weeks. The
findings are discussed with respect to the efficiency of incorporating synchronous and asynchronous learning materials.

Dr. Rositsa DONEVA, Dr. Silvia GAFTANDZIEVA and Dr. George TOTKOV are the authors of the 6th article. **AUTOMATED QUALITY ASSURANCE OF EDUCATIONAL TESTING** is the title. This paper presents a study on known approaches for quality assurance of educational test and test items. On its basis a comprehensive approach to the quality assurance of online educational testing is proposed to address the needs of all stakeholders (authors of online tests, teachers, students, experts, quality managers, etc.). Results are discussed in the end of the article.

**DIGITAL DEVICE OWNERSHIP AND LEARNING ENVIRONMENT PREFERENCES OF STUDENTS IN SOUTH AFRICA AND GHANA** is the title of the 7th article. Dr. Simon-Peter Kafui AHETO and Dr. Johannes CRONJE are the authors. This paper explores differences in access to technology and configuration of preferences for learning environments among design students in two universities of technology in South Africa (ISA) and Ghana (IG). The authors recommend a blended approach when designing learning environments for Design Education, while promoting the use of media platforms for content management due to device ownership among students.

The 8th article is written by Dr. Esmaeil JAFARI, Dr. Kourosh Fathi VAJARGAH, Dr. Mahboobeh AREFI and Dr. Morteza REZAIEZADEH. The title of this article is **MOOC-BASED CURRICULUM MODEL VALIDATION IN HIGHER EDUCATION IN IRAN**. The aim of this study is to validate MOOC-based curriculum in higher education in Iran. The research method is mixed and of exploratory type.

Dr. Maximus Gorky SEMBIRING is the author of the 9th article. **MODELLING THE DETERMINANTS OF EFFECTIVE ONLINE TUTORING PROGRAMS** is the title. Determinants of effective online tutoring program are modelled and elucidated in this report. It is aimed at clarifying influential factors, how and in what behaviors they were interrelated observed by Universitas Terbuka students.

The 10th article is written by Yolande REYNEKE and Christina Cornelia SHUTTLEWORTH. The title of this article is **ACCOUNTING EDUCATION IN AN OPEN DISTANCE LEARNING ENVIRONMENT: CASE STUDIES FOR PERVERSIVE SKILLS ENHANCEMENT**. In the end of this study, it is recommended that the training of distance education accounting students should be adapted to include case studies for pervasive skills development.

**THE ROLE OF STUDENT SUPPORT SERVICES IN ENHANCING STUDENT PERSISTENCE IN THE OPEN UNIVERSITY CONTEXT: LESSON FROM INDONESIA OPEN UNIVERSITY** is the title of the 11th article. Dr. Muhammad Husni ARIFIN is the author. This study is aimed to explore contribution of student support in increasing student persistence by employing mixed methods approach. In the end, this study suggests the improvement of student support at the level of affective, cognitive, and systemic to enhance student persistence.

Dr. Olga PILLI, Dr. Wilfried ADMIRAAL and Dr. Aysegul SALLI write the 12th article. **MOOCS: INNOVATION OR STAGNATION?** is the title. This study aims to examine the strengths and weaknesses as well as opportunities and threats of MOOCs in higher education. The data from the document analysis is examined by SWOT method to put insights on MOOCs internal and external standing. Results indicates that it is worth to explore the ways to improve the completion rates, weak pedagogical structure, degree provision, quality
insurance and assessment as well as to discover the needs of new generation in online learning.

The title of the 13th article is STUDENTS AWARENESS AND UTILIZATION OF EDUCATIONAL BROADCASTS TO LEARN IN OGBOMOSO, OYO STATE NIGERIA. Dr. Charles Olubode OLUMORIN, Musiliu Adekola ADEROJU and Amos Ochayi ONOJAH are the authors. The study recommends that teachers in secondary schools should include educational broadcasts as forms of stimulus variation that they could apply to their classes and educational programs producers on both radio and television should create enough awareness about the programs to enable students follow the programs at appropriate time.

There are two book reviews in this issue. MAKING ONLINE TEACHING ACCESSIBLE: INCLUSIVE COURSE DESIGN FOR STUDENTS WITH DISABILITIES is the title of the 1st book. The author of this book is Norman COOMBS. The reviewer is Suleyman ARI.

Other book’s title is THE ONE WORLD SCHOOLHOUSE: EDUCATION REIMAGINED. Salman KHAN is the author of this book. Aysun GUNES is the reviewer.

Hope to meet you in the next issue of TOJDE.

Cordially,

Dr. T. Volkan YUZER
Editor-in-Chief
ARE FREE INTERNET TECHNOLOGIES AND SERVICES
THE FUTURE OF SYNCHRONOUS DISTANCE LEARNING?

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ABSTRACT

Distance education is not a new paradigm, but the latest ways it can be delivered certainly are. In the past couple of decades, the distance learning implementations were mostly realized using videoconferencing technologies and/or learning management systems. Recently, various Internet collaboration services have gained enormous popularity in all areas of human living, especially in distance learning, where many of them are offered free of charge. In this paper we elaborate the deployment of a synchronous distance lecturing solution based on free audioconferencing and screen sharing networking technologies, and we discuss the benefits gained in the context of cost, functionalities, effectiveness and users’ satisfaction. The experiences after three semesters of use indicate that this alternative approach provides quite valuable means for effective implementation of distance learning, where the students appeared to be highly satisfied by the possibilities and functionalities that the system offers.

Keywords: Distance education, distance learning, Internet technologies, video conferencing, audioconferencing, learning management systems.

INTRODUCTION

Educational institutions employ an ongoing effort to enhance their educational processes and effectively deliver the required knowledge to their students. For many centuries of education, the only method for such tasks has been the traditional Face to Face (FtF) method. But, the advent of modern communication technologies, especially the Internet, has brought to existence various means for delivering of lecturing activities to remote locations, where inhabitants are prevented to attend classes for different reasons. Such teaching concepts have extensively been researched in the last couple of decades, and reported as being quite beneficial to educational processes in the contexts of cost and time. The majority of systems for synchronous distance learning are built on videoconferencing concepts. In this manner, to name a few, Sagias (2002) looks upon the issues of a distance lecturing system based on videoconferencing technologies incorporating the MPEG-4 coding standard. In this research, multiple benefits are reported, while incorporating various teaching methods and approaches, including synchronous (online and offline lectures), as well as asynchronous, such as bulletin boards or forums. Chipps, Brysiewicz and Mars (2012) explore the effectiveness of videoconference-based tele-education for medical and nursing education of rural nurses and doctors from South Africa that have little opportunities to further their education and training. This research has also shown high participant satisfaction with the use of
videoconferencing as an educational technology. Tapsis and Tsolakidis (2015) compare the advantages of using virtual worlds and videoconferencing as supporting tools for educational communication in distance learning. In their research they conclude that both platforms offer similar benefits, but the choice should be based on the specific requirements of the course subject. Qi and Shi (2016) develop a distance learning system that in its basics works with video recording and streaming. In this research, a distance learning platform for students majoring in physical education is designed. The platform is based on 3D technologies and real-time video collaboration. The teaching platform includes many functions such as 3D real time recording and playing, access to information, generation of 3D simulation videos and video downloads. The authors report that the experimental results revealed improvement in learning efficiency and academic achievement among the participating students. Anderson, Beavers, VanDeGrift and Videon (2003) developed a distance learning system based on Internet videoconferencing and a pen-based computer system for presentation. Their analysis of qualitative data (observation notes, surveys and interviews) collected throughout the course suggest that technological interruptions increased the feeling of separation between the sites, while the integration of natural handwriting with presentation slides increased flexibility and was perceived quite positively by the students and instructors. Another implementation of videoconferencing in distance learning is proposed by Snow, Pullen and McAndrews (2005). The research presents the development of an open-source distance-learning system that is described as inexpensive, easy to use and operate, and highly effective. Based on videoconferencing technologies, the system provides many of the valuable aspects of the live classroom experience that are essential for learning. The system also makes recordings of classes available for playback and it is free for academic use.

Concerning the distance learning delivery using the http protocol, one of the pioneers in web-based multimedia learning were Chen, Chen and Hong (1999) who in 1999 suggested a system for synchronous distance education using HTML learning materials augmented with video materials of recorded lectures. The system is built in three modules: 1) video reorder for recording live lectures; 2) Event server for storing and serving content, and 3) browser for presentation of synchronized multimedia lectures. Furthermore, Giesbers, Rienties, Tempelaar and Gijselaers (2013) investigate the relations between motivation, tool use, participation and performance in an e-learning course using web videoconferencing tools like Skype or Adobe Connect and deduce valuable conclusions in the aforementioned contexts. Kear, Chetwynd, Williams and Donelan (2012) also investigate web videoconferencing implementation in distance learning. Their findings indicate that overall experiences of both tutors and students reacted positively to the opportunities that web videoconferencing technology provides for interactive teaching and learning.

Some research is concentrated on well-established learning management technologies. In this manner, Hampel and Stickler (2012) base their research on a project in which multiple distance lecturing technologies are trialed and evaluated in a distance education institution. Afterwards, the university adopted Moodle ("Moodle – Learning Management System") as the platform for its virtual learning environment (VLE), to contribute to students’ experience of studying in a distance education setting as well as improving learning in their particular subject area. Similarly, Ren and Wu (2015) present a design and application of a distance educational platform based on Moodle as well. The platforms is intended for use on tablets by professional peasants. The findings include stimulated interests of many peasants and it exhibited strong amusement reactions. On the other hand, Fozdar (2015) explores the potentials of open and distance learning (ODL) concepts in the national science and technology knowledge gain. In his research, an experience from a university in delivering science program through open and distance learning mode is discussed, where the results indicate a success in providing access to higher science education and leveraging the knowledge to a diverse learner population across the country. The solution includes collaboration platform for exchange of lectures augmented with multimedia content for support. We must also mention that there are research efforts that witness considerable challenges in the implementation of distance education.
In the research conveyed by Ayo, Odukoya and Azeta (2014), the focus is on empirically ascertaining the state of Open and Distance Education (ODE) in Nigeria, striving to evolve a pragmatic solution to the challenges of ODE in the whole continent. The researchers conclude that the imposed challenges present strong limitations for proper implementation of ODE and consequently many institutions have reverted to the traditional FtF teaching. But, realizing the benefits of ODE concepts they also conclude that there is clearly a need to the realization of the ODE core objectives that could cater for all categories of people, irrespective of their location or planned learning time.

One of the most interesting paradigms of present times is the Virtual Reality (VR) technology. As such, VR is present in many areas of human living, and it has certainly found its place in education. Considering this, Chang, Zhang and Jin (2016) promote VR technology as a platform for distance learning, where teachers and students are engaged in a simulated three-dimensional world with a vivid and lifelike learning environment in terms of vision, hearing and touch, having the students feel as participants in a real environment. The system developed on this research offers various activities for students, such as attending lectures, doing exercises and even making friends. The teachers are able to create lectures, review works of students and conduct examinations, while managers can manage the daily teaching activities and students' affairs.

There is also an ongoing research in exploring the possibilities of implementing distance learning for practical exercises. Thus, Ionescu, Fabregas, Cristescu, Dormido and De Keyser (2013) presents the development, structure, implementation, and some applications of a remote laboratory for teaching automatic control concepts to engineering students. The main conclusions of the feedback from both the students and the academic staff are that the experiences are quite positive and such practices, as a good pedagogical tool, are encouraged. Similarly, Xu, Huang and Tsai (2014) present a cloud-based virtual laboratory educational platform called V-Lab that provides a contained experimental environment for hands-on experiments using virtualization technologies (such as Xen or KVM Cloud platform) and OpenFlow switches. The evaluation demonstrates that the platform and curriculum have produced excellent results and helped students to understand and build up computer security knowledge to solve real-world problems.

Indeed, there is a variety of different technologies that can be effectively employed for development of synchronous or asynchronous distance learning. These technologies include VR, collaboration platforms such as Moodle or similar proprietary systems, but if we summarize the existing experiences in distance learning we can easily infer that the most frequently used is the videoconferencing technology. In all the cases the transportation infrastructure is the Internet, where some research activities use the videoconferencing for educational purposes as a web service. Furthermore, Martin (2005) confirms that the videoconferencing is of extraordinary importance to distance education, and that it is important that there is a new awareness of its vast potential in order to ensure that the technology is fully exploited for the benefit of learning communities. Nevertheless, besides the video presence, the importance of other possibilities required during a distance lecture, such as documents and links sharing, collaboration among the students, adequate presentation and screen sharing by both the teachers and the students, cannot be neglected. On the other hand, many distance learning systems that are based on videoconferencing are built on expensive hardware. These costs may not be significant influential factor in the developed world, but for the developing countries it is quite important to be reduced.

Analyzing the previous reported experiences with distance learning and bearing in mind the required reduction of development and implementation costs, we decided to explore an alternative solution using free Internet collaboration technologies and services. The solution we have chosen is not based on videoconferencing, but rather on audioconferencing using an existing VoIP communication platform. Besides the audio collaboration, the solution involves another Internet service for screen sharing that is
used for presentation and drawing over the screen. Both platforms are also used for documents exchange. The combination of these two free Internet services appeared as a quite feasible alternative for synchronous distance learning compared to the already established educational platforms. The implementation of the aforementioned free Internet services is realized for the distance education purposes at the “St. Kliment Ohridski” University – Bitola, Faculty of information and communication technologies (Faculty of ICT), Bitola, R. Macedonia.

The rest of this paper is organized as follows. Section 2 describes the implementation of a synchronous distance learning that is based on free Internet technologies and services, as a solution utilized by the Faculty of ICT for the purposes of realizing the educational tasks for the students that for various reason were not able to attend regular classes. Section 3 elaborates the experiences of the usage of distance learning approach and discusses the main findings concerning the students’ satisfaction. Section 4 concludes the paper with a discussion of the most relevant findings of the referred distance learning implementation.

DISTANCE LEARNING IMPLEMENTATION USING FREE INTERNET TECHNOLOGIES AND SERVICES

Previous experiences with distance learning at the University in Bitola started with a TEMPUS project entitled “Video conferencing educational services – VICES” (Caporali & Trajkovik, 2012), realized between 2009 and 2012 in which many universities from Italy, Serbia, Macedonia, Albania, Belgium and Hungary took participation. Besides, during the testing period, videoconferencing connections were established between Bitola and many other locations, such as Florence, Belgrade, Skopje, Leuven and Budapest. The solution was based on Polycom HDX 8000 terminal, along with eagle eye smart cameras, super sensitive microphones, and HD video projectors. This equipment was combined with an older Polycom equipment consisting of integrated Polycom PVS 1419 module, in order to experimentally implement distance learning in a distributed classroom in the city of Veles, located 120 km from the main premises in Bitola. The main difference between the two Polycom devices was the support for SIP signaling protocol that the older equipment did not offer, but this issue did not represent an obstacle since the main implementation of the videoconference communications was based on the H.323 protocol. The aforementioned Polycom equipment met the needs for a distance education, since not only it enabled establishment of teachers’ virtual presence, but enabled presentations or combinations of video collaboration and presentation, as well as content sharing. It was a Point-to-Point (PtP) synchronous distance learning solution where the students were provided with an opportunity to follow live lectures, exchange documents and communicate with the teacher. However, even though this PtP videoconferencing solution was perfectly viable for synchronous distance learning, it appeared that it cannot fulfill the requirements of the specific circumstances emerged.

Namely, in recent years we noticed that many students that live in distant rural areas do not attend classes as often as they should, and even miss up to 80 % of the lectures. The reasons for this discontinuity of their studying were multiple, starting from weather conditions in the winter periods, the daily traveling costs, to spending a lot of valuable time while traveling to and from the faculty premises because lot of student living in rural areas have certain house or farm works during their spare time. In such circumstances, the aforementioned videoconferencing solution was infeasible because the distance learning implementation needed to enable lectures delivery to the students’ homes so that they would be provided with the opportunity to follow the lectures out of the comfort of their own premises and with all the benefits that are provided for other students.

The other requirements were that the solution should be suitable for fast implementation and with the least possible expenses. Thus, we turned to Internet technologies and we started to seek a solution that would fulfill our requirements, favoring the free solutions if possible. In this manner, the web inquiry reveled many existing Internet services that could be feasibly used for the purpose, but out of the many that we briefly reviewed two
free Internet communication technologies emerged as a quite adequate combination that would meet the specific requirements of the intended approach for synchronous distance learning solution at the Faculty of ICT. The technologies that we have chosen were TeamSpeak (“TeamSpeak – VoIP Cloud Services”) and FreeScreenSharing (“FreeScreenSharing – Screen Sharing for Online Meetings”).

**TeamSpeak**

TeamSpeak is a VoIP collaboration system designed to offer crystal clear voice, with the ability to scale up to thousands of simultaneous users, and multiple customization options. TeamSpeak is most commonly known as a gamming communication platform, but it is quite often used for education and training, internal business communication, and keeping in touch friends and families. The primary focus of the TeamSpeak creators is to deliver easy to use solution incorporated with high security standards, excellent voice quality, and low system and bandwidth demands.

TeamSpeak uses a proprietary VoIP protocol for audio communication between users on a chat channel, much like a telephone conference call, where users typically use headphones with a microphone. The client software connects to a TeamSpeak server of the user’s choice, from which the user may join a certain chat channels. The TeamSpeak server runs as a dedicated server on Microsoft Windows, Mac OS, Linux or FreeBSD operating systems and provides a web based user interface, or a command-line interface, for administration and configuration.

TeamSpeak clients are available for Windows, MacOS, Linux, iOS, and Android. The TeamSpeak version 3 server can be used at no cost for up to 32 slots (simultaneous users). For non-commercial use, non-profit licenses are available that allow usage of the server with up to 512 slots at a time. With the use of 512 slots, a server administrator can choose to split up the slots into multiple virtual server instances. In this manner, the latest version of TeamSpeak supports virtual server instancing that allows up to 75 server instances to be contained in one process on the server. Additional server processes are possible as well. Featuring a client-server architecture, TeamSpeak is literally capable of handling up to thousands of simultaneous users. To maximize the collaborative experience TeamSpeak enables storing and sharing files directly on the server without having to mess with firewall issues.

Several additional features are also provided that aid to the functionalities required for distance learning environments, such as:

- **Text chat** – TeamSpeak enables the teacher to send text messages to students in a specified communication channel, or in a private one-to-one manner.
- **Robust system permissions** – With a powerful hierarchical permission system, the teacher has the complete control, deciding who can talk, who can join channels and much more.
- **Mobile connectivity** – Everyone using the platform can stay connected on the go, because the mobile versions of the user software are available for Android and iOS operating systems.
- **Security** – TeamSpeak incorporates AES based encryption that can be enabled on the entire server or on specific channels. To avoid potential threats arising from weak usernames and passwords, TeamSpeak uses public-private key authentication.
- **Customization** – TeamSpeak Client software can be customized to meet any personal style with the included plugins, themes and sound/icon packs. There a hundreds of add-ons contributed by the TeamSpeak community, that a user can choose from.
FreeScreenSharing

FreeScreenSharing is an Internet service that offers screen sharing for various online meetings. The system allows a single host to have up to 1000 participants, while having the possibility to switch presenter capabilities to any participant in the meeting, allowing them to share their screens as needed. FreeScreenSharing is frequently used for web conferencing, product demonstrations, webinars and other implementations that require online collaboration. FreeScreenSharing has a limit to a single meeting of six hours, which is more than required time for any distance lecture. The number of online meetings that a single host can organize is unlimited.

Using FreeScreenSharing is simple by the installation of a software that allows conducting a session or attending one. One of the disadvantages of FreeScreenSharing is the requirement for the installation of Adobe Flash, Java and a newer web browser with enabled JavaScript execution, in order to properly function, but the features offered are a plausible reason to neglect this issue. FreeScreenSharing is provided in versions for Windows and Mac OS operating platforms. FreeScreenSharing offers chat and allows the host to send messages to all or selected participants in the meeting, as well as enables document sharing among participants during online meetings in various file formats, such as Word, Excel, PDFs, Power Point presentations, and URL links.

THE PROPOSED SYNCHRONOUS DISTANCE LEARNING SOLUTION

The solution we built mostly relies on TeamSpeak, which is used for audio collaboration, as well as for documents exchange. We used the freeware version because the 32 channel slots were sufficient for the intended group of students per lecture. The TeamSpeak server version 3 was installed on a Linux machine running Ubuntu version 12.4. The server setup was realized in a single working day, which added to the appropriateness of the selected solution. The FreeScreenSharing was used mainly for presentation as well as for documents exchange. The selection of documents exchange option was left to the students’ preference, and both options appeared quite adequate. But, concerning the audioconferencing for conveying the lectures, even though FreeScreenSharing offers some audio collaboration possibilities, TeamSpeak appeared quite more adequate offering functionalities that made it the preferable choice for synchronous audio distance learning. The following Fig. 1 presents the diagram of the synchronous distance learning system configured at the Faculty of ICT in Bitola, R. Macedonia.

The actual implementation comprised four steps: i) Provision of the required hardware; ii) Implementation of the audio service; iii) Implementation of the visual service; and iv) Provision of additional settings and/or services. For the realization of the first step, the minimum hardware requirements for the audio server were 512 MB of RAM, 800 MHz CPU and 5 GB HDD, thus we employed a machine consisting of 512 MB of RAM, 3.2 GHz CPU and 80 GB of HDD. In the second step we installed the TeamSpeak server according to the specific instructions given in the corresponding documentation. The third step, implementation of the visual service, included account creation at FreeScreenSharing, as well as installation of an executable file that is offered to the user at the first login. The fourth step, provision of additional required settings and/or services, among other requirements, includes possibilities to configure the TeamSpeak server for a dynamic network address using Dyn-DNS. The first implementation of our distance learning solution was based on the free Duck DNS ("Duck DNS – Free Dynamic DNS"), a free Dyn-DNS software.
The solution for synchronous distance learning, configured out of the two previously elaborated free Internet technologies and services, was used for three semesters and the experiences of the students involved was quite satisfying. The main comments were that it provides all the functionalities that a distance lecture requires.

EXPERIENCES AND DISCUSSIONS

Besides the online attendance data that we were able to collect during distance lecturing, after each semester of using the aforementioned free Internet technologies and services, we conducted a short survey about the students’ satisfaction of this kind of distance learning. The surveys consisted of questions that answer some essential requirements concerning the educational activities, such as easiness to use, appropriateness for the specific lectures, possibilities for collaboration, initial hardware or software requirements, possibilities for exchange of documents, and a question about their preference between attending distance lecture in a distance classroom along with their accompanying colleagues (PtP), or attending distance lecture out of the comfort or their homes, i.e in a Point-to Multipoint (PtM) manner.

Concerning the primary issue of impaired attendance to lectures, as expected, the situation improved significantly. The average percentage of attendance for the students
from the aforementioned category increased from 15 % for the standard classroom lectures to more than 85 % for the distance learning. This was due to the fact that besides the possibility for each student to attend lecture out of his/her home, the time schedule for distance lectures was negotiated among concerned students and the teachers before reaching the agreement. In this agreement, besides the regular (FtF) lectures for a given subject in the main campus, the involved teachers were obliged to hold additional lectures for the distance class, but it was a necessary and mutual decision reached by the faculty management and the involved teachers.

Through the conducted surveys, the student was asked to express their satisfaction from the use of this type of distance learning, considering the aforementioned requirements. Thus, in order to more adequately plot the survey results we decided to quantify students’ satisfaction and requested that the answers in the surveys are within the range from zero to ten, where zero means unsatisfied and ten represents the highest satisfaction. Figure 2 presents the plot of the students’ satisfaction regarding several important requirements.

![Figure 2. Students' satisfaction with the provided distance learning solution](image)

Regarding the question about the students’ preference between attending distance lecture in a distance classroom along with their accompanying colleagues (PtP distance learning), or attending distance lectures out of the comfort or their homes (PtM) distance learning), 44.4 % responded that they prefer attending the distance learning in a PtP manner, while 55.6 % prefer to enjoy the comfort of their homes while attending distance lectures. Additional students’ comments were mainly concentrated on the requirement to enable recording and storing of lectures and possibilities for lecture downloads for later use. Some of the students pointed out that practical exercises are a necessity of educational processes and they find the distance learning solution deficient of such valuable learning assets.

**CONCLUSIONS**

There is an ongoing trend of innovative approaches to distance learning by the integration of technologies that facilitate different lecturing modalities. Considering the specifics of the problems imposed with the poor student attendance records, we decided to explore an alternative solution for synchronous distance learning using free Internet technologies and services. In a world wide web inquiry we reviewed many technologies that offer adequate online collaboration services, thus we decided to try a solution that combines two free Internet technologies and services, i.e. TeamSpeak and
FreeScreenSharing. From a viewpoint of an educational institution the deployment of such technologies emerged as a quite significant activity, because the services were offered as free to use on one hand, and because of the extremely short durations for setting up the required hardware, as well as the preparation of students to use the newly established system, on the other. The whole setup of the TeamSpeak server, as well as the preparation of the instructional material for the students was completed in a single working day. Concerning the students’ satisfaction, the answers from the conducted surveys mostly range from satisfied to highly satisfied, which can be thought as a confirmation that the solution provided for distance learning activities completely justifies its’ goals. In this manner we can conclude that certain Internet communication technologies and services do present a feasible alternative solution for distance learning, especially when are offered free of charge, and they impose substantial threat to the hardware systems that are still offered by an immoderate price.

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QUALITY ASSURANCE THROUGH EXPERIENTIAL LEARNING IN A DISTANCE EDUCATION CONTEXT: THE VIEWS OF MAJOR STAKEHOLDERS

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ABSTRACT

The quality of experiential learning in distance education is a dominant concern of all major stakeholders and the public at large. Institutions of higher learning which train school teachers at a distance are often blamed for the poor quality of teachers and teaching. The perception among some sections of the society is that teachers trained at a distance are of poor quality compared to those trained via the conventional face-to-face mode. While this perception can be disputed it gives distance education institutions food for thought. Debunking the wrong perception is to ensure quality in the training of teachers at a distance. Students of the University of South Africa (UNISA) are scattered all over the country and beyond and this makes effective and quality organization, managing, supervision, mentoring and evaluation of experiential learning quite daunting. Effective experiential learning cannot be organized and managed effectively without the involvement of key stakeholders. This paper used the qualitative research approach to explore the views of major stakeholders from two Provinces in South Africa on quality assurance of experiential learning for teacher trainees in distance education. The findings indicate that all the major stakeholders involved in providing experiential learning in the UNISA teacher training program support the idea of collaboration as the basis of quality teacher training.

Keywords: Quality, experiential learning stakeholders, Open Distance Learning, collaboration.

INTRODUCTION

The desire for quality education is the aspiration of all citizens although its realisation does not come cheap. The achievement of quality education depends on a number of factors including the commitment, participation and dedication of all major role players or stakeholders such as the government, the community, the school, the home and the learner. When the major stakeholders play their respective roles effectively, learning outcomes can be positive. In today’s world, technology has made it possible to provide education in general and teacher training in particular at a distance. For socio-economic reasons, many people who want to become qualified teachers choose the open and distance learning (ODL) mode of education because of its advantage of earning while learning. This puts the quality of teacher education at a distance under the spotlight because as a novel aspect of training of teachers, there might be many community members and citizens in general who are only used to traditional ways of training teachers and may often cast doubt on the quality of the distance education mode of delivery.
Institutions of higher learning which train school teachers at a distance such as the University of South Africa are sometimes blamed for poor quality of teachers and teaching. Watts and Allsop (2015) for example, note that several factors, including: (i) the professional education of the teacher; (ii) the resources and environment provided for her/his work; and (iii) the level of support provided by state - and school -level management structures pose serious challenges to Open Distance Learning (ODL) institutions. There are some perceptions among some people that the teachers who are trained at a distance are of poor quality compared to those trained via the conventional face-to-face mode. Such people hold the conservative idea and think that face-to-face teacher education is the only way of training teachers. This perception can be disputed but it is a food for taught for distance education institutions to put their house in order by closing all the possible loopholes not only to avoid public criticism but more importantly to produce quality teachers to ensure quality education. The point of departure in debunking the wrong perception is to ensure quality in the training of teachers at a distance as a whole but with serious emphasis on the experiential learning component. To do this, distance education institutions have to involve all the major stakeholders in education right from community to the national level. The issue of quality in experiential learning in distance education is therefore the dominant concern of all stakeholders- government, providers, practitioners, students, parents and the public at large.

The University of South Africa is a major distance education institution in South Africa and on the continent at large. It trains almost half of the primary and high schools teachers in the country and beyond. It offers initial teacher training for those who like to become teachers and provides further training for underqualified practicing teachers. As part of the requirement to complete courses for a teaching qualification and be admitted to the teaching profession, all teacher education students at UNISA have to undertake experiential or practice teaching for eight weeks in schools or colleges. During the period of experiential learning, UNISA lecturers and some experts in teaching visit the classes of the practicing teachers to evaluate and support their teaching. The evaluation of students focuses on core teaching domains such as content knowledge, teaching skills, assessment and classroom management. This is done to ensure quality in teaching practices of the students who would be certificated or licensed to become qualified teachers in both public and private schools.

Unlike face-to-face residential institutions, UNISA is a unique context; its students are scattered all over the country and beyond. This unique context poses a huge challenge to the organization, management, mentoring and supervision of experiential learning which is why the need for involvement of all stakeholders is crucial to achieve the desired goal. Kiggundu and Nayimuli (2009) affirm that teaching practice can be challenging but it is an important aspect in teacher training in a developing country such as South Africa. In South Africa, the effectiveness of the training of teachers can be compromised by challenges such as geographical distance, low levels of teacher expertise, lack of resources, as well as the lack of discipline among a large section of the teacher and student population in schools. In the light of this fact, the authors argue that effective experiential learning cannot be organized, managed, supervised and mentored without the cooperation and involvement of the key stakeholders in education such as communities, schools, principals, education officials, parents and learners.

The quality of teaching depends on the quality of the teacher and therefore to achieve quality, educational institutions offering teacher education programs at a distance must be innovative by putting mechanisms in place to ensure quality in experiential learning for all teacher trainees. One mechanism and innovative way of ensuring quality in experiential learning at a distance is to engage and involve all major stakeholders in teaching practice activities at all levels - from its organization to implementation and evaluation. It is through collaboration with key stakeholders that the Work Integrated Learning part of teacher training can be successful. This paper used the qualitative research approach to explore the views of major stakeholders in education from two of the nine Provinces of South Africa on how quality can be achieved in experiential learning of distance teacher trainees.
THEORETICAL FRAMEWORK

The stakeholder participation theory of whose chief proponent is Edward Freeman (Quezeda, 2012) underpins this paper. The theory posits that any individual or group of people who have a stake or interest in a business or organization are said to be its stakeholders. Freeman (1984) defines the concept stakeholder as any individual or group which affects or is affected by an organization. Bryson (2004) adds that stakeholders are individuals or groups that have the direct power to directly impact on the future of an organization. Stakeholders are those groups or individuals without whose support an organization would cease to exist (Freeman, 1984). These may include employers, employees, shareholders, clients, suppliers, clients, communities and state departments. As individuals or group of people with vested interest in an organization, they play major role in maximizing the organization’s potential through their active involvement in the day to day activities of the organization. Stakeholders have a say in the management of an organization. Phillips (2003) attests that organizations are dependent on their stakeholders for their successes or failures. The theory is unquestionably the most popular framework for discussing organization or business ethics. From organizational management perspective, stakeholders can be classified into two, namely; - primary and secondary stakeholders. The actors at the coal face of production in organizations are seen as primary stakeholders while people in its broader environment (e.g. suppliers and clients) are regarded as secondary stakeholders. The stakeholders have a common goal i.e. the success and achievement of organizational goals. Thus, management of organization should ensure that the interest of stakeholders is its dominant concern. The Stakeholder Theory is all about how business really works because, for any business or organisation to succeed, it has to create value for its customers, employees, communities and shareholders. The theory is an approach to organizational management and governance that emphasizes the importance of considering organizational stakeholders when making leadership decisions (Freeman, 2009). It is a theory of organizational management and business ethics that addresses morals and values in managing a business or an organization. In short it attempts to address the principle of what or who really counts (Mansell, 2013).

The theory has implications for quality assurance in experiential learning at a distance because it makes a unique contribution to decision-making processes. In organizing a successful experiential learning in the context of Distance Education for teacher trainees, all important stakeholders such as schools, principals, School Management Teams, teachers, education officers, students, parents, community members and department of education should be consulted and taken on board because their involvement can ensure collaborative advantage at all levels of implementation of the program. Through unity of purpose and collaboration, the sense of ownership and ‘we feeling’ can be created and nurtured among the major role players for the success and achievement of quality in experiential learning at a distance. By involving major stakeholders in distance education, institutions can dispel the notion of top-down approach to experiential learning.

The Essence of Experiential Learning in Teacher Education

Experiential learning is an important component part of any teacher education program because it offers student teachers with the opportunity for real exposure to the realities of the practice of teaching. There are many student-teachers who have never taught while some others might have taught without any training. Experiential learning gives them the opportunity to learn the skills of the ‘trade’. It is during the practical aspect of learning that students put theory into practice. Du Plessis (2013) affirms that teaching practice should be based on the key features of Work Integrated Learning (WIL) which involves a learning program that focuses on the application of theory in a true, work-based context.

Just as a learner-driver needs to pass a practical driving test before being awarded a driving license so should a student teacher pass the practical component of the training to ensure that s/he has acquired teaching skills to impart knowledge to learners. It is a common knowledge that quality teaching is one of the ingredients of academic success in schools.
Thus, how well a teacher is grounded in both content and pedagogical knowledge has a positive impact on students’ academic achievement. Quan-Baffour & Arko-Achemfuor (2009, p.125) affirm that one of the ingredients of better learning outcome is quality teaching and this can only be achieved when the teacher is quality one.

Citing Perraton (2000), Chukuya (2007) attests that the purpose of distance learning in teacher education is to address the problems of teacher shortages and as well as taking care of national teacher upgrades. Teacher education at a distance however is bedevilled with some challenges. As Du Plessis (2013) affirms, the organization of teaching practice poses serious organizational, logistical and educational challenges for distance education institutions. To achieve quality in experiential learning, UNISA must put some support systems in place in an integrated manner to enhance the experiential learning of student teachers (Du Plessis 2013). About a quarter of the total UNISA student population are enrolled in teacher education programs and have to undergo a successful experiential learning in addition to content knowledge courses before they can become professional school teachers. Without passing the experiential learning aspect of the program, students cannot be certified as professional teachers. In view of its strategic importance, the University must provide experiential learning organizers with enough resources to enable them involve all the major stakeholders as a strategy to ensure quality in the practical aspect of teacher education. Schools are established in communities to provide education to the future generation which is why it is the business of all stakeholders - school management teams, principals, parents, community members, education officials, the government and the tax payer - to be involved in the training of teachers for the realization of educational goals.

RESEARCH METHOD

The phenomenological research approach was used in gathering data from the major stakeholders in teacher education for this qualitative study. This approach of data collection was deemed appropriate because it offered the participants the opportunity to describe and interpret their experiences of the phenomenon as being lived (Polit & Beck, 2012). It also enabled them to reflect on and examine human experience through the descriptions provided by the people involved (Brink, 2006) in the investigation.

Participants
The target population for the study was all major stakeholders in experiential learning at a distance e.g. lecturers, part-time tutors, schools, School Management Teams (SMTs), Principals, parents, learners, teacher education students, School Governing Bodies (SGBs), community members and education officials (Department of Education).

Sampling Procedure and Recruitment of the Study Sample
The study involved 30 stakeholders from three [3] education districts in the North West and Free State provinces of South Africa. The researchers used the purposive sampling technique (Polit & Beck, 2012) to recruit the stakeholders from each of the major group of stakeholders that constituted the population for the study. i.e. school management teams (SMTs), principals, school governing bodies (SGBS), tutors, parents, education officials, teacher education students, learners and community members. The 30 participants were deemed information rich because as major stakeholders in education their views were important for the organization and implementation of teaching practice at a distance. The participants were selected on the basis of the stake they have in education and experiential learning for that matter. It was assumed that the participants’ views and interest in the phenomenon under study could make them to provide objective information which could make experiential learning effective and produce quality teachers.

Data Collection
With the kind assistance of a staff from the Teaching Practice Office at UNISA, three districts from the two provinces were identified for the study. Using the snowball approach three [3] stakeholders of experiential learning from each of the designated groups were
traced to their homes and work places for interviews. The informal in-depth interviews centred on how stakeholders can contribute to the achievement of the goals of experiential learning. The interviews were conducted during the last school term of 2015. The researchers made appointments with the identified stakeholders to ensure their availability for the discussion. Permission was obtained from the stakeholders to tape-record the interviews. The researchers kept journals in which field notes were recorded during the interviews.

FINDINGS AND DISCUSSIONS

The interviewees were requested to provide their views on experiential learning in the schools in their communities. To this item most of the participants concurred in their responses that experiential learning exposes the student teachers to the real act of teaching. A few others were of the view that experiential learning enables learners, teachers, community members and the student teachers to understand themselves as citizens with a common educational goal—realization of quality teaching. Most of the responses from the participants indicated the important role experiential learning is to the stakeholders. It is important to stakeholders because teaching practice offers student teachers with a holistic exposure to the teaching career—classroom management, learner discipline, motivation, parents and community support. As one student-teacher said;

*I came to realize from the experiential learning I had at the school that theory is completely different from practice. I came face to face with teaching learners from different backgrounds with different behaviors and attitudes. The time I spent at the school has helped me to prepare well and have the confidence to go to the classroom when I complete my studies.*

One of the school principals collaborated similar observation to what the student teacher said above that;

*Experiential learning is very important for novice teachers because it gradually boosts their confidence as they practice more and more. You can pity them the first time they stand in front of a class to teach. They are very nervous and make simple mistakes but the more they have the chance to teach, the more you see how good most of them can be. By the end of their experiential teaching one is able to note that most of them can be good teachers.*

The remarks from the student-teacher and the school principal above confirm the role and importance of experiential learning for new teachers by giving them the opportunity to experience the real school and classroom environment. In addition, Experiential Learning helps in boosting the confidence of the novice teacher through the guidance and support of more experienced colleagues in the field. Citing Carnoy et al., (2010) and Reeves (2005), Shepherd (2015) confirms that teacher quality and opportunity to learn were estimated to have positive and significant effects on learner gains in mathematics test scores. The importance of experiential learning through teaching practice is further affirmed by Kiggundu and Nayimuli (2009) that teaching practice can be challenging but important aspect in teacher training for the fact that, if it is not done well to equip students, the effectiveness of the training of teachers can be compromised most especially in the Open Distance Learning context.

Regarding who should be involved in the organization, management and implementation of experiential learning, an overwhelming majority of the participants corroborated in their responses that all the major stakeholders in education like the university, part-time tutors, principals, school governing bodies, school management teams, learners, and the officials from the department of education should be involved in experiential learning. It is only few of the respondents who said that in their views, the involvement in experiential learning
should be limited to the university and the schools because they have the direct responsibility to organise and manage it.

Most of the respondents were of the view that the organisation and implementation of teaching practice is a very huge task that cannot be left to only one or two stakeholders. As one SMT member put it;

_We all have a role to play in ensuring quality and success of experiential learning at a distance in our schools. Teacher education is everyone’s business. As teachers in the school, we can provide student teachers with basic teaching and learning resources like textbooks, writing materials and accommodation. We can also accompany them to class to ensure that learners do not misbehave during lessons._

The above response is relevant to this study because it sums up the role of the school - SMT, Principal, teachers, SGB and learners- in ensuring the effective implementation of experiential learning in the school. It also affirms the general view that teacher education is everyone’s business hence the school as an organization in a community and its members are key stakeholders in experiential learning. They should play active role in the organization and implementation of teaching practice, at least at the local level to ensure quality in the training of teachers for schools in the communities. The need for collaborations and stakeholder involvement is noted by Hart, Diercks-O’Brien and Powell (2009) that the involvement of educational advisers results in some consistency of process and improves the quality of information available for sharing the learning from projects more widely. The researchers argue that teacher training and experiential learning involve many stakeholders who have to collaborate well for it to be successful. In experiential learning in the ODL context, some of the stakeholders are the ODL institutions, SGBS, SMTS, student teachers, learners and communities the Department of Education and its officials.

In stressing how stakeholders can collaborate to make experiential learning by student-teachers a success, an SGB member who was a retired school principal had this to say,

_In most of our communities we have experienced teachers who can be requested to do class visits, guide and evaluate student teachers for free or at minimal cost. This can contribute to quality of the program._

Thus, the need to involve the communities and schools to identify expertise for supervision of teaching practice is emphasized by the above viewpoint from a participant. The response affirms the important role stakeholders can and are willing to do to make experiential learning more effective and successful. The view was supported by most of the participants who agreed that the university must be supported by all schools and communities during the practical training session of teachers. The stakeholders of an organization, as Philips (2003) attests, comprise all the elements organizations are dependent on for their successes or failures. In supporting student teachers in experiential learning as indicated by the retired school principal above, the stakeholders have many and diverse roles they can bring to the table to support one another.

On the benefits of experiential learning to the stakeholders, one participant, an education official said;

_After all it is the community that stands to benefit from quality experiential learning in both long and short terms. The learners in these community schools may receive quality education when teachers are well trained._

Truly, it is the community which benefits first and foremost. For example, in the short term the presence of student-teachers can assist the schools which lack enough teachers. Again the good student-teachers who might not be employed at the time of the experiential
learning could be identified for employment in the near future. Thus the communities could benefit from the programme hence every stakeholder should be involved to get the best out of experiential learning. One school principal collaborated the view of the education official above when he said;

*Those student-teachers who do their experiential learning at our schools and prove themselves as potentially good teachers can be hired after their training. Since I arrived here as the principal four years ago, I have recruited three teachers who had their teaching practice in this school and they have proven to me that we did not make a mistake in offering them the opportunity to work here.*

The need for collaboration of stakeholders in teaching practice or Work Integrated Learning as per the responses of the stakeholders and the benefits thereof are immense. For example, Mubika and Bukaliy (2013) point out that all stakeholders in the training of teachers should be considered in all the aspects of teaching practice. Some of the key stakeholders include the training institution, the school offering facilities for teaching practice and the Ministry of Education as the prospective employer who may derive certain benefits in the long and short run.

When asked how they think experiential learning could be organized and implemented to ensure quality, all the participants corroborated in their responses that, although the university is the institution that trains teachers and places student teachers, all stakeholders must provide some input to ensure quality and success in its implementation. One participant who happened to be an online part time tutor and supervisor of experiential learning pointed out that she has observed and learnt through experience that in order to continuously ensure quality in experiential learning the university should lead to conscientise the communities on their role in the project. She suggested that one way of doing this could be an invitation of a university staff who are involved in the organization of experiential learning to address teachers and community members when there is a meeting in the communities or districts.

Providing views on the experiences of experiential learning most the participants agreed that it is a very good way of equipping student teachers with teaching skills. The respondents however added that they have observed situations where practicing teachers (placed for experiential learning) are abandoned by [subject] teachers. Some teachers leave student-teachers alone to go to class without sitting in the class to assist where necessary. As experienced teachers in the school, their presence could contribute to the experiential learning of student teachers. Thus the opportunity for student teachers to learn from them is often wasted perhaps because such teachers do not know they have a role to play in the program. The indifference among some school teachers could be reduced if they are made aware of their role in the training of teachers.

**CONCLUSION**

The findings from the study affirm one very important issue in education i.e. the need for collaboration and involvement of all stakeholders in ensuring quality in experiential learning because of the fact that teacher education is every citizen’s business. As everyone’s business ways and means must be found to engage every stakeholder right from the university to the community. The conclusion that can be drawn from the findings is that experiential learning as the practical aspect of teacher education should not be left on the shoulders of the university staff alone. Although all stakeholders in education must be involved in the Work Integrated Learning component the onus is on the University to provide the program with overall administrative function to regularly and systematically record and monitor its implementation, content and progress for the purpose of achieving quality.
RECOMMENDATIONS

In line with the findings the researchers made the following recommendations to improve the quality of teaching practice at a distance:

- The organizers of teaching practice should liaise with schools and local education offices to find out the available resources, expertise and the programs of local schools before placing student teachers in the local schools.
- Local education district offices should assist the university to identify well qualified and experienced teachers, principals and retired educators who have the expertise to be involved in the implementation of experiential learning in the community schools. This will be economical in an era of cost cutting because the university might not need to send out many of its own staff to the districts or schools.
- In case of student teachers without teaching posts the teachers of the host schools should be requested to support them. They should accompany them to class, guide and support the student teachers.
- Further research should be done in the field of experiential learning at a distance regarding the involvement or support from subject teachers in schools where teaching practice takes place.

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ABSTRACT

Videoconferencing technology is a successful tool for expanding possibilities for collaborative and distance learning, while bridging the distance between the teacher and students, providing time and cost savings. Recently, the focus in literature and practice for quality requirements are shifting from deterministic behavior of the infrastructure in videoconferencing learning environments to students’ Quality of Experience, as subjective measure that involves human dimensions. Hence, this study evaluates the impact of different Quality of Service mechanisms utilized in the infrastructure on students’ Quality of Experience in videoconferencing learning environments. It involved 263 faculty students that participated in 42 learning sessions via videoconferencing during their academic activities, while the infrastructure was subjected to Quality of Service mechanism in the network, as well as application enhancement in the videoconferencing platform, or both. The performance counters from the technical equipment and results from the survey regarding students’ perceived experience, showed definite Quality of Service to Quality of Experience correlation. When network and application Quality of Service were considered complementary, students’ Quality of Experience was in average 18.5% higher compared to network and 15% to application Quality of Service implementations. Similarly, best technical performance was achieved when both mechanisms were consider as a whole, such as 34% decrease in average transmit delay compared to application and 62.5% to network Quality of Service mechanisms, etc. Finally, application controls had greater impact on perceived students’ Quality of Experience than the network ones, which correlated to performance behavior of the infrastructure.

Keywords: Videoconferencing, learning environments, Quality of Service, Quality of Experience, Quality of Service/Quality of Experience correlation.

INTRODUCTION

Distance learning educational systems have developed rapidly in recent years and have become more popular in public and private institutions, while applying different forms of electronically supported teaching and learning (Bozkurt et al., 2015; Harris & Krousgrill, 2008; Simonson, Smaldino, & Zvacek, 2014; Zawacki-Richter & Anderson, 2014). Latest technologies that offer different options for distance education are quickly adopted in order
to promote additional values in the educational area. The educational process over distance involves different pedagogical and methodical approaches, which strive to reach an optimal level of perceived student knowledge according to students’ potential. Hence, knowledge transfer is performed via number of learning methods, like self-paced learning with prerecorded audio and video materials, videoconferencing, tele-presence, web-based instructions, utilization of mobile devices, etc. (Bouhnik & Marcus, 2006; Lawson et al., 2010; Malinovski et al., 2014; Xiong et al., 2017; Huang et al., 2016).

Videoconferencing-based educational systems can enable students in one or many locations, to watch and listen to an instructor in real time, and maintain interactivity with those remote locations. It is a mature technology that can be used in the distance learning process to provide instructor-student or student-student interaction (Clawson et al., 2016; Harris & Krousgrill, 2008; Lawson et al., 2010; Malinovski et al., 2014; Neeman et al., 2010). If it is used appropriately, videoconferencing can be cost-effective way for educational institutions to deliver successful educational experience to an expanded student population. Videoconferencing-based systems are relatively easy for end-users to operate, while establishing connections between remote locations. When in a call, the distributed team members are “virtually present” in same environment. Still, the usability of a videoconferencing session is closely connected to performance of the technological equipment and the underlying transport network, which influence the overall quality of the process (Borodakiy et al., 2015; Chen, Farley, & Ye, 2004; Chodorek et al., 2017). Large amount and different types of data packets within the network that facilitates a videoconferencing session may introduce bottlenecks at certain part, so appropriate measures must be taken in advance to avoid the problems that may occur and provide stable, efficient, cost-effective solutions.

Quality of Service (QoS) is a mechanism that manages packet loss, delay and jitter in the infrastructure during data stream transport from the source to the destination. ITU–T has developed several recommendations that define QoS and Performance (i.e. ITU-T E.800–E.899, G.1000–G.1999, Y.1500–Y.1599, Y.2100–Y.2199 series) and Transmission Media Characteristics (ITU-T G.6000-G.6999), which can be applied on infrastructures that support different process, to maintain appropriate level of service and meet end-user expectations. Similarly, QoS provisioning and controls are necessary in a videoconferencing learning environments to provide predictable, stable and measurable behavior of the infrastructure (Hossain, 2014; Sudarsono et al., 2016). Hence, the performance of the possible heterogeneous infrastructure must suit the basic necessities for rich audio and video media during an interactive videoconferencing session. On the other hand, QoS is a technical measure that deals with behavior of protocols, services and applications within the infrastructure, which might or might not significantly influence students’ expectations for quality, while participating in a videoconferencing learning environment. In like manner, Nikravesh et al. (2016) state that QoS mechanism in the network does not always directly influence users’ experience, since changes in a video streaming application’s frame rate may compensate changes in packet loss rate. Malinovski et al. (2014) have found moderate support between technical performance and students’ experience while using videoconferencing-based educational system, which means small variations in technical quality might not be detected by the students. Hence, number of studies have focused on students’ Quality of Experience (QoE) as a full-scale evaluation of the learning process in a terms of students subjective experience and quality expectations (Aldrich et al., 2000; De Mare, & De Moor, 2007; Kalliris et al., 2014; Karadimce & Davcev, 2014; Malinovski et al., 2014; Van Moorsel, 2001; Vasileva-Stojanovska et al., 2015). Still, having in mind the variety of QoS mechanisms and the link between technical performance of the videoconferencing infrastructure (including applied QoS) and students’ QoE, research studies that provide information for the impact of different forms of QoS on students’ QoE can provide benefit to educational institutions that use or plan to implement similar learning methods.

This study aims to analyze the influence of different QoS mechanisms that can be implemented in the infrastructure of videoconferencing-based learning system on
students’ QoE involved in the learning process. Even though students’ QoE is a complex and multidimensional measure influenced by different factors (Laghari et al., 2017; Malinovski et al., 2014; Vasileva-Stojanovska et al., 2015), the study covers only the link between QoS and QoE to provide information whether different QoS controls can be detected by students and will further influence their experience. Hence, it researches traditional QoS mechanisms in the network, as well as application enhancement for QoS in the videoconferencing platform. These QoS measures are utilized in multiple learning videoconferencing sessions, while real-time feeds from the infrastructure devices and instruments are correlated with students’ perceived QoE. The results aim to help stakeholders of education institutions that use videoconferencing in their practice to understand the necessity for proper QoS implementation, which can further affect students’ satisfaction and positive QoE.

THEORETICAL BACKGROUND

Different researchers have focused on QoS provisioning and controls that can enhance performance of the system. Some studies are focusing on the network, where proper traffic identification and classification can be applied (Kilinc & Andersson, 2014; Lee & Copeland, 2009; Richards et al., 1998; Yan et al., 2016; Zander, Nguyen, & Armitage, 2005). These QoS mechanisms aim to increase the quality of network delivery (jitter, delay and packet loss) via prioritization and resource reservation, while providing satisfactory service to end-users. Other studies try to implement transparency for the existing QoS mechanisms and introduce additional QoS middleware positioned in the application layer in servers or devices into the infrastructure (Egilmez, Civanlar, & Tekalp, 2013; Nahrstedt et al., 2001; Nikravesh et al., 2016; Romero, 2010; Shirazi, Kumar, & Sung, 2004, Yim, Son, & Lee, 2016). Hence, they target the quality of delivered content via the utilized application, such as audio/video synchronization, terminal handling of media flows, video error concealment, etc. The first group is referred as network-based Quality of Service (NQoS), while the second application-based Quality of Service (AQoS).

During a videoconferencing-based session, NQoS aims to ensure reliable delivery of multimedia data packets over a converged transport infrastructure (Chen, Farley, & Ye, 2004; Lee et al., 2007; Rajkumar et al., 1997; Vasileva-Stojanovska et al., 2015). Different types of data streams that are usually present within the converged network where videoconferencing based e-learning systems are placed, could introduce bottlenecks at certain part of the infrastructure. Hence, NQoS classification and provisioning scheme has to be designed and tested in advance, before videoconferencing e-learning sessions are utilized in the learning process, so latency, jitter, and packet loss would be avoid as possible. AQoS relates to measures embedded within an application that preserve the quality of its intended use. It has increased popularity in recent years in different type of video communications over distance, utilized to minimize the effects of the packet delay and loss while responding dynamically with measures in the application (Agboma & Liotta, 2007; Nikravesh et al., 2016; Pathak, Singh, & Patel, 2016; Rajani, Khaparde, & Ghuge, 2017; Siller & Woods 2003; Usman et al., 2015). Hence, AQoS mechanism during videoconferencing can improve call signaling, media flows termination, for both video and audio, as well as quality of video signal via recovery of small blocks of data using the information from neighboring ones that were already received.

ITU-T (2007) has define QoE as overall acceptability of an application or service, as perceived subjectively by the end-user. Laghari & Connelly (2012) have perceived the term QoE as a blueprint of human subjective quality needs and experiences arising from interaction of a person with technology in a particular context. According to Yan et al. (2016) QoE ultimately determines the user-perceived service quality, while Malinovski et al. (2014) use QoE to determine students’ subjective experience and quality expectations during distance education activities. Despite the importance of QoE, Nikravesh et al. (2016) have come to conclusion that a single mapping from QoS to QoE values does not exist, having in mind the wide variance of QoS measures across different applications, e.g., frame rate in video conferencing and page load time in web browsing, etc. Still, they emphasize
that QoS to QoE correlation is important, so QoS mechanisms can be adjusted for increased end-users’ QoE from certain service, when their low QoE should be improved to tolerable levels. There are number of studies that explore the link between QoS and QoE in different contexts (Agboma & Liotta, 2007; Chen, Wu, & Zhang, 2015; Kim & Choi, 2010; Laghari et al., 2017; Kuipers, et al., 2010; Siller & Woods, 2003; Stankiewicz, & Jajszczyk, 2011), but only few studies focus on QoS and students’ QoE during videoconferencing learning sessions, mostly as an addition to other factors influencing QoE (Malinovski et al., 2014; Vasileva-Stojanovska et al., 2015). Therefore, these limited attempts to show a correlation between QoS and student’s QoE in videoconferencing learning environments open new prospects for research on this topic that can be applied in similar distance learning programs.

**METHODOLOGY**

**Participants and Design**

This study included information technologies students in the several Universities in Republic of Macedonia, positioned in different parts of the country, as well as one University in Italy. The study were organized during 2013-2016, in three academic years, with students attending “traditional” classroom courses, as well as distance learning lectures with an aid of a videoconferencing platform, which were analyzed during the research. Hence, the study involved 263 students, 65% male and 35% female, with average of 21 years and students of all undergraduate and postgraduate years.

The videoconferencing infrastructure that was used to facilitate videoconferencing-based learning environment covered different sites/Universities with suitable classrooms, professional platform and a central videoconferencing management control site. These sites are connected with a live, IP transport infrastructure, which provides communication between different Universities for day-to-day activities. It represents a converged network, which consolidates different media, such as data, video and voice into a single infrastructure. This system encompasses advanced video coding standards (MPEG4, H.263, H.264 etc.), which are used to compress rich media on the top of the underlying IP transport infrastructure. H.323 was used for call signaling/control, multimedia transport/control for point-to-point and multi-point conferences (Saxena, Jasola, & Sharma, 2006), which enabled the remote video conferencing endpoints to participate as a closed user-group. Each classroom was equipped with point of presence devices, teacher/student camera, coding/decoding engine, display or projector, and proper sound system (microphone and speakers). Hence, this professional videoconferencing infrastructure was utilized in 42 learning sessions between different sites (two, sometimes three in same session), conducted within the standard academic activities in three years. Each learning session started with 30 minutes presentation from lecturer in one site, followed by 30 minutes presentation from lecturer at the other site. The learning sessions were concluded with discussion via videoconferencing, which promoted students cooperation and opportunity for students to share educational expertise with colleagues. In our methodological approach, we have implemented three QoS mechanisms, during random, equally spread learning sessions:

- QoS controls and provisioning implemented within the network (NQoS);
- application enhancements of the videoconferencing platform for improved performance (AQoS);
- both, NQoS and AQoS during videoconferencing sessions.

The students participated in several videoconferencing learning sessions, with the different QoS controls, so they can express their QoE from the learning sessions. Students were not aware of the technical setup, so the produced results could provide adequate information for the relation between utilized QoS mechanism and students’ QoE.
Research Procedure

The transport infrastructure in the environment where the study was conducted has sophisticated networking devices (routers) at different points of the network, including ones that can experience traffic saturation, so their flow recognition and provisioning capabilities can be programmed as NQoS according to the learning objectives and tested for results. While designing NQoS controls within the network we have implemented: (1) discovery phase, which was running for several weeks in advance, gathering information/statistics for the traffic across the live infrastructure, including test videoconferencing streams as planned for the learning sessions and (2) classification and provisioning phase, which used the gathered information of the previous phase, to classify the traffic according to the behavior of the network (Li et al., 2017; Szigeti et al., 2013). Hence, the networking infrastructure and its predefined policy for NQoS provisioning was adjusted to follow the desired classification and handling of rich media, so the videoconferencing flows (signaling and voice/video media) could receive as little delay and jitter as possible, with minimal packet loss (Figure 1).

![Figure 1. NQoS mechanism within the transport network](image)

The videoconferencing platforms used during the learning sessions has different application based mechanisms that can increase QoS during the sessions (AQoS). The H.323 protocol used for call signaling, maintenance and termination of the videoconferencing sessions, was optimized related to delay and reliability. The signaling reliability was increased through retransmission of signal messages, after a minimal timeout, which generally improved the reliability and has speed up the communication. AQoS also enhanced the rich media handling through the videoconferencing platform. Hence, dynamic jitter buffers were used for compensation of inter-arrival packet jitter and dynamic bandwidth allocation to adjust the video bit rate and bandwidth during video communications, in order to eliminate packet loss (Dixit et al., 2013; Parakh & Jagannatham, 2012). In addition, the videoconferencing platform used in the study has vendor specific algorithm that provides video error concealment (Pathak, Singh, & Patel, 2016; Rajani, Khaparde, & Ghuge, 2017; Usman et al., 2015). This technology was designed...
to maintain the quality of videoconferencing session over a live transport infrastructure, by immediately recognizing and taking action on video packet loss. With video error concealment, the video stream is coded in macro blocks, which are then randomized and sent through the transport infrastructure. Therefore the macro blocks, that are part of a same video frame, are sent in different packets. When a packet loss occurs during a videoconferencing session, the video concealment algorithm needs to compensate for the isolated missing macro blocks, since the codec can reproduce the lost micro blocks from the others, which are received within the packets that were not lost. These AQoS controls complement each other, so they were utilized to provide improved quality of the systems’ performance during the learning sessions. Figure 2 illustrates the position of AQoS mechanism within the system infrastructure.

Figure 2. AQoS mechanism within the videoconferencing platform

Data Collection
The system and videoconferencing platform have a central site with multipoint control unit (MCU), which functions as videoconferencing interconnect-bridge and multimedia gateways/gatekeepers. The centralized management provided real time feed from instruments and sensors, which facilitated proper session monitoring, log generation, measurement selection and preparation of evaluation information on several aspects. Therefore, we were able to gather necessary technical information regarding packet loss, delay and jitter in the infrastructure during each learning session, so we can analyze the system’s performance during NQoS and AQoS only, as well as both NQoS and AQoS implementations. Hence, we further used this information during analysis and correlation with students’ perceived QoE.

As indicated in Laghari & Connelly (2012) in their analysis of QoE frameworks, QoE is usually gathered via interviews, web based surveys and questionnaires, to obtain
subjective information from users about product or service. In line with Vasileva-Stojanovska et al. (2015) that students’ QoE derives from the complete system’s effect on the students, influenced by their perception of the technical performance as well as their expectations for the learning session in general, we have designed a web based survey to gather students’ opinion after each session with two sections. The first section of the survey contained direct questions regarding students’ perception of technical quality (video, audio, their synchronization, etc.), while the second section focused on student’s opinions for the learning session, which was to certain extent indirectly connected the technical environment. Survey’s questions were phrased on a ten-point Likert scale (Likert, 1931), where 1 = strongly disagree and 10 = strongly agree. Table 1 lists research variables and questions from the evaluation survey used during the study.

<table>
<thead>
<tr>
<th>Section</th>
<th>Question (QoE research variable)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section A: Evaluation of the technical environment</td>
<td>A1. The videoconferencing provided quality video performance</td>
<td>Student survey</td>
</tr>
<tr>
<td></td>
<td>A2. The videoconferencing provided high quality audio</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A3. I did not notice loss of synchronization between the video and audio during the session</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A4. I received enough information to participate in the videoconferencing session</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A5. I did not notice technical inconvenience during the session</td>
<td></td>
</tr>
<tr>
<td>Section B: General aspect of the learning session</td>
<td>B1. I observed education advantages because videoconferencing was introduced in the learning session</td>
<td>Student survey</td>
</tr>
<tr>
<td></td>
<td>B2. I did not experience lowering of the attention level during the session</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B3. I found it difficult to follow teacher explanation through the videoconferencing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B4. I did not find difficulties to concentrate during the session</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B5. I was satisfied with the organization of the session</td>
<td></td>
</tr>
</tbody>
</table>

The educational institutions that participated in the study required course evaluation survey after each session, so students’ response rate was 100%. Students’ personal data and privacy was protected at all time, and the teacher did not influence students’ decision and evaluation criteria. Having in mind that students’ QoE is influenced by different factors, we have designed the questions to obtain students’ opinion on different aspects and ideally produce information that can be correlated with QoS results during the videoconferencing learning sessions.

RESULTS

The information gathered for the technological performance of the equipment contains objective values, which depend solely on utilized QoS mechanism, videoconferencing platform and transport infrastructure. Hence, from the central site we obtained negotiated video/audio codec during each learning session depending of the current state of the infrastructure, call rate, packet delay and jitter, as well as packet loss during NQoS, AQos and both implementations.
Table 2. Statistical information for technical performance from several videoconferencing sessions

<table>
<thead>
<tr>
<th>Date</th>
<th>Duration</th>
<th>Type</th>
<th>Call rate</th>
<th>Audio protocol</th>
<th>Video protocol</th>
<th>Video format</th>
<th>Average packet loss % (Tx/Rx)</th>
<th>Max. delay msec (Tx/Rx)</th>
<th>Average delay msec (Tx/Rx)</th>
<th>Max. jitter msec (Tx/Rx)</th>
<th>Average jitter msec (Tx/Rx)</th>
</tr>
</thead>
<tbody>
<tr>
<td>31/May/2013</td>
<td>00:33:41</td>
<td>H323</td>
<td>1920Kbps</td>
<td>Siren22</td>
<td>H.264</td>
<td>4CIF</td>
<td>0.1/0.6</td>
<td>43/43</td>
<td>24/24</td>
<td>9/12</td>
<td>1/2</td>
</tr>
<tr>
<td>02/Jun/2013</td>
<td>00:42:53</td>
<td>H323</td>
<td>1024Kbps</td>
<td>G.722.1c</td>
<td>H.264</td>
<td>2CIF</td>
<td>1.4/0.5</td>
<td>200/184</td>
<td>88/85</td>
<td>8/15</td>
<td>3/6</td>
</tr>
<tr>
<td>04/Jun/2014</td>
<td>00:36:29</td>
<td>H323</td>
<td>1024Kbps</td>
<td>G.722.1c</td>
<td>H.264</td>
<td>4CIF</td>
<td>1.8/2.66</td>
<td>439/439</td>
<td>196/203</td>
<td>40/40</td>
<td>15/12</td>
</tr>
<tr>
<td>24/Jun/2014</td>
<td>00:57:43</td>
<td>H323</td>
<td>1920Kbps</td>
<td>Siren22</td>
<td>H.264</td>
<td>4CIF</td>
<td>1.3/1.8</td>
<td>213/213</td>
<td>55/57</td>
<td>30/34</td>
<td>13/18</td>
</tr>
<tr>
<td>24/Jun/2015</td>
<td>00:28:24</td>
<td>H323</td>
<td>1920Kbps</td>
<td>Siren22</td>
<td>H.264</td>
<td>720p</td>
<td>0.1/0.3</td>
<td>42/42</td>
<td>37/37</td>
<td>8/8</td>
<td>4/5</td>
</tr>
<tr>
<td>08/Oct/2015</td>
<td>00:33:53</td>
<td>H323</td>
<td>1920Kbps</td>
<td>Siren22</td>
<td>H.264</td>
<td>4CIF</td>
<td>0.16/0.1</td>
<td>41/41</td>
<td>21/22</td>
<td>31/7</td>
<td>2/2</td>
</tr>
<tr>
<td>18/Nov/2015</td>
<td>00:41:04</td>
<td>H323</td>
<td>1920Kbps</td>
<td>Siren22</td>
<td>H.264</td>
<td>4CIF</td>
<td>0.06/0.1</td>
<td>20/20</td>
<td>6/6</td>
<td>10/4</td>
<td>2/1</td>
</tr>
<tr>
<td>03/Dec/2015</td>
<td>00:26:06</td>
<td>H323</td>
<td>1920Kbps</td>
<td>Siren22</td>
<td>H.264</td>
<td>4CIF</td>
<td>0.8/1.86</td>
<td>163/161</td>
<td>129/129</td>
<td>35/39</td>
<td>15/19</td>
</tr>
<tr>
<td>13/Jan/2016</td>
<td>02:04:19</td>
<td>H323</td>
<td>1920Kbps</td>
<td>Siren22</td>
<td>H.264</td>
<td>4CIF</td>
<td>0.4/0.3</td>
<td>60/60</td>
<td>40/40</td>
<td>16/8</td>
<td>8/2</td>
</tr>
</tbody>
</table>

Table 2 shows technical information from several videoconferencing sessions for better illustration of the technological parameters that were included in the study, while Table 3 shows summarized statistical information for these parameters, grouped by the utilized QoS mechanism.

Table 3. Summarized statistical information for technical performance, grouped by QoS mechanism

<table>
<thead>
<tr>
<th>QoS Mechanism</th>
<th>Average packet loss % (Tx/Rx)</th>
<th>Maximum delay msec (Tx/Rx)</th>
<th>Average delay msec (Tx/Rx)</th>
<th>Maximum jitter msec (Tx/Rx)</th>
<th>Average jitter msec (Tx/Rx)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NQoS</td>
<td>0.8/1.2</td>
<td>439/439</td>
<td>88/99</td>
<td>40/41</td>
<td>10/9</td>
</tr>
<tr>
<td>AQoS</td>
<td>0.5/0.6</td>
<td>178/180</td>
<td>50/50</td>
<td>35/35</td>
<td>6/6</td>
</tr>
<tr>
<td>NQos and AQoS</td>
<td>0.2/0.3</td>
<td>70/65</td>
<td>33/33</td>
<td>24/30</td>
<td>4/6</td>
</tr>
</tbody>
</table>

These results show that the videoconferencing platform, endpoints and transport network were working satisfactory, without significant problems while establishing and maintaining a quality videoconferencing session. Still, since the system was operating on a live converged network that carries different type of traffic flows, congestion and small issues were detected at certain intervals. With NQoS in place and its traffic discovery phase, the networking devices were able to gather information regarding the actual network itself, while the classification and provisioning steps for videoconferencing privileged alignment and treatment had also benefit from this phase. Additionally, the system was performing better with AQoS compared to NQoS mechanism only. The application enhancement within the videoconferencing platform were able to coop with the sudden traffic saturation within the infrastructure and provide better performance in avoiding packet loss, latency and jitter during the videoconferencing sessions. Still, both QoS mechanisms were able to provide the best performance results while working complementary, providing premium treatment for the videoconferencing rich media, from one end-point in one site, through the transport network, to the other sites.

Additionally, we have analyzed students’ response for their perceived QoE after each videoconferencing learning sessions, grouped by the utilized QoS mechanism in the infrastructure. Thus, we obtained comprehensive QoE results as their subjective opinion for the technical performance (section A) and general aspects of the learning sessions (section B). Figure 3 and Figure 4 students’ QoE expressed as Mean Opinion Score (MOS) for each research variable, grouped by utilized QoS mechanism and survey section.
We have used Cronbach’s alpha test to assess data validity and internal consistency of the research items for each section of students’ responses, during different QoS implementations. As indicated in Figure 3 and Figure 4, the resulting Cronbach’s values for each group were sufficiently above the desired threshold of 0.7 (Nunnally & Bernstein, 1994), which verifies the scale reliability for measurable items in each section, having in mind that high alpha values do not imply that the measure is unidimensional. In addition, MOS results of students’ self-reporting information show that students have positively accepted the use of videoconferencing in the learning environment. The interaction between different sites and collaboration with other students and faculties contributed to positive attitude towards this learning method. Most importantly, the results show correlation and link between objective technical performance obtained from the infrastructure (as QoS result) and subjective students’ QoE. Even though students were not aware of the technological setup during each learning session, their subjective opinion was reflecting the actual performance of the videoconferencing platform and transport network. The level of students’ perceived QoE (technical view and general aspects) was highest during NQoS and AQoS implementation, which completely correlates to objective information gathered from the equipment itself. Furthermore, students have shown slightly higher QoE level when AQoS was used compared to NQoS, which was similar to the difference in statistical information for technical performance. Consequently, these results altogether support research claims for close relation between QoS and QoE in videoconferencing learning environment.

DISCUSSIONS

This study confirms the finding of different research endeavors (Agboma & Liotta, 2007; Chen, Wu, & Zhang, 2015; Kim & Choi, 2010; Laghari & Connelly, 2012; Siller & Woods, 2003; Stankiewicz & Jajszczyk, 2011) that emphasize the importance of QoS to QoE.
correlation, so QoS mechanisms can be adjusted or improved in order to increase end-users’ perceived QoE. While demonstrating a connection between utilized QoS mechanisms in the infrastructure and students’ QoE during videoconferencing learning sessions, it provides contribution to literature that can be replicated in similar distance learning activities. Hence, the objective QoS and system’s performance were measure from different aspects, while covering concepts, parameters and methods needed to manage interactions between videoconferencing applications, students’ terminals at each of the sites and the underlying transport infrastructure in a form of NQoS, AQoS, or both. Via the information supplied in a form of students’ experience and the link to different QoS controls within the system, the study provides conversions from technical parameters to human experience.

CONTRIBUTIONS

In line with similar studies that understand QoE as multidimensional concept (Aldrich et al., 2000; De Marez, & De Moor, 2007; Karadimce & Davcev, 2014; Laghari & Connelly, 2012; Malinovski et al., 2014; Nikravesh et al., 2016; Siller & Woods, 2003), students’ QoE in videoconferencing learning environments is conceived as a multidimensional concept that consists of both objective (e.g., bit rates, packet loss, latency, performance etc.) and subjective (e.g., user-related satisfaction, positive experience) aspects. Recognizing that QoE is influenced by different factors, most of these factors were kept constant during the learning sessions (same students participated in different classes, as well as same professors were included during various QoS implementations, the subject materials were on similar topics, etc.), so the results can show whether the difference in technical performance is correlated with the difference in students’ QoE. Hence, the study’s findings show that ultimately both NQoS and AQoS mechanisms should be used, since they can properly position the infrastructure to facilitate increased level of students’ QoE. They complement the results in Vasilieva-Stojanovska et al. (2015) that indicate NQoS as one of the factors affecting students’ QoE in distance learning environments, while providing additional correlation for AQoS and both NQoS/AQoS implementations and students’ experience. Despite the findings in Siller & Woods (2003) that state that NQoS controls have bigger impact on perceived end-user QoE than AQoS for multimedia services, this study has shown that AQoS should be also considered, optimally complimenting NQoS, to increase students’ QoE in videoconferencing learning environments.

In line with the latest shift in literate and practice from QoS to QoE (Agboma & Liotta, 2007; Chen, Wu, & Zhang, 2015; Jarschel, et al., 2011; Laghari et al., 2017; Zhang & Ansari, 2011), the results from this study can benefit organizations that use or plan to introduce videoconferencing in the learning environment. These findings are helpful in QoS/QoE correlation, since educational institutions that fail to understand the importance of the students’ QoE, affective and meaningful interaction with technology behind the service, and the ways to improve it, will be left behind in future development and proper positioning in the distance learning area.

CONCLUSION

The study follows a user-oriented approach while focusing on positive students’ experience in videoconferencing learning environment, a key driver of technology acceptance, adoption and usage behavior. Hence, we have presented our findings for the link between different QoS mechanisms and students’ QoE in videoconferencing learning environment. In our research activities, we have included 263 students that participated in 42 learning sessions via videoconferencing, while utilizing NQoS, AQoS and both NQoS/AQoS controls in the infrastructure. After each session, students’ expressed their experience for the perceived technical performance and general aspect of the videoconferencing learning environment. The finding in this study have determined that:

- There is a link between objective technical parameters provided by QoS mechanisms and subjective students’ indicators for QoE in videoconferencing learning environments;
Combined NQoS and AQoS implementation provide best results for technical performance in the infrastructure, which correlates with highest level of students’ QoE compared to videoconferencing learning sessions when only NQoS or AQoS mechanisms are utilized;

AQoS should not be neglected, even when is used as only mechanism, since in specific environments it can provide better technical performance than NQoS, which ultimately correlates with students’ QoE.

In line with studies in literature that focus on QoS and QoE in different contexts, this study tries to bridge the QoS/QoE gap in videoconferencing learning environments while providing helpful information to educational organizations to optimize their network and application resources driven by students’ perceived QoE. Henceforth, this study opens up new avenues for future research, so researches can use obtained results while trying to model factors (objective and subjective) predicting students’ QoE in similar learning environments.

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USE OF AUGMENTED REALITY
IN SOCIAL SCIENCES AS EDUCATIONAL RESOURCE

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ABSTRACT
This study investigated the effects of the use of Augmented Reality (AR) on the academic performance of students, as well as perceptions that were following the use of this new technology resource. The participants were students of primary education in Spain, which were assigned to an experimental group and a control group. Contents related to the topic Representation Earth were created, and were held with the collaboration of teachers using tablets to display bookmarks. To analyze the results collection tools of quantitative and qualitative data are used, a pre-test and post-test on the subject explained. I was done and Likert questionnaire on aspects of the use of the AR was given and an in depth interview was done teachers. Used tools of collection of data quantitative and qualitative to the deal are of a design quasi-experimental. In order to analyze the data, the statistical software SPSS 23 was used. The use of the AR as a teaching tool sheds results that reveal that the performance and the acquisition of knowledge of students improves significantly, being reflected in the ratings that were higher. The process of teaching and learning is perceived as positive, incentive and facilitator in the acquisition of knowledge.

Keywords: Augmented reality, elementary education, integration of technology, teaching/learning process.

INTRODUCTION
The evolution of information and communication technologies shows each certain time advances that can consider novel, many of them hide a long adaptation from others areas: of research, business or military, until its adaptation to the use of the great public, and in the same process to the educational field. One of these is the augmented reality (AR) that in these moments begins to implement is in the educational field and that presents numerous possibilities in presentation of content and the way of encourage to them students (Tanner, Karas, & Schofield, 2014). There are clear definitions about what AR is the best known are those of Azuma (1997) pioneer in the study of this technology, and having in common the of the superimposition of elements generated by the computer to reality, real, in three dimensions and whose vision is mediated by an electronic device with camera and internet (Wu, Lee, Chang, & Liang, 2013; Tanner, Karas, & Schofield, 2014; Holley, & Howlett, 2016).

Although the basis for the use of AR is a few years ago, the possibilities for its effective application in educational settings have not been given until recent dates. The cheapening of the costs of mobile devices such as telephone, tablets and computers
equipped with a camera and Internet connections allows for their use in the educational environment. Experiences such as those of Huang, Li, & Fong (2015) allow us to understand how it will be implemented and what its benefits are.

This study covers from the creation of the materials that are used in the classroom until its use, with the main objective being to understand the complete process for its implantation and the impact on the students when interacting with the ICT and with the AR in particular. This paper analyzes the way in which it implants in our educational field, how the contents are created and its use in the teaching of a Social Science theme for five weeks. The theme "The Representation of the Earth" was chosen in collaboration with the professors, within the syllabus of the subject. It proceeded to the creation of ad hoc contents by means of the use of programs of AR. In the classroom these contents were visualized by pairs of students through the use of tablets.

The objectives of this work are to know if the use of AR tools in the teaching and learning process favors the acquisition of knowledge by students, compare if the ratings improve using these technologies as well as explore the perceptions of students and teachers when using AR in their classrooms. Is remarkable the interest woken up in the students who perceives an extra motivation that is not present in the classes in which it did not use the AR, favoring the process of teaching and learning and the comprehension of the contents, aspect that we can see reflected in the improvement of the ratings of the groups that use AR.

THEORETICAL FRAMEWORK

The Augmented Reality (AR) is emerging as one of the technological advances that transform education, presenting potentially relevant contributions when presenting content to our students. Of the same mode exists the perception that the use of ICT improves the process of teaching and learning and them skills technological of students and teachers (Wu, Lee, Chang, & Liang, 2013; Badia, Chumpitaz, Vargas, & Suarez, 2016; Holley, & Howlett 2016). For Azuma (2010) the AR allows that the real and the virtual coexist in the same space, giving the possibility to interact with these elements in real time. It allows us to show information by providing multimedia or texts related to objects or places, in a simple and immediate (Billinghurst, Kato, & Poupyrev, 2001).

So can successfully implement the needed technologies that are currently found in many mobile devices, some of them quite affordable. It is common for mobile phones, the Tablet and laptops allow access to technologies such as GPS, internet, camera, audio, giving the option of installing software with easy to use user interfaces. This has been used in various areas of life from the advertising that is having a big impact, reaching used in games of various kinds (Del Moral, Villalustre, & Neira-Pinero, 2016; Laine, Nygren, Dirin, & Suk, 2016).

Multidisciplinary Use of AR

There are many authors that show which disciplines can be used the AR, medicine, design, entertainment, tourism, games network (with the global impact of Pokemon Go) and mentioning the field that compete us, education. Huang, Li, & Fong (2015) collect multiple experiences around the world of the interaction of the students with the AR in the different stages of education in different subjects: teaching language, biology, foreign languages... in all the curriculum in some cases. Or as Huang, Chen, & Chou (2016) studies that used the AR to environmental education. The use of this technology permeates all phases of education, being especially motivating and fostering autonomous learning (Martín-Gutierrez, Fabiani, Benesova, Meneses, & Mora, 2015) in upper stages, featuring improvements over traditional teachings in terms of involvement and motivation (Di Serio, Ibanez, & Kloos, 2013). Similarly, there are numerous applications that we find for the use of the AR in everyday life, increasing almost daily the number of applications that you can download to our devices. More limited are those used in the classrooms of history and social sciences being many of them pay or linked to editorials.
The integration of these resources is taking to cape in all the world can find exponents of them in various studies. Some examples for our environment arise from investigations such as Prendes (2015) that analyses the context of production and use of the AR, appearing as relevant in our educational environment, with experiences like Wasko (2013) and Cheng & Tsai (2016), or projects that geo located information for purposes of training or tourist. The AR is present in the networks and can be considered fluent communication of experiences in our educational environment, although its development and dissemination is dependent on their own classrooms and presentation on Blogs and Web centers or instructors, still present on pages such as http://www.educaciontrespuntocero.com or http://www.enlanubetic.com.es, there are many more. Similarly, we can find projects of use of AR in the international level and that we can use as inspiration when applying or replicating experiences in our classrooms.

Experiences of AR in the Classroom
We find that AR is used in non-educational environments in which it reports benefits; Ruiz-Ariza, Casuso, Suarez-Manzano, & Martinez-Lopez (2017) perceive significant profits in the cognitive performance and emotional intelligence with the use of Pokemon Go. We also find it in the industrial field, in which the advantages and disadvantages of its use have been analyzed, and the degree of maturity of this technology for its implantation (Palmarini, Erkoyuncu, Roy, & Torabmostaedi, 2018).

For use in education we find valuable examples in classrooms around the world. Giasiranis & Sofos (2017) in the teaching of the topic "Representation of information in computers" determine that the use of AR has an added value in education, and contribute to improving performance with positive effects in the teaching and learning processes. For a better understanding of implantation in primary classrooms, Alkhattabi (2017) combines the use of observation and survey using the Technology Acceptance Model (TAM), and evaluates the use of AR by primary school teachers when finding in their classrooms to digital natives who demand the adoption of these technologies. The use of AR in the classroom makes the learning process more active, effective and meaningful, interested researchers and is well accepted by users, both students who perceive the benefits of their use, as teachers who have the will to use it and have already acquired skills in technologies that motivate them to use them.

In other cases, the use of AR and traditional methods does not show differences as in the work made by Gun & Atasoy (2017), on the subject of sixth degree "Geometrical objects and volume of measurement" using a design quasi-experimental that compares the data obtained of a group control and an experimental group, in which they used real objects in the first case and AR in the second. Its use in secondary education in the Chemistry classrooms analyzed by Chang & Chung (2018) improves the students' understanding of the macro and microscopic world of Chemistry by improving the effects of learning and reaching the conclusion that AR can be integrated positive way in teaching and intervenes in the improvement of grades. These examples show how AR is being integrated into classrooms around the world and in all areas of knowledge. In some cases with greater benefits than in others.

METHODOLOGY

Participants
The participants in this study were 49 students from two classes of 5th of elementary education in a school in the province of Seville (Spain). The age of student ranged between 10 and 11, of which 22 were women and 27 men. The experimental group was 5th A, composed of 25 students of which 11 (45%) were women and 14 (55%) males, with which tools of AR was used. The control group was 5th B composed of 24 students, 11 (33%) were women and 13 (67%) men, with those who used a traditional method of teaching.
Design
This study was conducted on the course academic 2016-17 following methodology quantitative and qualitative. Methodologically it responds to a research design quasi-experimental where he applied a pre-test and post-test to an experimental group and a control group with the goal of studying whether the use of the AR as independent variable (IV) influence in the acquisition of knowledge and learning as the dependent variable (DV).

The objectives in this study were:
- Find out if the use of AR as a technological tool in the teaching and learning process promotes the acquisition of knowledge and improve the performance of students.
- To compare the qualifications of students before and after the use of AR as a teaching tool.
- To explore the perceptions of students has the use of the AR as a teaching tool.

Materials
With the purpose of perform this study properly contacted teachers in two classrooms that were taught at the time where he was going to carry out the investigation in their school. The given topic was "Representation of the Earth", for which content ad hoc was created. For the realization of this work were available to classrooms 15 Tablets of mid-range which had some problems when using them to display contents of AR, including the do not display, access errors to the camera of the device with some applications, the information recorded by the gyroscope of device which presented information to reverse failure, or in a direction contrary to that performed is the display.

Figure 1. Example of Representation of the Earth, Hemispheres in AR

It was decided to use of free version of Aumentaty Author, with which they were made the contents of Aumentaty Viewer for use in devices by the students in these programs to be the most compatible. This program allows you to preload the contents which facilitated its use not necessary to crap content from the network, limited due to the low bandwidth of school (see Figure 1 and Figure 2).
Figure 2. Example of Representation of the Earth, Political Map.

For immersion in the classroom of elements of AR is followed guidelines for teachers of both groups, presenting content that was the theme in its two aspects, mechanisms and structures, performing a timing of the use of elements that do not break the teaching style of teachers, trying to insert the AR in the classroom in a natural way and altering as little as possible, the behavior of the students in the classroom to be present technological elements innovative and minimizing the presence of researchers.

Procedures
The procedure followed in this research is divided into five phases and was the following:

- **Pre-test phase.** A pre-test was administered to the control group and the experimental to assess the level of knowledge on the subject that he would teach, which was social sciences.
- **Learning phase.** Is explained to the group 5th A (experimental) the theme of science social "the representation of the Earth", using those materials previously created of AR and that were displayed in couples with Tablet. The lesson of the 5th B group (control) was explained in a traditional manner without AR. Development of the theme and activities were developed in three weeks with the hours established by the school. He was explained to the students that in the next week would be a test to learn what had learned explained topic.
- **Post-test phase.** Once the theme concluded passed the post-test both the experimental group and control, so if you had or not used the contents of AR, in order to know if the use of AR influenced in the knowledge of the subject explained with or without AR. It served to quantify the average degree of learning achieved by both groups. The test time was 20 minutes.
- **Stage of perception of use of the AR in teaching.** Once they concluded the theme were passed to students in the experimental group (5th A) a brief questionnaire of 16 items, which were valued on a Likert-type scale the perceptions of students in the use of AR in the teaching-learning process.
- **Phase of interviews.** The last phase consisted of interviewing the students in the experimental group about their feelings and opinions during the learning process in which we used the AR. Also he interviewed the teacher about the use of AR in the process of teaching and learning.
Data Collection Instrument

In this study, quantitative and qualitative data collection tools were used. First the pre-test and post-test were used to obtain the scores of students before and after explaining the subject in the classroom. And a questionnaire was also used to obtain information on perceptions of the use of AR in the process of teaching and learning.

The pre-test and post-test it was exam type multiple choice test, consisting of ten questions and three answers of which only one was valid, with which was obtained ratings of 0 to 10. The questionnaire was developed from the Technology Acceptance Model (TAM) (Davis, 1989; Venkatesh, & Bala, 2008), with the object to collect information about the opinions of students regarding the use of AR in the classroom experience. 16 items in the questionnaire Likert-type with five levels of responses was composed of five dimensions (see Table 1), they are: utility perceived (UP), ease of use (EU), enjoy perceived (EP), attitude of use (AU) and intent of use (IU). Analysis of reliability of the questionnaire gave a Cronbach alpha of 0.858.

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utility Perceived (UP)</td>
<td>Grade in that a student estimated that the use of the AR would improve their learning and get draw better ratings.</td>
</tr>
<tr>
<td>Ease of Use (EU)</td>
<td>Extent to which the use of the AR is perceived as easy and does not require great efforts.</td>
</tr>
<tr>
<td>Enjoy Perceived (EP)</td>
<td>Degree in which the use of the AR is perceived as pleasant.</td>
</tr>
<tr>
<td>Attitude of Use (AU)</td>
<td>Positive or negative sentiment regarding the use of the AR in class.</td>
</tr>
<tr>
<td>Intent of Use (IU)</td>
<td>Grade in which the student formulates plans to use or not the AR in the future.</td>
</tr>
</tbody>
</table>

DATA ANALYSIS

The data obtained from the administration of the pre-test and post-test received different analysis with the statistical package SPSS 23.0. In first place, is proceeded to the analysis descriptive of mean and frequencies to know the features of the samples. Secondly, the test t-student was used to compare the two groups (control and experimental) in order to check if the use of the AR improved the performance of students. On the one hand is compared the group control before and after teach the theme, by another is compared the group experimental before and after give the theme with AR, and in third place is compared the group control and experimental at the level of pre-test and subsequently at the level of post-test.

Also were the means and standard deviations of 16 items in the questionnaire collecting information of the perceptions of students regarding the use of AR as technology in the teaching and learning process. The reliability of the questionnaire was measured through the internal consistency between items and Cronbach's alpha coefficient was obtained.

The qualitative data collected from interviews were analyzed using content analysis method. During the analysis process, data first were coded and categories and subcategories (see Figure 3) were found. In the data analysis frequencies, they were used, and thus, qualitative data collected were expressed numerically to make them more understandable (Dundar, & Akcayir, 2012).
RESULTS

The results obtained in the study were of two types: (a) the level of learning achieved by both groups of students to ensure that the use of technologies of AR in teaching was favorable being reflected in better ratings and (b) the perceptions students in the experimental group had the use of AR during the teaching in class.

Acquisition of Knowledge and Improving the Academic Achievement

Level of learning achieved by the experimental group after the application of AR was reflected in the qualifications obtained in the post-test. Figure 4 shows the differences between the qualifications obtained by the experimental group in the pre-test and post-test. The results of test t-student of the pre-test and post-test of the experimental group obtained with the SPSS indicated that students score higher after the use of the technology of AR in the teaching and learning process, because the average obtained with the pre-test is 3.4 and the post-test 7.9, with a difference of 4.5 points more. Figure 4 shows that a large number of students passed with good grades the theme of social science explained with AR technology. 36% of students obtained qualification of outstanding and remarkable notable, 8% of good and 20% of approved. There was no suspense.
Figure 4. Qualifications obtained in the pre-test and post-test of the group experimental

Applying test t-student to the pre-test and post-test of the group control is obtained ratings a little higher after the explanations of the topic following a traditional method but the difference between the average is a little lower, 3.2, in the pre-test the average rating was 3.2 and the post-test 6.4. Figure 5 shows how ratings from the control group in the post-test after the explanation of the subject are a bit higher, having a 21.5% of suspended students, 21% were outstanding, 24% notables, 12% good and 21.5% approved.

Figure 5. Qualifications obtained in the pre-test and post-test control group
In this same line, Figure 6 showing the results of the test t of the pre-test of the control group and the experimental group indicated that the experimental group (\( M = 3.4 \)) obtained ratings slightly higher than the group control (\( M = 3.2 \)) even before using tools of AR, with a difference of 0.2 score. And those obtained in the post-test of both groups also said that the group experimental obtained qualifications more high (\( M = 7.9 \)) that the group control (\( M = 6.4 \)), with a difference of score of 1.5, more high that it obtained in the pre-test.

![Figure 6. Comparison of the pre-test and post-test of the experimental group and control](image)

Perception and Opinion Regarding the Use of AR

In accordance with them results obtained, the opinion of them students of 5\(^{th}\) to (experimental group) have had on the use of the AR as a technology that facilitates the learning and the understanding of the content is positive, since to features general them answers in them different items reached values of them middle above 3 except the item 13, which referred to the students were bored in class when used the AR, whose value was 1.86, which meant that on the contrary not where they bored with its use, and item 2 which refer to take better grades when using the AR in classroom, with a value of 2.69. In relation to the dimensions and items of the questionnaire, the different results obtained from the experimental group can be consulted in table 2 and Figure 7.

| Table 2. Mean scores and standard deviations obtained for Perceptions of the use AR |
|---------------------------------|-----------------|----------|
|                                | **Mean**        | **SD**   |
| **Utility Perceived (UP)**     | 3.3304          | .75705   |
| I learn better when used in class AR. | 3.1739        | 1.11405  |
| I get better grades when used in class AR. | 2.6957        | .70290   |
| I understand better explanations of class with the AR. | 3.0435        | 1.39734  |
| The AR is helpful when you are learning. | 4.0000        | 1.04447  |
| The use of the AR increases my desire to work in class. | 3.7391        | 1.21421  |
| **Ease of Use (EU)**           | 4.2899          | .70571   |
| The AR is easy to use.          | 4.3043          | 1.01957  |
| Use the AR is not a problem for me. | 4.3913        | .98807   |
| I understand how to use the AR in class. | 4.1739        | 1.02922  |
| **Enjoy Perceived (EP)**       | 4.4493          | .57392   |
| Use the AR in class is fun.     | 4.7826          | .51843   |
| I liked to use AR in class.     | 4.6522          | .64728   |
| Use the AR me allows you to learn playing. | 3.9130        | 1.20276  |
| **Attitude of Use (AU)**       | 3.0145          | .60702   |
| The AR makes learning more interesting and exciting. | 3.6522        | 1.26522  |
| I got bored using AR in class.  | 1.8696          | 1.39167  |
| I think that using the AR is a good idea. | 3.5217        | 1.34400  |
| **Intent of Use (IU)**         | 3.6739          | 1.28460  |
| I would like to reuse the AR in class if I had opportunity | 3.9130        | 1.31125  |
| I would like to use the AR to learn other subjects. | 3.4348        | 1.67403  |

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The first five items of the questionnaire were targeted to obtain information on the level of perception of students in relation to the usefulness of use of AR perceived in the teaching-learning process. As can see in the table 2, those students perceived to levels average the utility of it AR, with an average of 3.33. The results obtained in that dimension items have highlighted students: "Learn best when used in class AR" (M = 3.17) which were 30% agree and disagree 39%, "They get better grades when used in class AR" (M = 2.69) with those who were 13% agree and disagree 44%, the 30% of the students said be in accordance with that "understands better the explanations of class with the AR" (M = 3.04) and the 35% are in disagreement, the 44% perceived be completely in accordance with that "the AR is useful when is learning" (M = 4), on the other hand the 30% is completely of agreement and the 35% of agreement that "the use of the AR increase their desire of work in class" (M = 3.73).

<table>
<thead>
<tr>
<th>Item</th>
<th>Agree</th>
<th>Disagree</th>
<th>Neither</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learn best when used in class AR</td>
<td>30%</td>
<td>39%</td>
<td>31%</td>
<td>100%</td>
</tr>
<tr>
<td>They get better grades when used in class AR</td>
<td>13%</td>
<td>44%</td>
<td>43%</td>
<td>100%</td>
</tr>
<tr>
<td>Understands better the explanations of class with the AR</td>
<td>30%</td>
<td>44%</td>
<td>26%</td>
<td>100%</td>
</tr>
<tr>
<td>The AR is useful when is learning</td>
<td>30%</td>
<td>44%</td>
<td>26%</td>
<td>100%</td>
</tr>
<tr>
<td>Increase their desire of work in class</td>
<td>30%</td>
<td>44%</td>
<td>26%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 7. Perceptions of the experimental group the use of AR

With regard to the dimension ease of use of AR, as can see in the Figure 7, was very high the average obtained in the level of perception of them students, with value of 4.28. The three items of this dimension also reached very high averages, which indicated: that students perceived that "AR is easy-to-use" (M = 4.30), "use AR is not a problem for them" (M = 4.39) and that "understands how to use the AR in class" (M = 4.17). 61% were fully in accordance with its ease of use, 65% with lack of problem to use it, and 52% with understanding how to use it in class.

The dimension perceived enjoy the use of the AR in the teaching process also obtained very high average scores (M = 4.44), as well as the three items of the same, which meant that students perceived that: "Using AR in class is fun" (M = 4.78) which 83% were fully agreed, liked using AR in class (M = 4.65) were 74% completely agree and 44% were fully in agreement and 22 per cent in accordance with that "use AR allows them to learn by playing" (M = 3.91).
Dimension referring to the attitude of use of the AR obtained an average of 3.01, which meant from the results in the items that: 35% of the student body was fully in agreement and 22 percent agreed that "the AR makes learning more interesting and exciting" (M = 3.65), 61% completely at odds that the use of the AR is bored in class (M = 1.86) and 30% completely agree and the 26% agree in believing that it is a good idea the use of AR in class (M = 3.52). Finally it perception of it dimension intent of use also obtained values above it average (M = 3.67), which make reference to: the 57% of the students is completely in accordance with "I would like to return to use it AR in class if had opportunity" (M = 3.91) and the 48% also were completely in accordance with "I would like to use the AR for learn others themes" (M = 3.43).

Categorical Analysis of the Interviews
As shown in Table 3 students perceive the use of AR in a positive way, 72% (f = 18) students expressed the view that it was see and work with the Tablet, 48% (f = 12) learn everything in a way more fun and easy. The same percentage appreciates that they better understand the explanations and that with this technology they seem more interesting, 48% of students opine that the AR allows them to see it very real and from and from different perspective and 3D and 40% (f = 10) that learning is more fun. Regarding the reasons for using AR in all subjects, 100% of the students think that they tend to be better, and only 32% (f = 8) perceive that learning is faster. As for the negative use of AR in the classroom we find some displeasure with the technical problems posed by the use of AR (8%).

Table 3. Qualitative Analysis of the Interviews of Students

<table>
<thead>
<tr>
<th>Categories</th>
<th>SubCategories</th>
<th>Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPAR (Using positive of AR)</td>
<td>UTR (Use Tablets to work with AR)</td>
<td>18 72</td>
</tr>
<tr>
<td></td>
<td>LE (Learn more easily)</td>
<td>12 48</td>
</tr>
<tr>
<td></td>
<td>BUI (Better understanding of the explanations and more interesting)</td>
<td>12 48</td>
</tr>
<tr>
<td></td>
<td>MRV (more real vision and in 3D)</td>
<td>7 28</td>
</tr>
<tr>
<td></td>
<td>FL (Fun learning)</td>
<td>10 40</td>
</tr>
<tr>
<td>RUT (Reasons for use in all topics)</td>
<td>FFL (Faster and fun learning)</td>
<td>8 32</td>
</tr>
<tr>
<td></td>
<td>BU (Better understanding)</td>
<td>25 100</td>
</tr>
<tr>
<td>NUR (Negative use of AR)</td>
<td>TP (Technical Problems)</td>
<td>2 8</td>
</tr>
</tbody>
</table>

To know the perceptions that teacher has of the use of AR and to what problems is faced for its use is made open in-depth interview in which he said the incentives and capability of this technology and the possibilities that presents at the time of integrate it in the classroom. He was at all times ready to use and integration, regretting that it is limited to a few sessions and a single subject. Before the possibility of continued use it seemed well although not for all subjects and topics, considering that this methodology not is conformed to some materials and content according their opinion, as language, math or physical education.

Although it welcomed this initiative was not it considered formed to create the content related to the AR, process that was complex, the same being so desirable that these contents are provided by publishers and out of easy implementation in the classroom. Also said that would accept receiving training on this type of technology always in its schedule of work and in its own School. Regarding the use of Tablet or mobile for Education considers it problematic and far away for use at this stage.

DISCUSSIONS
After analyzing the results of the pre-test and post-test of the experience in a 5th grade classroom using AR applied to the theme The Representation of the Earth, the data analysis gives us valuable information about the existence of a significant difference to
teach classes using AR or not. In this same process can know the vision that of the technology have students and teachers about the process that allows integrate the use of AR in the classrooms (Kerawalla, Luckin, Seljeflot, & Woolard, 2006; Di Serio, Ibanez, & Kloos, 2013).

With the results obtained that reflect an improves in the process of teaching learning and in the performance of them students is can appreciate that is an opportunity that have of pose in them schools, performing experiences similar as which found in all the world (Di Serio, Ibanez, & Kloos, 2013; Diaz, Hincapie, & Moreno, 2015; Prendes, 2015; Akcayir, Akcayir, Pektas, & Ocak, 2016).

Comparing the control group and the experimental group we appreciate that this improvement is more than 4 points out of 10, so this methodology focused on skills performance. Students and teachers are receptive, this technology seems them motivating and incentives, although the first steps of this deployment presents some technical and creative problems occasionally of and adaptation of the contents, is of special importance to teachers who don't feel ready with the challenge of addressing technical problems, creating content or deal with problems that may arise the various devices, Tablet of different brands and specifications techniques in particular.

While teachers raise these difficulties when it comes to the integration of the AR in their classrooms students accept it naturally, are digital natives and have around us access to devices with relative ease. They mostly have smartphones and access to wifi networks and data for which we should take into account the work of Harley, Poitras, Jarrell, Duffy, & Lajoie (2016) describing the design recommendations for AR applications and techniques devices that should lead to a standard of use features. Therefore, they would like use AR in the themes if they have the opportunity and it seems a good idea integrated into classrooms.

In this aspect it would have to change the rules of the elementary schools that do not allow the use of these devices. Students say they are less bored with the use of this technology, which seem more interesting content and allowing them to learn by playing, even when the activities and content are not posed as a game (Laine, Nygren, Dirin, & Suk, 2016). They like and fun use these devices, they know how to use, and no they pose a challenge. They appreciate that helps them work in class, to learn and better understand the explanations of their teacher and get better grades.

As studies of Han, Hyun, & So (2015) this perception so positive that allows them students is makes necessary enhance the use of this technology in classrooms, integrating in schools, improving contained and facilitating the training of them teaching and giving to them centers of personal technical right. Is necessary to provide future teachers of capabilities, not only for the use of the AR, but also to adapt to a changing technological environment which will present major challenges in the coming years and that demand of teachers an open attitude towards the incorporation of new methodologies and technologies in the classroom, whether AR, Virtual Reality (VR), or those that arise in the coming years.

CONCLUSIONS AND FUTURE WORK

A qualitative-quantitative methodology is implemented for this work starting from a quasi-experimental design in which a pretest and post-test are administered to the groups. Significant differences were observed in the results after teaching traditionally and using the AR, both in the acquisition of knowledge, translated into an improvement in academic results, and in the perceptions of students and teachers, as well as in the motivation and the interest towards the contents taught with this method. Specific materials were designed for this work and adapted to the devices, contents and number of students. This adaptation effort does not seem to be within the reach of teachers,
because it requires training in ICT and of specific endowments in the classrooms, both of software and hardware, and of contents. Another aspect is the regulation of the presence of mobile devices in the classrooms, which in our field and currently does not allow the use of Smartphone by the students, but also has no classrooms equipped with this technology in most cases.

The use of mobile devices in households is currently a fact, being able to give the paradox that students have at their disposal available online content that is not used in school or is not present in it, being in many cases adequate. Work is being done on the adaptation of contents to AR and VR, although but this progress is slow. On the other hand, the presence of AR contents in the textbooks will facilitate the task of the teachers who will have at their disposal such contents, as well as AR and virtual reality programs at reasonable prices. Analyze the impact in the classrooms of the AR, the suitability of the contents that appear and its implementation in our classrooms is a task to be done in the coming years.

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STUDENTS’ REFLECTIONS ON VOCABULARY LEARNING THROUGH SYNCHRONOUS AND ASYNCHRONOUS GAMES AND ACTIVITIES

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ABSTRACT

Many learners are now quite digitally skilled. However, this does not entail that they know how to learn through digital technologies. Therefore, establishing an interactive virtual learning platform that connects everyone together in a classroom environment and helping learners become familiar with such media might serve a set of purposes in any educational setting. Today, with the advances in web-based learning technologies, a hybrid teaching methodology has become widespread: blended learning. It is a term used to describe the way e-learning is being combined with traditional classroom methods and independent study. Educators design online materials and utilize them in synchronous or asynchronous ways to suit the convenience of learners and instructors and program demands. In this study with a group of intermediate-level English language learners at the School of Foreign Languages of an English-medium state university, the goal was to enhance students’ vocabulary learning performance by using synchronous and asynchronous games and activities that will activate and maintain intrinsic motivation in an effort to teach parts of speech and collocations over a period of eight weeks. The data consisted of a survey of students’ reflections on their vocabulary learning experiences through digital games and activities. The findings were discussed with respect to the efficiency of incorporating synchronous and asynchronous learning materials.

Keywords: Synchronous and asynchronous games, intrinsic motivation, vocabulary development, collocations, parts of speech.

INTRODUCTION

Advancements in wireless communication and mobile technology have contributed to the emergence of novel learning approaches which provide learners with an environment that blends learning resources from both the real- and the digital-world (Hwang, Shi, & Chu,
and these digital platforms are rapidly extending the scope of learning outside the formal learning contexts, allowing immediate and flexible access to a wide range of digital content (Cheon, Lee, Crooks, & Song, 2012). As it has been widely observed, many of today’s learners have grown up utilizing various digital tools and wirelessly networked technologies have become ubiquitous in the lives of these learners, the so-called ‘digital natives’ (Looi et al., 2010), a term first coined by Prensky (2001) referring to the people born in 1980s. They learn differently from their predecessors and have active ‘e-lives’, accessing and exchanging information instantly through blogging, online shopping, social networking, online gaming, file sharing or chatting. Technology is an inseparable part of their lives and they are quite digitally skilled. However, this does not entail that they know how to learn through digital technologies and that is what educators need to help them with (Pivec, 2007).

**Digital Platforms and Digital Skills**

This group of learners, digital natives, has attracted the attention of many researchers in the field (e.g. Brown & Czerniewicz, 2010; Helsper & Eynon, 2010; Ng, 2012). It has been shown that if the use of digital tools can be implemented effectively in educational settings, student progress can be achieved through motivating and engaging skill enhancement activities. Educational technology can enable learners to exchange information, share knowledge or experiences with others at the time of the learning process (Hwang et al., 2011). In doing so, mobile device applications also play a significant complementary role to serve teaching-learning purposes anywhere and anytime. With mobile technology, students can receive better support not only in the classroom, but also as they navigate to the context of their learning (Martin & Ertzberger, 2013). Martin and Ertzberger (2013) use the term ‘here and now mobile learning’ to describe the kind of “learning that occurs when learners have access to information anytime and anywhere via mobile technologies to perform authentic activities in the context of their learning and [that] gives students the opportunity to be in the context of their learning and have access to information that is related to what they are seeing and experiencing at the moment” (p.77). Their three-characteristic framework is illustrated in Figure 1 below:

![Figure 1. The model for here and now mobile learning (adapted from Martin & Ertzberger, 2013, p.77)](attachment:image)

In this figure, through the incorporation of this extended-context idea with the adoption of mobile devices, learning is made engaging, authentic, and informal as it requires learners to get fully involved in the process and make decisions depending on their individual needs and desires. In this respect, even if they are quite digitally skilled and interested in using the mobile devices to learn, educators need to afford timely assistance to help achieve the learning outcomes. For effective e-learning, instructors are required to remain as close as possible to the online environment (Asoodar, Vaezi, & Izanloo, 2016). Therefore, establishing some kind of an interactive virtual learning platform that connects everyone together in a classroom environment and helping learners become
familiar with such media serve a set of purposes in any educational setting: working in collaboration to learn from others and help others learn, having unlimited access to instructional content and easy online access to instructors and classmates, and planning studies with a consideration of individual needs, expectations, and preferences (e.g. pace, timing, or location).

**Synchronous or Asynchronous Options within a Novel Approach: Blended Learning**

In response to this need to incorporate web-based learning technologies in the field of education, a hybrid teaching methodology has become popular: blended learning. The concept of blended learning has originated from the idea that learning is a continuous process (Singh, 2003). It is a term increasingly used to describe the way e-learning is being combined with traditional classroom methods and independent study, and recognized as one of the major trends in higher education today (Gill, 2009; Park, Yu, & Jo, 2016). In fact, blended learning has been defined in a variety of ways in the field. According to Singh (2003), blended learning encompasses various event-based activities, involving face-to-face classrooms, live e-learning and self-paced learning. It enables students to adjust their path and pace through online technologies as well as being supervised during face-to-face instruction (Ja’ashan, 2015). Classroom settings are enriched with materials provided by media delivery resources (Abidoye, 2015) and seat time in classroom is reduced (Dziuban, Hartman, & Moskal, 2004; Hartman, Dziuban, & Moskal, 2007). Learners engage in interactive and collaborative online activities, and complete subsequent tasks as part of the classroom work, which aim to help them build meaningful connections with their online experiences (Strajer, J.F., 2012; Lukassen et al., 2014; Lane-Kelso, M., 2015).

In this regard, to support the teaching process, facilitate learning, guide learners and enhance the learning experience, blended learning is required to be structured on a basis that goes beyond a mere replication of the traditional classroom instruction. Gill (2009) offers two types of blended activities; static ones which present all the information and require learners to work on them individually, or active ones to be completed individually or in collaboration with others. These activities can be synchronous or asynchronous in nature. That is, online content can be utilized in synchronous (through chat or videoconferencing) or asynchronous (offline via web, email, message boards or forums) ways to suit the convenience of learners and instructors and program demands. Singh (2003)’s suggested set of synchronous and asynchronous content or activities in Table 1 below illustrate the possible options:

<table>
<thead>
<tr>
<th>Table 1. Learning approaches and choices suggested by Singh (2003)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Learning Approaches</strong></td>
</tr>
<tr>
<td>Synchronous physical formats</td>
</tr>
<tr>
<td>Synchronous online formats (live e-learning)</td>
</tr>
<tr>
<td>Self-paced, asynchronous formats</td>
</tr>
</tbody>
</table>
As demonstrated in Table 1, information technologies, learning technologies in particular, enable learners to learn individually, and create opportunities for more innovative, learn-centered programs relying on a combination of high-quality, interactive learning-ware, asynchronous and synchronous communications, and individualized mentoring (Beyth-Marom, R., Saporta, K. & Caspi, 2005). In asynchronous learning, the process is facilitated by streaming media, social media, emails, and discussion boards among others, and critical thinking is encouraged as the learners have more time to reflect, interact with the content and process the information (Hrastinski, 2008). Asynchronous learning makes it possible for learners to log in and communicate at any time depending on what is most convenient to them. They can make use of the activities in a variety of ways such as online or offline, individually, in pairs, teams or groups. Synchronous learning, in class or online, on the other hand, has a complementary role and supports e-learners in the development of learning communities (Hrastinski, 2008). In sum, both are handy delivery tools to assist learning, especially in contexts where face-to-face instruction is limited or not likely.

Study findings into blending learning promoting the use of educational information technologies indicate that it was regarded more effective in enhancing student learning and achievement from secondary school classes such as geography to college coursework compared to conventional teaching methods (Abidoye, 2015; Cheon, Lee, Crooks, & Song, 2012). With the college students especially, “attitude, subjective norm, and behavioral control positively influenced their intention to adopt mobile learning” (Cheon, Lee, Crooks, & Song, 2012, p.1054). Likewise, in another study investigating the effects of here and now mobile learning on student achievement and attitude in a college-level art class, the iPad/iPod treatments had positive attitudes and received higher student ratings though there was no significant effect of the treatments on student achievement (Martin & Ertzberger, 2013).

With respect to the synchronous vs. asynchronous features of blended learning contexts, it has been revealed that students exhibit preference for one tutorial mode over the other depending on a variety factors that relate to students’ study inclinations including “time management,” “ease of access” to learning materials, “positive aspects of interaction” and “negative aspects of interaction” (Beyth-Marom, R., Saporta, K. & Caspi, 2005). In more specific terms, the participating students who had stronger views regarding “positive aspects of interaction” valued synchronous tutorials more while on the other hand the students who scored higher on the need for autonomy and ease of access to learning materials favored asynchronous tutorials (Beyth-Marom, R., Saporta, K. & Caspi, 2005). Consequently, although the two modes complement each other in crucial ways, student choices and preferences may also guide the process.

**Digital Game-Based Vocabulary Learning**

One major challenge for language learners is handling vocabulary (Ghanbaran & Ketabi, 2014; Flores Rojas, 2008; Asgari and Mustapha, 2011). The comprehensiveness, retention and appropriate use of words with a consideration of their lexical and grammatical features requires studying these words in an enriched context where it is possible to observe their various instantiations and have access to a word’s semantic map (Oxford and Crookall, 1990). When learners are presented with activities that allow the analysis of samples of real world texts in their natural context, they may develop the kind of lexico-grammatical awareness essential in acquiring vocabulary (O’Keeffe et al, 2007; Zimmerman, 2009; Hunston, 2010). Nevertheless, in most cases, class time devoted to vocabulary practice is quite restricted. Thus, learners are often in need of a supportive environment tailored around their individual needs and expectations as well as motivating and encouraging them to engage in vocabulary learning activities (Jung & Graf, 2009), which might sound quite dull or unattractive if they merely involved memorizing lists or matching items.

In the context of a game, however, vocabulary can be acquired without pressure, and variety in game formats including text, audio, video, animation or interactivity and features promoting challenge, fantasy, curiosity, control, competition or recognition
(Malone & Lepper, 1987) prove effective in gathering learner attention and helping them stay focused (Gorjian, Moosavinia, Ebrahimi Kavari, Asgari, & Hydarei, 2011). Further, games can offer a platform to practice skills in an efficient way as learning is most fruitful when it is active, situated, problem-based, experiential, requiring higher-order thinking and providing immediate feedback (Boyle, Connolly, & Hainey, 2011).

Digital game based learning, a novel approach in the area of higher education and lifelong learning and advocating active learning through technological devices and the Internet, is a promising option to address some of the problems prevalent in the traditional approaches to vocabulary learning. They help course designers and teachers not only present but also revise topics, integrate language skills and strategies, tailor course content in a flexible way based on a range of criteria from student needs to physical constraints, and most importantly maintain student attention, which is quite a critical aspect of classroom management. As they are closely associated with a range of perceptual, cognitive, behavioral, affective and motivational impacts and outcomes (Connolly, Boyle, MacArthur, Hainey, & Boyle, 2012; Erhel & Jamet, 2013), online games for educational purposes, whether synchronous or asynchronous, can support and facilitate the learning process (Pivec, Dziabenko, & Schinnerl, 2004). More specifically, in a study reviewing the literature on computer games and serious games regarding their potential positive impacts on users with respect to learning, skill enhancement and engagement, it was revealed that playing computer games is associated with a range of learning outcomes and impacts such as knowledge acquisition and engagement (Connolly, Boyle, MacArthur, Hainey, & Boyle, 2012). Multimedia games were also regarded as tools that increase motivation and encourage a deeper processing of vocabulary (Ghanbaran & Ketabi, 2014; Turgut & Irgin, 2009: cited in Ghanbaran & Ketabi, 2014), thus resulting in the reinforcement of learning (Baltra, 1990; Carrier, 1991; deHaan, 2005; Hubbard, 1991; Li & Topolewski, 2002; Bell, 2005: cited in Ghanbaran & Ketabi, 2014), a shift in student attitudes towards language learning (Ja’ashan, 2015; Yip & Kwan, 2006: cited in Ghanbaran & Ketabi, 2014), and a 20% increase in student achievement (Marzano & Brown, 2007: cited in Ghanbaran & Ketabi, 2014).

Despite this positive representation of the educational information technologies in the related literature, there are also limitations to its use especially with low achievers with respect to vocabulary retention and recall (Gorjian, et al., 2011). In their comparison of two groups of language learners, high vs. low achievers, adopting an asynchronous computer-assisted language learning approach, Gorjian et al. demonstrated that low achievers’ ability to recall vocabulary declined significantly over time lapses of more than two weeks. This finding relates to the important issue of memory formation and recall in learning as memory is not a single entity or fixed location, rather a process which cannot be separated from retrieval and requires the involvement and functioning of multiple brain locations and systems (Bayındır, 2003); thus, there are critical strategies that help memories stick to mind and learning to become permanent such as intend, file, and rehearse (Howard, 2000: cited in Bayındır, 2003), which requires strong intrinsic motivation on the part of the learner, who is a low achiever in this case.

These findings, despite reflecting a widespread use of educational technologies and games in teaching in general and in language teaching in more specific terms, point to a gap in the related literature indicating a lack of concern for the specific elements of gamification, such as encouraging intrinsic motivation, that should guide the game development process (Faiella & Ricciardi, 2015). Thus, in this study on a group of English language learners at the School of Foreign Languages of an English-medium state university, we addressed this gap regarding the specific features of games, and the primary goal was to enhance students’ vocabulary learning performance by using synchronous and asynchronous games and activities that will activate and maintain intrinsic motivation in an effort to teach collocations and parts of speech. Synchronous in class or online games were employed to achieve deeper conceptual coverage and peer interaction while asynchronous activities were mainly devoted to personalized,
independent study; recycling and revision to ensure student ownership/agency and mastery-based learning. We predicted that the students would generally have positive views and feelings about the incorporation of digital game-based vocabulary development activities as part of their English language learning program. Accordingly, the research question investigated in the current study was: What are students’ reflections on their vocabulary learning experiences through synchronous and asynchronous games and activities?

METHOD

Context of the Study and Participants
The study was carried out in the School of Foreign Languages at an English-medium state university over a period of eight weeks. In the regular English preparatory program, students are enrolled in different levels based on their initial language scores and they follow the syllabi appropriate for their levels. At the end of each academic year, the proficiency exam is administered and if students cannot attain the required pass score, they are required to study at the English preparatory program again. In their second year, these students are offered a blended learning program providing them with online resources to practice the receptive skills and 8-hour tutorials each week on the productive skills. This format and content builds on the idea that it is essential to provide some flexibility in schedules to address students’ individual needs and to ensure detailed, face-to-face feedback on their performance. This is due to the fact that this group often represents a specific profile consisting of unmotivated and underachieving students who are likely to fail across most levels and eventually drop out. Thus, the learning process needs to be planned with a consideration of how each can develop his route to linguistic and academic success. In response to this need, the current study on vocabulary enhancement was designed and implemented as part of the overall curriculum and instruction activities. 45 second year intermediate-level preparatory school students, 24 male and 21 female with an age-range of 18-20, participated in this study.

Procedure
A group of students participated in this study over a period of eight weeks. They viewed and played a set of interactive and collaborative online games instructing and testing them on collocations and parts of speech. They were provided with the theoretical background as well as some practical examples and hands-on experience. Web tools and content used included Kahoot, Quizlet, Nearpod, Powtoon, and YouTube. Subsequently, students completed further tasks as part of the classroom work, which aimed to help them build meaningful connections with their synchronous and/or asynchronous online experiences. At the end of the eight-week implementation period, they were asked to complete a self-report questionnaire on their digital game-based vocabulary learning experiences.

Materials
In order to provide students with vocabulary training for the purposes of this study, course-specific games and activities that included both introductory theoretical content and practical examples and exercises were developed and used. The games were of two types: (1) presenting the concepts (with bonus points); (2) training and testing them through exercises (with actual points). They were played in team or single-player modes in synchronous ways in class as well as asynchronously outside the class, and contained elements of music, video, images or quotes evolving around popular themes. They were designed around the most fitting elements of Malone and Lepper’s (1987) framework of intrinsic motivation for the purposes of the current study: challenge (involving a proper amount of difficulty with multiple goals, immediate feedback and some amount of randomness), competition (returning information on their relative performance in comparison to that of other players), curiosity (stimulating multiple senses for prolonged engagement), recognition (praising accomplishments), and control (providing choices and showing their consequences); as well as the additional elements of cooperation (allowing team-building and information exchange), pleasure and relaxation. Web tools and
content used included Kahoot, Quizlet, Nearpod, Powtoon, and YouTube, and the games developed were revised and edited by a certified online training expert, one of the research team members, prior to use. The games and activities focused on the following spread over eight weeks:

**Week 1: Introduction to Collocations**
(see https://create.kahoot.it/#quiz/3f3cdd90-dd25-45e6-9d88-e0335a9802dd for a sample introductory Kahoot game)

[Figure 2. Sample Kahoot game screen introducing the topic of collocations]

**Weeks 2-4: Further Exercises on Collocations**
(see https://create.kahoot.it/#jumble/7b945f20-b573-4d6a-8b67-1e963fb5e55e for a sample practice Kahoot game on Turkish movies)

[Figure 3. Sample Kahoot game screen for collocation practice]
Week 5: Introduction to Parts of Speech
(see https://share.nearpod.com/vsph/wnr5qZaAkB for a sample introductory Nearpod game)

Figure 4. Sample Nearpod parts of speech game screen where a Powtoon video from YouTube is embedded

Week 6: Further Exercises on Parts of Speech
Week 7: Revision of Parts of Speech
(see https://create.kahoot.it/#jumble/04e616fd-aafb-4d2d-9e84-35bd61da1245 for a sample revision Kahoot game)

Figure 5. Sample Kahoot game for revising parts of speech

Week 8: Introduction to Common Prefixes
(see https://quizlet.com/6347155/20-most-common-prefixes-flash-cards/ for a sample introductory Quizlet game on prefixes)

Subsequently, the students completed further tasks as part of the classroom work, which aimed to help them build meaningful connections with their synchronous and/or asynchronous experiences.
Data Collection Procedure and Analysis

Prior to the study, all the ethical procedures of the study were completed and the study was approved by the Ethics Committee of Ankara Yildirim Beyazit University. The participants contributed to the study with their informed-consent. Data regarding students' views on their digital game-based vocabulary learning experiences were collected through a self-report questionnaire. The questionnaire was developed by the researchers following the framework of intrinsic motivation by Malone and Lepper (1987) and the additional elements considered while designing the games used in this study. Prior to use, the items were revised and edited by an expert in the field of computer education and instructional technology and an expert in the field of educational psychology, and piloted with a group of 15 students who did not participate in the original study but were familiar with educational games. The motivational elements considered while developing the items were challenge, competition, curiosity, recognition, and control as well as the additional elements of cooperation, interest, pleasure, fun and relaxation. It contained 11 items like, “I like the feeling of curiosity created in games.” There were also general evaluative items such as “I believe games are a waste of time,” or “I find vocabulary learning through games beneficial and meaningful” (see Table 2 below for the questionnaire items). Each item/statement required a Yes or No reply and an open-ended explanation section from the participant. The questionnaire was administered at the end of the eight-week implementation period and the students were asked to complete it in 15 minutes during their classes.

To answer the research question on students’ reflections on their vocabulary learning experiences through synchronous and asynchronous games and activities, the quantitative data gathered through the Yes/No replies to the self-report questionnaire statements were subjected to frequency analysis while the qualitative data gathered through the open-ended explanation section were compiled and subjected to content analysis. The content analysis on the qualitative data (Creswell, 2012) was carried out as follows: (1) organize the data, (2) explore and code the data, (3) construct descriptions and themes, (4) identify the qualitative findings, (5) interpret the findings, and (6) validate the accuracy of the findings. During the data analysis, the answers were read individually and grouped based on the points students considered. At the same time, the researchers analyzed and generated questions in order to determine common themes. All four researchers compared and discussed the content analysis to categorize the data based on the similarities and differences in views and finalize the themes. The explanations were aligned with these findings. The findings were presented without comment to demonstrate the actual data, and then the results were interpreted.

Since the analysis consisted (1) frequency analysis which involved counting the number of yes and no items, (2) content analysis of explanations which involved the compilation and categorization of recurring themes; inter-rater reliability was ensured by blind review of the data by each researcher independently, and the constructed themes were finalized via a group discussion at the end.

RESULTS

The frequency analysis of the students’ Yes/No replies in response to the self-report questionnaire items/statements reflecting their views and feelings on their game-based synchronous and asynchronous vocabulary learning experiences and the results of the content analysis of their respective explanations are reported in Table 2 below. Of the 45 students who participated in the study, most had positive ideas and feelings about the
games though some also reported their limitations, which need to be taken into consideration for later applications.

Table 2. Frequencies of students’ Yes/No replies and sample reasons derived through content analysis

<table>
<thead>
<tr>
<th>Items</th>
<th>'Yes' Frequency</th>
<th>Sample Reasons (Yes BECAUSE)</th>
<th>'No' Frequency</th>
<th>Sample Reasons (No BECAUSE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like learning vocabulary through games.</td>
<td>43</td>
<td>Fun, competitive, motivating, beneficial practice for exams; easier recall</td>
<td>2</td>
<td>Dislike; forget easily</td>
</tr>
<tr>
<td>I find vocabulary learning through games beneficial and meaningful.</td>
<td>43</td>
<td>Free associations, effort, active visual memory; making you stay focused</td>
<td>2</td>
<td>No permanent learning</td>
</tr>
<tr>
<td>I like it when games contain songs (e.g. Fluency MC rap songs).</td>
<td>34</td>
<td>Rhythm helps concentration and recall; like tongue-twisters</td>
<td>11</td>
<td>Find it unnecessary or childish; cannot follow the lyrics;</td>
</tr>
<tr>
<td>I like it when games contain interesting, cultural themes (e.g. Turkish movies).</td>
<td>40</td>
<td>Adds color; nostalgic feelings and cultural elements help to relate to</td>
<td>5</td>
<td>Not remember the story or script</td>
</tr>
<tr>
<td>I like playing games in class.</td>
<td>43</td>
<td>Interaction; a sense of community; exchange of ideas for success</td>
<td>2</td>
<td>No place for games in class</td>
</tr>
<tr>
<td>I like playing games on my own outside the school.</td>
<td>36</td>
<td>Still a fun activity in free time or when bored</td>
<td>9</td>
<td>Boring; no competition</td>
</tr>
<tr>
<td>I like the competition in games.</td>
<td>40</td>
<td>Ambition and competition; think fast</td>
<td>5</td>
<td>Dislike losing or dislike competition</td>
</tr>
<tr>
<td>I like the feeling of curiosity created in games.</td>
<td>41</td>
<td>Unpredictability and excitement; questions</td>
<td>4</td>
<td>No curiosity</td>
</tr>
<tr>
<td>I like the team spirit created in games.</td>
<td>40</td>
<td>Close interaction; get help or even blame others in cases of failure; no embarrassment</td>
<td>5</td>
<td>Dislike team work; not everybody in a team is successful</td>
</tr>
<tr>
<td>I believe games teach me new skills.</td>
<td>36</td>
<td>Learn and use new vocabulary; think in new ways; build confidence; practice speaking</td>
<td>9</td>
<td>You cannot learn new skills or remember the new words</td>
</tr>
<tr>
<td>I believe games are a waste of time.</td>
<td>4</td>
<td>Dislike games in general; wanting to play them less frequently</td>
<td>41</td>
<td>Better than other course content; no obligation</td>
</tr>
</tbody>
</table>


In more specific terms, based on the frequency analysis, it was revealed that out of 45 students, 40 or more students liked learning vocabulary through games, playing them in class synchronously in particular; found it beneficial and meaningful; liked interesting, cultural themes; liked the competition, curiosity and team spirit created in games; and believed that games were not a waste of time. Similarly, 34 to 36 students liked games when they contained songs, liked to play them on their own asynchronously outside the school, and believed that games taught them new skills.

The content analysis of the students’ explanations for their Yes/No replies in response to the self-report questionnaire items reflecting their views and feelings on their game-based synchronous and asynchronous vocabulary learning experiences revealed themes similar to the motivational elements addressed while developing the questionnaire items. The motivational elements considered were based on the framework of intrinsic motivation by Malone and Lepper (1987) and included challenge, competition, curiosity, recognition, and control as well as the additional elements of cooperation, interest, pleasure, fun and relaxation.

In response to the first questionnaire item, “I like learning vocabulary through games,” 43 students said yes owing to the elements of fun, competition, motivation, interest, advantages for exam preparation and writing practice as well as easier and better (visual) learning and recall, while only two students replied no due to reasons such as not liking games or still forgetting easily. Similarly, in response to item 2, “I find vocabulary learning through games beneficial and meaningful,” 43 students replied yes based on the view that games including interesting-fun elements and requiring competition and effort help with free call and associations, and active visual memory formation, all of which contribute to better and easier recall, further speaking practice, and staying alert and focused, while only two students who replied no said games do not result in permanent learning.

With respect to the third, fourth, seventh, eighth, and ninth items in the questionnaire which investigated students’ reactions to specific game elements such as, containing songs/music, interesting-cultural themes (e.g. Turkish movies), competition, curiosity, and team spirit, respectively, 40-41 students replied positively, with the exception of item 3 with 34 students. They stated the rhythm and the songs like tongue-twisters made learning fun, and concentration, memorization and recall easier as well as helping to stay focused. They found familiar themes which grab their attention and add color with nostalgic elements motivating and interesting. In this way, by activating a common background and special moments that have links to the subconscious, they thought games made it easier for them to personalize and relate to, and helped with learning and recall. They also believed that as everyone wanted to win, this desire to win resulted in competition and ambition in the games, which made them to think and learn fast to achieve success. Team work, they thought, was also an advantageous aspect of these games as there was active and close interaction among team members and competition between the teams; and there was always someone to share ideas with, to get help from or even to blame in cases of failure. They never felt embarrassed as it was not a personal failure, if they failed; on the contrary, some felt special, even like a leader. Finally, they liked and learned a lot from the elements of unpredictability and excitement by questioning various things as to what would come next, what would be the topic, and who would win.

On the other hand, although only around one ninth of the participants responded negatively to these items (except for item 3 in which it was two fifth), their reasons were noteworthy for the future applications of this research. Some students said they did not like songs or movies, or they found such games unnecessary or childish, while some could not follow the lyrics or the storyline due to their limited vocabulary and/or background. Again, some students stated that they did not like team work or competition as they did not like losing or they could not tolerate unsuccessful members on a team. Finally, four students did not find anything curious in the games played.
In response to the fifth and sixth items in the questionnaire which investigated students’ reactions to specific game elements as to playing them in class synchronously versus playing them asynchronously outside the school, they showed a preference toward playing it in class, 43 vs 36 students respectively. They liked the interaction and sense of community created in class as well as the competition and exchange of ideas. They thought funny moments led to better recall and recycling. Only two students thought there was no place for games in class; and nine students considered playing games asynchronously boring or as waste of time.

In response to the last two general evaluative items in the questionnaire, item 10, “I believe games teach me new skills,” and item 11, “I believe games are a waste of time,” the majority of the students stated that they learned new vocabulary and used them appropriately with the help of games. They added that learning was fun and they were made to think fast in new ways, by which they could build confidence and practice speaking further. They also thought games were better than other course content because of the lack of obligations and rules. The minority, who showed negative reactions, believed they did not learn new words or did not like games in general because they did not remember anything; therefore, they wanted to play them less frequently.

As the summary table above (Table 2) and the detailed content analysis results indicate, the students reported positive views about digital game-based vocabulary learning. With respect to the overall theme of this study as to the distinction between synchronous and asynchronous learning, it was revealed through the frequency analysis of item 5 referring to synchronous learning (43 students voted yes) and item 6 referring to asynchronous learning (36 students voted yes) that playing the games in-class allowed better interaction, competition and exchange of ideas which resulted in the creation of a sense of community as well as more effective memory formation and recall, and that playing games asynchronously outside the class on their own was still considered a fun activity in their free time when they were bored.

**DISCUSSION AND CONCLUSION**

In this study on a group of intermediate-level English language learners at the School of Foreign Languages of an English-medium state university, we aimed to improve students’ vocabulary learning performance by using synchronous and asynchronous games and activities that will activate and maintain intrinsic motivation in an effort to train them on collocations and parts of speech. Synchronous in class or online games were employed to achieve deeper conceptual coverage and peer interaction while asynchronous activities were mainly devoted to personalized, independent study; recycling and revision to ensure student ownership/agency and mastery-based learning. Upon the completion of this vocabulary training program spread over eight weeks, we collected data on the participating students’ views and feelings about the incorporation of digital game-based vocabulary development activities as part of their English language learning program. Accordingly, we investigated their reflections on their vocabulary learning experiences through synchronous and asynchronous games and activities using an 11-item self-report questionnaire that required a Yes/No response from the students accompanied by an open-ended section in which they were asked to provide a reason for their choice. However, due to the limited duration of this intervention and considering the amount of rehearsal and frequency of encounters required for any piece of information to be transferred from short-term to long-term memory (Bayındır, 2003; Gorjian, et al., 2011) especially with low achievers as in our case, only around 10% of an increase was observed in students’ average vocabulary performance on the vocabulary tests administered two times over the eight week period, and thus, such data was not considered in this study.

The results of the self-report questionnaire showed that they had positive views about the games in most respects though they also stated some of their limitations that need to
be considered as ideas for improvement. With respect to game formats and features, they seemed to enjoy and benefit significantly from the elements such as music/songs (audio, video, or animation), cultural themes, interaction and competition, curiosity, cooperation, recognition and control, all of which were shown to be effective in gathering learner attention and helping them stay focused in the previous research as well (Malone & Lepper, 1987; Gorjian, et al., 2011). Further, they regarded games as a beneficial and useful platform to efficiently practice skills such as speaking, writing, word learning, and strategies including exam-preparation, visual memory formation, word memorization, background activation, and provocative thinking (in new ways) since learning is most fruitful when it is active, situated, problem-based, experiential, requiring higher-order thinking and providing immediate feedback (Boyle, Connolly, & Hainey, 2011). Students, in our context, got the opportunity to practice all such higher-order skills in a relaxed atmosphere with their peers under the supervision of their instructor with the immediate feedback available on digital game platforms.

Finally, as to the game delivery options which varied between synchronously in class and asynchronously outside the class, students preferred learning vocabulary in class with their classmates due to reasons such as the interaction and sense of community created in class as well as the competition and exchange of ideas. They thought funny moments led to better recall and recycling. This finding is again aligned with the results of previous studies as to the significance of synchronous games in deeper conceptual coverage and peer interaction (Beyth-Marom, R., Saporta, K. & Caspi, 2005; Hrastinski, 2008), though student preferences and choice reflecting their study inclinations still play an important role guiding the entire process.

Some students, however, disliked playing digital games for vocabulary learning and practice for several reasons. One reason was that they easily forgot the new words practiced or there was no permanent learning. These students were advised to replay the games occasionally with/without minor changes on the content, and the same was suggested as further recycling or revision options during in-class sessions by the instructors. Another reason why some students did not want to play these games was they found them unnecessary or childish or did not find anything curious in them or did not like the content. In such cases, the students were advised to prepare their own digital vocabulary games under the guidance of their instructors and the instructors were advised to revise their game content based on more frequent student feedback. In some cases, when games include explicit, rather than implicit, teaching, students become more motivated believing that they will contribute more to their exam-preparation. This might be useful in cases especially when students might believe games make subjects to be learned trivial or do not take them seriously (Apostol et.al, 2013: cited in Faiella & Ricciardi, 2015)

Still another reason why some students were not interested in playing digital word games was that they thought there was no place for games in class and playing games asynchronously was boring or waste of time. In such cases, the instructors were advised to illustrate the real-life uses of games and offer bonus points (in their portfolio or classwork) for extra practice. Although most are not aware, in various contexts, not only with family and friends but also in the workplace, people play games of many sorts. Parents design digital games to be played among the family and relatives on special occasions like birthdays or anniversaries, or even before that many family gatherings used to be occasions for playing a variety of games from the very traditional board or card games to the more recent strategy games or quiz shows. Or alternatively, in workplaces, people are trained on team-building or problem-solving through games, either digital or conventional. Thus, it is worthwhile to draw student attention to these aspects of real-life games and how classroom needs to reflect the real-life. When it comes to playing games asynchronously on their own, some students, extrinsically motivated ones in particular, could be encouraged when they were offered some bonus points that would count toward their overall course work and scoring although this strategy would not be very appealing for the students who are rather intrinsically motivated (Faiella & Ricciardi, 2015).
One last reason was that some did not like games in general and wanted to play them less frequently or they did not like failure. In that case, the instructors were advised to limit their game use in class and spare some of them for asynchronous use. They were also advised to introduce variety not only in terms of content or format but also with respect to the game platforms they employ. Introducing variety or novelty is important in avoiding habituation, a decrease in response to some input due to its repeated presentation. Even if they enjoy and benefit from it, students might become accustomed to and pay less attention to games; as the interest fades so does the engagement (Koivisto & Hamari, 2014). Besides, with respect to the failure concern, the students were encouraged to reframe failure as an essential aspect of learning; that is, mistakes would provide them with new opportunities to try different options and gradually gain recognition for their accomplishments (Faiella & Ricciardi, 2015).

As proposed in the related gamification literature, in this study, we addressed a gap in research, and isolated and examined intrinsic motivation-related game features and their effectiveness from the perspective of the participating students in a small-scale, localized intervention in a School of Foreign Languages. We developed and used course-specific synchronous and asynchronous digital games and activities for both introductory theoretical content and practical examples and exercises, and student learning was reported to have improved due to various game aspects such as challenge, competition, curiosity, recognition, control, cooperation, pleasure, fun and relaxation.

As it has been shown in the current study, if wise, intentional, and suitable decisions are made as to game features, a learning environment that achieves active engagement and motivation can be attained and students can be provided with positive cognitive, emotional, and social outcomes as highlighted by Faiella and Ricciardi (2015). Thus, game designers need to achieve “a gamified environment with clear goals, challenging tasks, and authentic stories in which team spirit is fostered through game mechanics, discussions, and debates” with a consideration of student needs as to enjoyment and novelty (Faiella & Ricciardi, 2015). Gamification of learning serves such purposes only when games are intrinsically motivating as students go through a variety of decision making steps; fun as students can see the effect of their efforts; authentic as students are made to experiment with real-life skills without a fear of failure; allow self-reliance since students get immediate feedback to improve their responses; experiential since students exchange ideas and build connections (Perrotra et al., 2013: cited in Faiella & Ricciardi, 2015). Building on the current study, future research can investigate the effects of gamification on student performance and scores or the conditions which allow better student performance as well as ways to improve game content.

Finally, this study was conducted at a single institution in one country but its findings are relevant to a wider audience receiving a variety of language courses and training to become proficient language users. In addition, the results of the current study could guide all the parties involved in the decision-making processes of any teaching-learning setting including students, instructors, curriculum developers and course designers as well as the professionals and administrators in such institutions.

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ABSTRACT

This paper presents a study on known approaches for quality assurance of educational test and test items. On its basis a comprehensive approach to the quality assurance of online educational testing is proposed to address the needs of all stakeholders (authors of online tests, teachers, students, experts, quality managers, etc.). According to the proposed approach is developed an original software application Test Quality Evaluation (TQE) for the automation of the stakeholders’ activities for quality assurance of educational tests throughout the whole lifecycle. The application retrieves and provides analysis of data from online tests conducted and specially designed surveys for quality evaluation of educational tests by students and experts. It allows tracking and evaluating the quality of educational tests in real time and provides the related quantitative data in different levels of generalization – in the level of a separate educational test, of educational tests of an entire course, or educational tests of a subject area. The software application has been put under real-time testing for quality evaluation of educational tests, included in e-learning courses from different subject areas that prove its applicability.

Keywords: Assessment quality, educational testing, automated quality assurance, online tests and test items quality.

INTRODUCTION

According to ISO 9000:2015 quality assurance is focused on providing confidence that quality requirements to an object (product, service, process, person, organization, system, resource, etc.) will be fulfilled. To adapt the notion of quality assurance for higher education, the challenge is to determine how to identify whether the level of desired quality is maintained for every ‘educational object’ (Machado-da-Silva et al., 2015; Mutiara, Zuhairi & Kurniati 2007). Dill (2010), for example, puts the accent of quality assurance in higher education on the student assessment:

"The term quality assurance in higher education is increasingly used to denote the practices whereby academic standards, i.e., the level of academic achievement attained by higher education graduates, are
maintained and improved. This definition of academic quality as equivalent to academic standards is consistent with the emerging focus in higher education policies on student learning outcomes — the specific levels of knowledge, skills, and abilities that students achieve as a consequence of their engagement in a particular education program.”

Similarly, according to the European Standards and Guidelines for Quality Assurance in the European Higher Education Area (EUSHARE, 2015), the assessment of students’ knowledge and progression is also a key component of the systems for internal quality assurance in higher education:

"Considering the importance of assessment for the students’ progress and their future careers, quality assurance processes for assessment take into account the following:

- Assessors are familiar with existing testing and examination methods and receive support in developing their own skills in this field;
- The criteria for and method of assessment as well as criteria for marking are published in advance;
- The assessment allows students to demonstrate the extent to which the intended learning outcomes have been achieved. Students are given feedback, which, if necessary, is linked to advice on the learning process;
- Where possible, assessment is carried out by more than one examiner;
- The regulations for assessment take into account mitigating circumstances;
- Assessment is consistent, fairly applied to all students and carried out in accordance with the stated procedures;
- A formal procedure for student appeals is in place”.

Regardless of whether talking about traditional learning, blended learning or e-learning, the main modern mean for objective knowledge assessment is through conducting online tests, typically using a Learning Management System (LMS). Precisely because the assessment through online tests has become an integral part of modern educational testing activities in all forms of training, their quality assurance is of a prime importance for achieving a high level of educational services, offered by higher education institutions. For this reason we regard the quality of educational testing as quality of e-testing in this paper.

The concept of quality is related to educational testing in two contexts. On the one hand, to have a reliable academic assessment it is significant to ensure the quality of the online tests themselves. The quality assurance of online tests and test items affects all stages of their lifecycle – from the design and development to test conducting and scoring. In this sense, it concerns a relevant group of stakeholders in the education system – test authors, teachers/assessors, methodologists and experts in the test subject area, students (the testees). On the other hand, the quality of online tests is an important component of internal university systems for management and assurance of the educational quality as a whole, i.e. it is of essential interest to another group of stakeholders – quality managers and policymakers in higher education institutions.

This paper aims to propose a comprehensive approach to the quality assurance of online educational testing addressing the needs of all stakeholders (authors of online tests, teachers, students, experts, quality managers, etc.). In the following sections the literature review is presented. A comprehensive approach to the quality assurance of
online educational testing is proposed with its characteristics, stages, models for quality assurance and stakeholders. Next a software application TQE is introduced (developed on the basis of the proposed approach). TQE allows automation of the stakeholders’ activities for quality assurance of online tests throughout the whole lifecycle, tracking and evaluating the quality of online tests in real time and provides related quantitative data in different levels of generalization – quality measures in the level of a separate online test, of online tests of an entire course, or of online tests of an academic specialty, etc. TQE is experimented for quality evaluation of a test, included in e-learning courses from 3 different subject areas (physics; informatics; a foreign language).

LITERATURE REVIEW

The development of quality educational tests is a complex task, subject to a lengthy and labor-intensive iterative process (Totkov, Raikova & Kostadinova, 2014). Different authority organizations have published materials, guidelines and standards related to quality assessment to help the improvement of the quality of assessment of learning achievements. As, for example the “Standards for Educational and Psychological Testing” (APA, 2014), published collaboratively by the American Educational Research Association (http://www.aera.net/), the American Psychological Association (http://www.apa.org) and the National Council on Measurement in Education (http://www.ncme.org) since 1966, that represents the gold standard in guidance on testing in the United States and in many other countries.

One other direction in the efforts to improve assessment quality is based on the development of quantitative methods for the evaluation of test quality. The idea for quality evaluation of test items on the basis of the test response analysis originates around the middle of the last century in Item Response Theory (Hambleton, Swaminathan & Rogers, 1991), Classical Test Theory and the so called Rasch Model. The assessment is performed by the authors of the test items and/or by experts in the subject area after testing. The analysis provides empirical data on how individual test items are performed in real test situations. The data obtained is subject to special procedures and the analysis is done in relation to the following test characteristics (Pyrczak, 1973; Mark, 1985; Hambleton, Swaminathan & Rogers, 1991): difficulty, discrimination index, analysis of distractors (for questions with optional answers). The calculated values indicate which test items need to be modified or removed to improve the test quality (Rasch, 2017).

Reliability, validity and fairness are three fundamental properties of a test by which the technical quality of tests is evaluated (Hamilton, Stecher & Klein, 2002). The reliability of a test refers to the degree to which a test scores are free from various types of chance effects (Hamilton, Stecher & Klein, 2002). According to (Saad et al., 1999) there are four ways of estimating reliability: test-retest, alternate or parallel forms, inter-rater and internal consistency. After the reliability is estimated, the information can be reported via a reliable statistic – the reliability coefficient and standard error of measurement. The validity of a test refers to the extent to which the scores on a test provide accurate information for the decisions that will be based on those scores (Cronbach, 1971; Messick, 1989). A test’s validity is established in reference to a specific purpose and the test may not be valid for different purposes. There are several ways to estimate the validity of a test including content validity, concurrent validity, predictive validity and face validity (Professional Testing, 2017). The fairness of a test refers to its freedom from any kind of bias. The test should be appropriate for all students irrespective of race, religion, gender, or age. The test should not disadvantage any student, or group of students, on any basis other than the student’s lack of the knowledge and skills the test is intended to measure. According to (Professional Testing, 2017) “Item writers should address the goal of fairness as they undertake the task of writing items. Test items should be reviewed for potential fairness problems during the item review phase and any items
that are identified as displaying potential bias or lack of fairness should then be revised or dropped from further consideration”.

The evaluation of tests includes also assessment of other important tests properties as test materials, norms, computer generated reports, including a global final evaluation, etc. While in some cases the test quality characteristics could be measured by performing analysis of test results, the measurement of the other is possible only by a subjective evaluation of test by experts, teachers or students on the basis of specially developed quality models. A large number of experiments are conducted by different stakeholders for educational test quality evaluation on the basis of different quality models, for example:

- Quality evaluation of test items for language learning (CDC, 2017);
- Self-evaluation of the quality of test items by teachers (CFATIQC, 2017; CITL, 2017);
- Quality evaluation of multiple choice questions as structure and taxonomy (Amouei, 2014);
- EFPA Review Model for the Description and Evaluation of Psychological and Educational Tests (EFPA, 2013);
- Quality evaluation of multiple choice test items, created with automated processes (Gierl & Hollis, 2013);
- Quality evaluation of online tests by students (Legault, 2017; CITL, 2017).

In spite of the big interest in various aspects of student assessment, the quality assurance issues have not been fully addressed. For example, very slight attention is paid to the needs of educational quality managers and policymakers from having accurate and accessible information to inform the right decisions regarding quality. The above listed experiments where the test quality assurance approaches are devoted to a specific type of tests, subject area, or stakeholder, also show that additional research is needed. The approach and software tool, proposed in this paper, try to overcome these disadvantages by examining the issues in their complexity and integrity and providing quantitative measures of the online test quality in an automated manner.

METHODS

The methods used in the study include:

- proposing a comprehensive approach for automated quality assurance of educational tests (conducted online) by all stakeholders;
- developing models for educational test quality evaluation;
- developing an original web-based software application for automated quality evaluation of educational tests;
- verification of the proposed models and software application with real data.

Comprehensive Approach for Automated Quality Assurance of Online Testing

The approach for the quality assurance of online educational testing, proposed here, possesses the following characteristics that prove its comprehensiveness:

- The approach provides a possibility to obtain all the possible data of the evaluation of test items and tests as a whole, typical for the primary approaches for quality assurance of educational tests on the basis of:
  - A statistical analysis of the test responses after the test probation among a representative group of students or after conducting it in real test situations;
  - Specially developed test quality models for evaluation by experts or students.
It enables the process of assuring e-testing quality to be informed by input from representatives of all relevant stakeholders (test authors, teachers/assessors, methodologists and experts in the test subject area, students);

- The approach allows evaluation of the test quality during the complete lifecycle of a test (its design stage or usage stage, or even afterwards);
- It addresses the needs of quality-related information of all stakeholders (incl. educational quality managers and policymakers);
- It supports quality assurance activities in different levels of generalization in the level of separate online test items, of an online test as a whole, of online tests of an entire course, or of online tests of an academic specialty, etc.

Our model of the comprehensive approach (see Figure 1) demonstrates the basic components of an integrated system for educational test quality evaluation, namely:

- two perspectives on the problem (contexts) – of the quality of online tests themselves and of the educational quality as a whole;
- instruments for educational test quality evaluation (test quality models) – two quality models for test evaluation by questionnaires from experts and students/testees (see Table 1), two quality models for evaluation of the basis of testees’ responses of separate test items and educational tests as a whole (see Table 2 and Table 3), quality model for evaluation of the quality assurance process itself of educational tests an entire course, an academic specialty, a professional field, or an area of higher education (see Table 4);
- different stages of the test quality assurance (the testing lifecycle) – test design and development, test approbation, test conducting and scoring after test usage;
- the categories of significant players (the testing stakeholders) – test authors, teachers/assessors, experts (in didactics, in the test subject area), students, quality managers and policymakers;
- mutual relations that reflect the usage of quality models in the testing lifecycle by the stakeholders depending on their role in the process as evaluators or users of the quality measures obtained.

![Figure 1. Stages, models for quality assurance, stakeholders](image)

The approach will be easily applied if educational e-testing is organised using an LMS. This is not a limiting condition because the modern LMS provides tools for creating test items, creating online tests from a bank with pre-established test items, conducting online tests. Some systems, including Blackboard (Blackboard Help, 2017) and Moodle (Moodle Documentation, 2017), provide tools for automated analyses of test items. The
LMS also provides tools that allow teachers to organize and conduct surveys within the e-learning courses, the results of which can be used for analysis.

The possibilities for creating and conducting online tests and evaluating the quality of tests by experts, teachers and students allow automated quality evaluation of online tests on the proposed approach. The evaluation of the overall quality of online tests and test items included in them will be carried out on the basis of the proposed models. The next three subsections present the test quality models.

**Quality models for test evaluation by questionnaires from experts and students (testees)**

The two quality models presented here allow evaluation of the overall quality of online tests by experts and students through filling out questionnaires for the educational test quality evaluation at different stages of an online test lifecycle:

- the design stage of online tests where the evaluation is done by experts and a representative set of students;
- the stages of test approbation and test conducting and scoring where the evaluation is performed by students.

The models evaluate developed test items, tests, test conducting, test evaluative results, and the test interface design. The results obtained are relevant to the stakeholders and allow:

- the authors of an online test to improve the quality of the test items and of the overall quality of the online test at the design stage after testing it with a representative set of students.
- the authors of online tests to make changes in the test items in order to improve their quality after the test has been taken by a representative set of students and after the test has been conducted in real situations;
- quality managers and policymakers to ensure the overall quality of training.

The questionnaires for online test evaluations by experts and students are developed on the basis of a proposed hierarchical model for quality evaluation (based on Legault, 2017; Totkov, Raikova & Kostadinova, 2014; CITL, 2017; Amouei et al., 2014). The model includes 52 indicators broken down into 5 criteria as follows:

- test items - 21 indicators (A1 to A21), of which 21 are evaluated by experts and 10 by students;
- test - 8 indicators (B1 to B8), of which 6 are evaluated by experts and 7 by students;
- test conducting - 7 indicators (from B1 to B7), of which 6 are evaluated by experts and 5 by students;
- test evaluative results - 12 indicators (from D1 to D12), of which 8 are evaluated by experts and 8 by students;
- test interface design - 4 indicators (from D1 to D4), of which all 4 are evaluated by experts and 2 of them by students.

The evaluation of each composite indicator is obtained as the sum of the indicators’ evaluations (evaluated with a five-point scale). Table 1 presents the questions included in the questionnaires for experts and students. These questionnaires are used in a survey for quality evaluation of online tests.
### Table 1. Model for educational test quality evaluation by experts and students

<table>
<thead>
<tr>
<th>Criteria Indicator</th>
<th>Questionnaire for Experts</th>
<th>Questionnaire for Students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. TEST ITEMS QUALITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1. Test items are formulated clearly and accurately</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A2. Test items don’t allow ambiguous interpretations</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A3. Test items don’t contain formulations that help students to find the right answer.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A4. Test items check specific knowledge, ability or skill</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A5. The creation and selection of test items follows the informative principle over the full range of variation of the test for cognitive complexity levels of students and not only of individual cognitive knowledge</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A6. A simple but grammatically correct positive form of the test items is used in the form of a sentence of 5-15 words.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A7. Test items don’t use words with undefined content such as &quot;sometimes&quot;, &quot;often&quot;, &quot;always&quot;, &quot;all&quot;, &quot;never&quot;, &quot;big&quot; and &quot;less&quot;,&quot;more&quot;, double negations, excluding &quot;or&quot;, quantum negation, and so on (unless the test item intends to understand the listed language constructions).</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A8. The answer of a test item doesn’t follow from the answer of another test item</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A9. Test items are determinated and don’t require further clarification</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A10. Test items don’t require knowledge beyond the curriculum, program, or educational standard</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A11. Test items have a specification in the relevant test bank</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A12. Test items don’t require students to do detailed analysis, calculations, or answers</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A13. Test items are sufficiently meaningful and comprehensive to achieve the set goals</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A14. Test items are accompanied by specially designed instructions for their use</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A15. Test items are clearly formulated and contain detailed instructions</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A16. Test items require original thinking</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A17. Test items don’t contain contradictory or inaccurate instructions, introductions or explanations</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A18. Test items don’t contain complex instructions, introductions or explanations</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A19. Test items are designed in full compliance with the requirements of the testology</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>A20. The text of test items doesn’t have excessive verbal and unnecessary information</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td><strong>B. TEST QUALITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1. Test items are ordered in ascending order of difficulty</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>B2. The complexity of the test is not &quot;enhanced&quot; by the introduction of multiple additional phrases in the test items’ condition</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>B3. Test items included in the test reflect well the content and purpose of the course</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>B4. The test contains competent, grammatical and interesting questions and situations causing students to answer and not to choose answers</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>B5. A sufficient number of test items are provided to determine whether a student has learned the material</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>B6. Test items included in the test provoke students’ thinking</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>B7. Tests are designed with a sufficient degree of interactivity to engage students and provide an objective assessment of their knowledge and skills</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>B8. The test doesn’t contain banal test items.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>B9. Tests are developed with an appropriate methodology</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
### Criteria Indicator

#### C. TEST CONDUCTING
- C1. There are formulated clear criteria to evaluate the test
- C2. The process of computing testing provides a user-friendly and interactive multimedia interface
- C3. The process of computer testing provides students with the opportunity to return to unresolved tasks
- C4. The testing environment provides the ability to update the content of test items
- C5. The student has information about upcoming testing (test structure, time to solve, etc.)
- C6. Tests are planned to be conducted at appropriate intervals
- C7. There is enough time to solve the test

#### D. TEST EVALUATIVE RESULTS
- D1. The final grade is well-founded, categorical and impartial
- D2. Timely feedback is provided for (self-)assessment, allowing students to track their learning progress
- D3. Each test is scheduled to end with a grade
- D4. Each test will be completed by result analysing, determining the level of training and the quality of the testing conducted
- D5. The assessment criteria have been published in advance
- D6. The assessment methodology has been published in advance
- D7. The assessment allows students to show the extent to which the learning outcomes are achieved
- D8. There is an official student complaint procedure
- D9. The feedback is timely and allows students to track their learning progress
- D10. The feedback includes explanations of mistakes and personal comments
- D11. The feedback gives new knowledge
- D12. The evaluation is carried out in accordance with the established procedures

#### E. TEST INTERFACE DESIGN
- E1. The interface allows students to track their learning progress
- E2. All parts of the test items are located on the same page
- E3. The presentation of the different types of test items is consistent
- E4. The placing of too many test items on one page is avoided

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**Quality models for evaluation on the basis of testees’ responses of separate test items and tests as a whole**

In the proposed overall approach to quality assurance of online tests, the quality of test items is evaluated on the basis of an analysis of the responses to tests carried out at different stages of their life – at the test approbation stage after carrying out the test with a representative set of students and at the test conducting and scoring stage after the test is conducted in real test situations. The quality of each test item and of the test as a whole is evaluated on the basis of the calculated statistic data (Moodle Documentation, 2017; Thompson & Levitov, 1985; Pyrczak, 1973; Mark, 1985; Hambleton, Swaminathan & Rogers, 1991; Hamilton, Stecher & Klein, 2002; Cronbach, 1971; Messick, 1989; Professional Testing, 2017). The quality of each test item is evaluated on the basis of the calculated facility index, standard deviation and discrimination and the values obtained (see Table 2). The values obtained at the design stage after testing among a representative set of students allow the authors of the online test to determine which test items should be processed or excluded from the online test prior to conducting the test in real situations. The values obtained after the real conducting of online tests allow their authors to make changes to the test items in order...
to improve test quality and to increase their reliability after the real testing. The evaluation results are also important for the quality managers and policymakers. They allow them to take measures to improve the quality of tests that contain test items with unsatisfactory quality and thus to provide higher quality of testing and training.

Table 2. Quality evaluation of test items on the basis of testees’ responses

<table>
<thead>
<tr>
<th>Index</th>
<th>Definition</th>
<th>Values</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility index – FI</td>
<td>The percentage of students that answered to the test item correctly</td>
<td>&lt;5%</td>
<td>Extremely difficult test item</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6% - 10%</td>
<td>Very difficult test item</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11% - 20%</td>
<td>Difficult test item</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20% - 34%</td>
<td>Moderately difficult test item</td>
</tr>
<tr>
<td></td>
<td></td>
<td>35% - 64%</td>
<td>Neither difficult nor easy test item</td>
</tr>
<tr>
<td></td>
<td></td>
<td>66% - 80%</td>
<td>Fairly easy test item</td>
</tr>
<tr>
<td></td>
<td></td>
<td>81% - 89%</td>
<td>Easy test item</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90% - 94%</td>
<td>Very easy test item</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;95%</td>
<td>Extremely easy test item</td>
</tr>
<tr>
<td>Standard deviation – SD</td>
<td>A measure of the spread of scores about the mean and hence the extent to which the question might discriminate</td>
<td>&lt;33%</td>
<td>Unsatisfactory test item</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;33%</td>
<td>Satisfactory test item</td>
</tr>
</tbody>
</table>

Discrimination index – DI

| The percentage of correct answers by students who have scored highly on the other parts of the test | <0% | Invalid test item |
| 0% - 19%                                                   |     | Very weak discrimination |
| 20% - 29%                                                  |     | Weak discrimination |
| 30% - 50%                                                  |     | Adequate discrimination |
| >50%                                                       |     | Very good discrimination |

The overall quality evaluation of online tests carried out in higher education institutions (in the chosen course, academic specialty, professional field, field of higher education or all electronic tests carried out at university) allows the quality managers and policymakers to take measures to improve the quality of unsatisfactory quality tests in order to ensure a higher quality of training. The overall test quality on the basis of the answers given by the students and the results obtained is evaluated through a calculation of average grade, standard deviation, skewness, kurtosis, coefficient of internal coherence, standard and relative error. Table 3 presents the values and their interpretation used within the proposed evaluation model.

Table 3. Educational test quality evaluation on the basis of testees’ responses

<table>
<thead>
<tr>
<th>Measure</th>
<th>Definition</th>
<th>Values</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average grade</td>
<td>The average of students’ scores</td>
<td>&lt;50%</td>
<td>Unsatisfactory result</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50% - 75%</td>
<td>Satisfactory result</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;75%</td>
<td>Unsatisfactory result</td>
</tr>
<tr>
<td>Standard Deviation – SD</td>
<td>A measure of how widely values are dispersed from the average grade</td>
<td>&lt;12%</td>
<td>Unsatisfactory result</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12% - 18%</td>
<td>Satisfactory result</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;18%</td>
<td>Unsatisfactory result</td>
</tr>
<tr>
<td>Skewness</td>
<td>A measure of the asymmetry of the distribution of scores</td>
<td>&lt;-1</td>
<td>Lack of discrimination between students who do better than average</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[-1,-1]</td>
<td>Perfectly symmetrical distribution</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;1</td>
<td>Lack of discrimination near the pass fail border</td>
</tr>
<tr>
<td>Measure</td>
<td>Definition</td>
<td>Values</td>
<td>Evaluation</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------------------------------------------------------------------</td>
<td>--------</td>
<td>---------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>A measure of the flatness of the distribution of scores</td>
<td>0-1</td>
<td>The test is discriminating very well between very good or very bad students and those who are average</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;1</td>
<td>The test is not discriminating very well between very good or very bad students and those who are average</td>
</tr>
<tr>
<td>Coefficient of internal consistency – CIC</td>
<td>A measure of the reliability of the assessment scales</td>
<td>&gt;90%</td>
<td>Perfect result</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75%-90%</td>
<td>Satisfactory result</td>
</tr>
<tr>
<td></td>
<td></td>
<td>64% - 74%</td>
<td>Unsatisfactory result</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;64%</td>
<td>Completely unsatisfactory result</td>
</tr>
<tr>
<td>Error ratio – ER</td>
<td>It estimates the percentage of the standard deviation which is due to chance effects rather than to genuine differences of ability between students</td>
<td>&lt;50%</td>
<td>Satisfactory result</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;50%</td>
<td>Unsatisfactory result</td>
</tr>
<tr>
<td>Standard error – SE</td>
<td>It estimates how much of the standard deviation is due to chance effects and is a measure of the uncertainty in any given student’s score</td>
<td>&lt;7%</td>
<td>Perfect assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8%</td>
<td>Good assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;8%</td>
<td>Substantial proportion of the students will be wrongly graded</td>
</tr>
</tbody>
</table>

**Quality model for evaluation of the quality assurance process of online tests**

The model allows evaluation of the quality assurance process itself (of testing in an entire course, an academic specialty, a professional field, an area of higher education) during all stages of the online test lifecycle. The overall process of the quality evaluation of online tests is evaluated on the basis of the data stored from the filled questionnaires and test results. The evaluation model is hierarchical and includes three levels – 5 objects, 10 criteria and 20 indicators (Table 4). The evaluation obtained enables the quality managers and policymakers to monitor the evaluations and receive a summary of the courses in which the evaluation of online tests is being conducted at all times in which they want to monitor the process.

**Table 4. Evaluation of the quality assurance process**

1. **Object**
   1.1. **Criteria**
      1.1.1. **Indicator**
         1. **Learning course**
         1.1. **The quality of all tests in the course is evaluated by students and experts**
         1.1.1. **Data for all tests in the course:**
            - Information: Test;
            - Number of respondents (completed questionnaires) of each evaluated online test in the course;
            - Number of respondents of all evaluated online tests in the course.
         1.1.2. **Summarized results of the survey by the evaluated characteristics of tests in the course:**
            - Question (evaluated characteristic);
            - Percentage of experts/students that answered 1-5 to the evaluated characteristic in all evaluated online tests in the course.
         1.1.3. **Summarized results of the survey for all tests in the course:**
            - Information: Tests;
            - Average grade of each evaluated online test in the course;
            - Average grade of all evaluated online tests in the course.
         1.2. **The quality of all tests in the course is evaluated on the basis of the testees’ responses of the tests**
Object

Criteria

Indicator

1.2.1. Calculated statistic values: Average grade, Standard Deviation, Coefficient of internal consistency, Error ratio and Standard error of all online tests in the course.

2. Academic specialty

2.1. The quality of all tests in an academic specialty is evaluated by students and experts

2.1.1. Data for all tests in the academic specialty:
- Percentage of courses in the academic specialty with conducted surveys;
- Information: Course, Test;
- Number of respondents (completed questionnaires) of each evaluated online test in the course;
- Number of respondents (completed questionnaires) of all evaluated online tests in the course;
- Number of respondents of all evaluated online tests in the academic specialty.

2.1.2. Summarized results of the survey by the evaluated characteristics of tests in the academic specialty:
- Question (evaluated characteristic);
- Percentage of experts/students that answered 1-5 to the evaluated characteristic in all evaluated online tests in the academic specialty.

2.1.3. Summarized results of the survey for all tests in the academic specialty:
- Information: Course;
- Average grade of all evaluated online tests in the course;
- Average grade of all evaluated online tests in the academic specialty.

2.2. The quality of all tests in the academic specialty is evaluated on the basis of testees’ responses of tests

2.2.1. Calculated statistic values: Average grade, Standard Deviation, Coefficient of internal consistency, Error ratio and Standard error of all online tests in the academic specialty.

3. Professional field

3.1. The quality of all tests in the professional field is evaluated by students and experts

3.1.1. Data for all tests in the professional field:
- Percentage of academic specialty in the professional field with conducted surveys;
- Percentage of courses in the professional field with conducted surveys;
- Information: Academic specialty, Course, Test;
- Number of respondents (completed questionnaires) of each evaluated online test in the course;
- Number of respondents (completed questionnaires) of all evaluated online tests in the course;
- Number of respondents of all evaluated online tests in the academic specialty;
- Number of respondents of all evaluated online tests in the professional field.

3.1.2. Summarized results of the survey by the evaluated characteristics of tests in the professional field:
- Question (evaluated characteristic);
- Percentage of experts/students that answered 1-5 to the evaluated characteristic in all evaluated online tests in the professional field.

3.1.3. Summarized results of the survey for all tests in the professional field:
- Information: Academic specialty, Course;
- Average grade of all evaluated online tests in the course;
- Average grade of all evaluated online tests in the academic specialty;
- Average grade of all evaluated online tests in the professional field.

3.2. The quality of all tests in the professional field is evaluated on the basis of testees’ responses of tests

3.2.1. Calculated statistic values: Average grade, Standard Deviation, Coefficient of internal consistency, Error ratio and Standard error of all online tests in the professional field.

4. Area of higher education

4.1. The quality of all tests in the area of higher education is evaluated by students and experts

4.1.1. Data for all tests in the area of higher education:
- Percentage of academic specialty in the area of higher education with conducted surveys;
- Percentage of professional fields in the area of higher education with conducted surveys;
- Percentage of courses in the area of higher education with conducted surveys;
- Information: Professional field, Academic specialty, Course, Test;
- Number of respondents (completed questionnaires) of each evaluated online test in the area of higher education.
Object
Criteria
Indicator
course;
- Number of respondents (completed questionnaires) of all evaluated online tests in the course;
- Number of respondents of all evaluated online tests in the academic specialty;
- Number of respondents of all evaluated online tests in the professional field;
- Number of respondents of all evaluated online tests in the area of higher education
4.1.2. Summarized results of the survey by the evaluated characteristics of tests in the area of higher education:
- Question (evaluated characteristic);
- Percentage of experts/students that answered 1-5 to the evaluated characteristic in all evaluated online tests in the area of higher education.
4.1.3. Summarized results of the survey for all tests in the area of higher education:
- Information: Professional field, Academic specialty, Course;
- Average grade of all evaluated online tests in the course;
- Average grade of all evaluated online tests in the academic specialty;
- Average grade of all evaluated online tests in the professional field;
- Average grade of all evaluated online tests in the area of higher education.
4.2. The quality of all tests in the professional field is evaluated on the basis of testees’ responses of tests
4.2.1. Calculated statistic values: Average grade, Standard Deviation, Coefficient of internal consistency, Error ratio and Standard error of all online tests in the academic area of higher education.
5. University
5.1. The quality of all tests is evaluated by students and experts
5.1.1. Data for all tests in the university:
- Percentage of areas of higher education with conducted surveys;
- Percentage of professional fields with conducted surveys;
- Percentage of academic specialty with conducted surveys;
- Percentage of courses with conducted surveys;
- Information: Area of higher education, Professional field, Academic specialty, Course, Test;
- Number of respondents (completed questionnaires) of each evaluated online test in the course;
- Number of respondents (completed questionnaires) of all evaluated online tests in the course;
- Number of respondents of all evaluated online tests in the academic specialty;
- Number of respondents of all evaluated online tests in the professional field;
- Number of respondents of all evaluated online tests in the area of higher education;
- Number of respondents of all evaluated online tests.
5.1.2. Summarized results of the survey by the evaluated characteristics of all tests:
- Question (evaluated characteristic);
- Percentage of experts/students that answered 1-5 to the evaluated characteristic in all evaluated online tests.
5.1.3. Summarized results of the survey for all tests in the university:
- Information: Area of higher education, Professional field, Academic specialty, Course;
- Average grade of all evaluated online tests in the course;
- Average grade of all evaluated online tests in the academic specialty;
- Average grade of all evaluated online tests in the professional field;
- Average grade of all evaluated online tests in the area of higher education.
- Average grade of all evaluated online tests.
5.2. The quality of all tests in the professional field is evaluated on the basis of testees’ responses of tests
5.2.1. Calculated statistic values: Average grade, Standard Deviation, Coefficient of internal consistency, Error ratio and Standard error of all online tests.

Software Application for Automated Educational Test Quality Evaluation
The main purpose of the proposed original application for automated evaluation of the quality of online tests on the basis of the proposed approach is to enable stakeholders (authors of online tests and quality managers and policymakers) to generate documents evaluating the quality of online tests in real time which allow the quality of tests to be
improved. The application that allows automated quality evaluation of online tests on the proposed quality assurance approach should provide the following basic functionalities:

- retrieving results from online tests conducted in testing environments and/or in LMS used by the higher education institution;
- analysing results of the conducted online tests;
- analysing results of the conducted surveys for quality evaluation of online tests by students and experts;
- generating documents for quality evaluation of online tests by different users.

The software prototype of the application for automated quality evaluation of online tests TQE has been developed on the basis of previous studies in the field of automated quality evaluation in higher education (Doneva & Gaftandzhieva, 2015; Gaftandzhieva, 2017; Gaftandzhieva, 2016; Totkov, Gaftandzhieva & Doneva, 2016). During the development of the software prototype, part of the application's functionalities were realized. The realized functionalities allow:

- retrieving results from online tests conducted in LMS Moodle;
- performing analysis of results of online tests conducted in LMS Moodle;
- analysing the results of surveys conducted in LMS Moodle for quality evaluation of online tests by students and experts in the field;
- generating documents for quality evaluation of electronic tests by two stakeholders – authors of online tests and quality managers and policymakers.

The prototype of the TQE application includes two panels for each context to enable users (authors of online tests and quality managers and policymakers) to generate evaluation documents in the form of reports. The TQE application is written in PHP and uses JasperSoft BI Suite (JasperSoft, 2017) capabilities for creating reports and analysis by retrieving data from different information sources, for storing and organizing reports in a repository, and for presenting them in the form preferred by the user. The application is developed in 4 steps:

**Step 1. Studying the information context of an online test and surveys in LMS Moodle;**

**Step 2. Integration between the JasperSoft BI Suite tool for development of report templates (JasperSoft Studio) and an LMS Moodle database, which is set as a data source for data retrieving and creating documents (reports) that reflect online test quality;**

**Step 3. Development of templates of analytical reports in JasperSoft Studio, which can be used later to generate the real reports containing summarised data related to online test quality;**

**Step 4. Compiling of templates of analytical reports (developed in Step 3) in a special internal format, storing them in the JasperReports Server repository and Integration of the JasperReports Server with TQE through JasperServer REST API and PHP wrapper.**

As a result of the study carried out in step 1, the Moodle Feedback activity is chosen to be used for carrying out surveys among students and experts. For each of the two quality evaluation models questionnaire templates were created, which were included as a part of the learning activities in each e-course, so that they are completed by at least three experts during the online test design and by participating students after completion of the training. As a result of the study 18 tables from the Moodle databases, which store data related to the online test and the surveys conducted, have been studied in detail. Data stored in the tables is identified which can be used to accumulate dynamic online test quality evaluation.
To achieve the aim of the application in step 2 of the development process of TQE, relevant report templates are designed according to the specific parameters (e.g. e-course, professional field, and area of higher education). The choice of templates suitable for generating documents for the educational test quality evaluation according to the proposed models for quality evaluation is done on the basis of the analysis of the institution’s information infrastructure and subsequent systematization which of the data stored in the LMS Moodle can be accumulated automatically for each of the model criteria.

For complete educational test quality evaluation by students and experts, templates of reports are designed (see Column 1 of Table 5) depending on the specific parameters (see Column 2 of Table 5). They allow users (see Column 4 and Column 5 of Table 5) to retrieve evaluation data and generate evaluation reports that contain aggregated evaluation information on the online test quality (see Column 3 of Table 5).

**Table 5. Templates – educational test quality evaluation by experts/students**

<table>
<thead>
<tr>
<th>Template</th>
<th>Parameter</th>
<th>Returned information</th>
<th>Author</th>
<th>Quality managers and policymakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summarized results of the survey by the evaluated characteristics of an online test</td>
<td>Online test</td>
<td>• Question (evaluated characteristic)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Summarized results of the survey by the evaluated criteria of an online test</td>
<td>Online test</td>
<td>• Criteria</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Summarized results of the survey by professional fields and courses</td>
<td>• Professional field</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Summarized results of the survey by a professional field</td>
<td>• Professional field</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Summarized results of the survey by an area of higher education</td>
<td>Area of higher education</td>
<td>• Professional field</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Summarized results of the survey by professional fields and courses in an area of higher education</td>
<td>Area of higher education</td>
<td>• Professional field</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Summarized results of the survey by evaluated characteristics of an online test in an area of higher education</td>
<td>Area of higher education</td>
<td>• Question (evaluated characteristic)</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

To evaluate the quality of test items on the basis of an analysis of the responses and the overall quality of an online test on the basis of the statistical results after testing from TQE application, a document template is designed dependent on the specific parameter (an online test). The template presents in tabular form the calculated values of the facility index, standard deviation and discrimination of each test item included in the evaluated online test, and the answers given by the students are extracted dynamically from the Moodle database. The quality of test items is evaluated on the basis of the calculated values of the facility index, standard deviation and discrimination, average score, standard deviation, asymmetry of distribution, internal coherence coefficient, standard and relative error. According to the range in which the value falls (see column 3 of Table 2) dynamic evaluation is given (see column 4 of Table 2). The template provides an option for a dynamic generation of texts with a value
analysis on the basis of the range in which the value falls, and the alternative evaluations in Table 3.

To retrieve evaluation data for the indicators of the model for evaluation of the quality assurance process of an online test (see Table 4) 35 templates of reports are designed (15 for summarizing an experts’ grade and 20 for summarizing students’ grades and the result) depending on the specific parameters. They allow quality managers and policymakers to retrieve evaluation data and generate reports that contain summary data for the ongoing quality evaluation of online tests.

A total of 43 software models of accumulating templates are developed through JasperSoft’s template design tool in Step 2. Users can apply them to generate real documents that contain aggregated results from the ongoing quality evaluation of an online test by students and experts, or results from the analysis of test items. Figure 2 presents the developed model for analysing the quality of test items on the basis of students’ results. The developed templates are compiled in a special internal format and are stored in the Jaspersoft repository, which is realized in Step 4. In this way, they can be used both by the level of the JasperSoft system, TQE and another external applications for the generation of evaluation reports that are filled with data from the given data source (Moodle Database).

Figure 2. Template (created with JasperSoft)

Figure 3. Reports for quality evaluation of online tests – authors of tests (screenshot from TQE)
Users of TQE can use it to generate dynamic evaluations in the form of reports by selecting from the proposed capabilities (a dynamically generated list of available templates of reports for both groups of users in two evaluation contexts, see Figure 3 and Figure 4) at any time they want to monitor the ongoing evaluations and the results of the test quality analysis on the basis of student responses and results. Authors of online tests have access to functionalities that allow them to analyse the results of surveys, monitor the process of surveys and evaluate the quality of their test items included in an online test conducted in Moodle. TQE enables quality managers and policymakers to analyse the results of all surveys automatically, monitor the process of all surveys and evaluate the quality of all test items. The monitoring of the quality assurance process and the analysis of the results can be obtained by an online test, an e-course, a professional field and an area of higher education. Besides selecting the type of report that will be generated in real-time, the user must set values for the necessary local parameters of the report. The alternative parameters and their values between the user can choose are retrieved from the data source. This limits the user’s choice and thus eliminates the possibility of introducing incorrect data.

The generated report contains data (in the form of a table and chart) that the user can use to evaluate to what extent the students have participated in surveys for quality evaluations and analyse the results from conducted surveys. The generated report can be displayed on the screen and the user has the possibility to download it in his or her preferred format.

**FINDINGS AND DISCUSSIONS**

The software prototype TQE is experimented for quality evaluation of a test, included in e-learning courses from 3 different subject areas (physics; informatics; a foreign language):

- English – A2/B2 (professional field 1.3. Pedagogy of teaching in ...)
- Physics (professional field 4.1. Physical sciences)
- Web Programming (professional field 4.6. Informatics and computer science)
The quality of the tests is evaluated through the automated test quality analysis of the test items on the basis of the students’ responses and statistical data for the test.

Quality Evaluation Report: Analysis of test results

This report has been generated by TQE: on 04.12.2016 at 20:26:17

Course: English A0/81
Test: English test Pre

<table>
<thead>
<tr>
<th>Test Item</th>
<th>Facility index</th>
<th>Facility Index Interpretation</th>
<th>Standard Deviation</th>
<th>Standard Deviation Interpretation</th>
<th>Discrimination Index</th>
<th>Discrimination index Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Identify what part of speech are the following words: movement; relationship; negotiation.</td>
<td>83.33</td>
<td>Easy</td>
<td>38.92</td>
<td>Satisfactory</td>
<td>2.4</td>
<td>Very weak discrimination</td>
</tr>
<tr>
<td>2. Choose the group of state verbs</td>
<td>83.33</td>
<td>Easy</td>
<td>38.92</td>
<td>Satisfactory</td>
<td>-37.14</td>
<td>Question probably invalid</td>
</tr>
<tr>
<td>3. Choose which category contains extreme adjectives</td>
<td>58.22</td>
<td>About right for the average student</td>
<td>51.49</td>
<td>Satisfactory</td>
<td>-3.65</td>
<td>Question probably invalid</td>
</tr>
<tr>
<td>4. Which of these groups contain words with silent letters?</td>
<td>91.67</td>
<td>Very easy</td>
<td>28.87</td>
<td>Unsatisfactory</td>
<td>-18.46</td>
<td>Question probably invalid</td>
</tr>
<tr>
<td>5. Choose the correct preposition of the verb depend</td>
<td>91.67</td>
<td>Very easy</td>
<td>28.87</td>
<td>Unsatisfactory</td>
<td>-18.46</td>
<td>Question probably invalid</td>
</tr>
<tr>
<td>6. Choose the correct preposition of the verb “spend”</td>
<td>66.67</td>
<td>Fairly easy</td>
<td>49.24</td>
<td>Satisfactory</td>
<td>38.95</td>
<td>Adequate discrimination</td>
</tr>
<tr>
<td>7. Choose the correct preposition of the verb “fond”</td>
<td>83.33</td>
<td>Easy</td>
<td>38.92</td>
<td>Satisfactory</td>
<td>-11.61</td>
<td>Question probably invalid</td>
</tr>
<tr>
<td>8. Determine whether sentences I can’t find my keys. Have anyone seen them? Carrie’s really a close friend. We know</td>
<td>58.33</td>
<td>About right for the average student</td>
<td>51.49</td>
<td>Satisfactory</td>
<td>-3.65</td>
<td>Question probably invalid</td>
</tr>
<tr>
<td>9. Select the correct compliance to the phrase ‘keep my mind ...’</td>
<td>33.33</td>
<td>Moderately difficult</td>
<td>49.24</td>
<td>Satisfactory</td>
<td>34.11</td>
<td>Adequate discrimination</td>
</tr>
<tr>
<td>10. Select the correct way to complete the phrase “mind your ...”</td>
<td>66.67</td>
<td>Fairly easy</td>
<td>49.24</td>
<td>Satisfactory</td>
<td>38.95</td>
<td>Adequate discrimination</td>
</tr>
<tr>
<td>11. Select the most appropriate phrase to complete the sentence: Since that quarter they haven’t been on</td>
<td>66.67</td>
<td>Fairly easy</td>
<td>49.24</td>
<td>Satisfactory</td>
<td>71.67</td>
<td>Very good discrimination</td>
</tr>
<tr>
<td>12. Select the correct words to complete the phrase “my mind ...”</td>
<td>82.33</td>
<td>Very difficult</td>
<td>28.87</td>
<td>Unsatisfactory</td>
<td>-13.47</td>
<td>Question probably invalid</td>
</tr>
</tbody>
</table>

Test statistics shows that the average grade is 65.94%, which falls within the expected average grade (between 50 and 75%).

Standard Deviation (a measure of the spread of scores about the mean) is 13.97%, which falls within the expected value (between 12 and 18%).

Skewness (a measure of the asymmetry of the distribution of scores) is -0.1219. This value imply a perfectly symmetrical distribution.

Kurtosis (a measure of the flatness of the distribution) is 6.1245. The value is in the range 0-1 and indicates a normal, bell shaped distribution. It indicates that the test is discriminating very well between very good or very bad students and those who are average.

Coefficient of internal consistency is 23.52%. The value is below 61%, the test as a whole is unsatisfactory and remedial measures should be considered. The value indicates that some of the questions are not very good at discriminating between students of different ability and hence that the differences between total scores owe a good deal to chance or that some of the questions are lacking a different quality from the rest i.e. the test as a whole is heterogeneous.

Error ratio is 87.46%. The values cannot be regarded as satisfactory. It implies that less than half the standard deviation is due to differences in ability and the rest to chance effects.

Standard error that estimates how much of the standard deviation is due to chance effects and is a measure of the uncertainty in any given student’s score is 12.22%. The values indicates it is likely that a substantial proportion of the students will be wrongly graded in the sense that the grades awarded do not accurately indicate their true abilities.

Figure 5. Analysis of the results of an English pre-test

Questionnaires for evaluating the students’ satisfaction are included in each of the courses with added tests. Students fill them in after they complete their training. Figure 6 presents a report of summarised results from the evaluation, carried out as part of the experiment, according to the characteristics of the test for assessing knowledge gained in the English language course.
Figure 6. Example of a generated evaluation report for quality of test items and tests

Quality managers at the University of Plovdiv generated TQE documents on the relevant proposed templates for evaluating the quality assurance process. They did so on the basis of the survey data for quality evaluation of test items as part of the experiment. The aim was to obtain summary information in real-time, which allows:

- monitoring of the planned surveys of professional fields and fields of study;
- monitoring of the conducted surveys of professional fields and fields of study;
- monitoring of the results of the conducted surveys of professional fields and fields of study.

Figure 7. Generated evaluation report for summarised results of the survey (screenshot from TQE)
The report generated through TQE (see Figure 7) shows that the students have evaluated highly the quality of test items and tests conducted within the e-learning courses in the following professional fields: Pedagogy of teaching in..., Physical sciences, Communication and computer technology. Students have given all professional fields an average grade of above 3.

Proposed models and software application cover known approaches for development of high quality educational tests (e.g. Legault, 2017; Totkov, Raikova & Kostadinova, 2014; CITL, 2017; Amouei et al., 2014; Thompson & Levitov, 1985; Pyrczak, 1973; Mark, 1985; Hambleton, Swaminathan & Rogers, 1991; Hamilton, Stecher & Klein, 2002; Cronbach, 1971; Messick, 1989; Professional Testing, 2017). In addition, they provide the opportunity for automated evaluation of the quality assurance process, address the needs of quality-related information of all stakeholders and support quality assurance activities at different levels of generalization in the level of separate online test items, of an online test as a whole, of online tests of an entire course, or of online tests of an academic specialty. TQE proves the possibility of automated quality assurance of educational tests at each stage of their lifecycle from all stakeholders’ point of view.

CONCLUSION

The main theoretical contribution of this paper is the proposed comprehensive approach to the automated quality assurance of online tests from all stakeholders’ point of view (teachers, students, experts, quality managers, etc.) by assessing the tests’ quality at different stages of their lifecycle - from their creation and pre-evaluation to their conduction. The approach is directed towards finding an integrated approach for automated quality evaluation of tests, which leads to reduction of efforts for manual quality evaluation. The proposed comprehensive approach for quality assurance and developed models are applicable for any education institution.

The software application TQE developed according to the proposed approach was put under real-time testing. The experiments are carried out to prove the practical significance and applicability of the created software application.

The current study is limited because TQE retrieves and analyses data stored only in the databases of LMS Moodle. The plans for further implementations are TQE to be developed to be used by each higher education institution, regardless of the type of the relevant university information systems and the diversity of the used LMS.

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DIGITAL DEVICE OWNERSHIP AND LEARNING ENVIRONMENT PREFERENCES OF STUDENTS IN SOUTH AFRICA AND GHANA

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ABSTRACT

This paper explores differences in access to technology and configuration of preferences for learning environments among design students in two universities of technology in South Africa (ISA) and Ghana (IG). Laptops and Smartphones ownership influenced and supported design students’ learning. In IG, there was a 97% Laptop ownership as against 69% in ISA. IG does not have computer laboratories; hence Laptop ownership is a pre-requisite for Design programs. Oppositely, ISA has fourteen computer laboratories for Design programs. There is no statistically significant difference between male and female design students in their choice of learning environments for academic success. Design students are not enthusiastic about accessing library resources via handheld devices. Towards academic success, students ranked low, their institutions’ Learning Management Systems. We recommend a blended approach when designing learning environments for Design Education, while promoting the use of media platforms for content management due to device ownership among students.

Keywords: Device ownership, design, design students, higher education, learning environment.

INTRODUCTION

Technological advances are defining a new approach to education. The technological revolution has caused continuous discussions among practitioners viz-a-viz the role of technology in enhancing education (Miller, 2016; Shelly, Gunter & Gunter, 2012; Wheeler, 2012; Yumurtaci, 2017). The affordances of certain emerging technologies such as social media in Higher Education have been motivated by the well-connected and networked kind of students we have (Boyd, 2014; Bozanta & Mardikyan, 2017, Johnson, Becker, Estrada & Freeman, 2014; Koole & Stack, 2016). This connectedness can be observed from the kind of devices students use and the kind of activities mediated through these tools, which also impacts on their learning.

In the 21st century, it is common to see students try out various technologies for their personal, academic and social lives. Arguments by Barry, et al. (2015) indicate that exploring reasons about the extent to which students use technology in teaching and learning is good recipe for curriculum design that leverages on students technological capabilities and uses. This paper contributes an understanding of technological underpinnings with a relative effect on ingenious “curricula design and delivery” in Universities of Technology (UoTs) where research is scanty (Rambe, 2016, p. 86); therefore, seeks to explore the differences among two groups of design students and their
impact on design education and delivery in two Universities of Technology (UoTs) in South Africa and Ghana. The study considered students’ device ownership, use and their configuration of learning environment preferences using technology.

**Universities of Technology and Design Education**

The position of Universities of Technology in Higher Education is uniquely designed to strategically train, diversify and equip students with knowledge, skills and creativity underpinned by technology transfer. According to the South African Technology Network (SATN, 2008, p. 16), the focus of UoTs is “on the study of technology from the viewpoint of various fields of study, rather than a particular field of study” since technology affects all aspects of human life and existence. Design Education is one of such fields of study offered by UoTs that is broad in scope and affects humans in various ways.

Design Education in UoTs provides a repertoire of knowledge, skills and attitudes to students through “future-orientated curriculum” by pushing the limits of “technology forward but also domesticating it” from the realms of imagination and creativity to concretized “sustainable and meaningful social changes” (Baynes, 2010; Manzini, 2015). Positive consequences of students’ proficiency in technology use in their learning environments impact their work output in practice. The imperative place of Design Education in our current existence is needed to solve complex challenges in our “economic, social and political systems” through the work of designers, proper use of technologies and planning (Munshi, 2010). The role of Design Education share similar significance of three of Brook’s (2000) characteristics of UoT being:

- Multi-level entry and exit points for students;
- Concerned primarily with the development of vocational/professional education;
- Technological capabilities as important as cognitive skills.

Hitherto, design in general was only seen as a vocation not a profession due to apprenticeship. Here, UoTs have married a number of attributes: vocation, profession, technology and creativity in design education curriculum to make it practical and bias towards industry. Simply, UoT and Design Education strive to use technology to achieve their purposes via suitable technologies to better the lives of people and society. In the wake of pervasive technological advancement and the reason that Design Education has always functioned to solve ‘local’ challenges with ‘localized’ technologies, it is not out of place to explore the technological devices employed in a modern day Design Education in two leading Design institutions in Africa. In spite of the fact that design has gradually changed from studio-based to digital formats, very little is known about the kind of devices owned and used by design students and the preferred learning environments within which students learn best (Appiah, 2014; Ward, 1990).

**ICT Resources**

**Device ownership**

Despite the financial burden on schools, parents and teachers, device ownership by students continues to play a significant role in the teaching and learning process of students. In the bid to achieve learning outcomes, parents, school authorities and other stakeholders have invested in ICT infrastructure which includes Internet connectivity and other devices (Gikas & Grant, 2013; Salaway & Caruso, 2007). In their research, Witecki and Nonnecke (2015, p. 73) posited that though “ownership and use” of devices by Higher Education students were not only on the ascendency (Cross, Sharples, Healing, 2015; Dahlstrom, Grunwald & Vockley, 2011), it also related strongly to lower course engagement. Recently, Sydney Grammar School in Australia announced that it had banned students from having laptops in school due to its role as a preventive agent to class engagement and absolute misappropriation of funds (Bita, 2016).

In contrast, other studies have held that student ownership regimes of new technologies such as computer, mobile devices and computer applications are crucial in curriculum designs and delivery (Sharples et al., 2014; Shelly, Gunter & Gunter, 2012). Access to
educational resources like e-books from libraries is increased due to the proliferation of computer and mobile device ownership (Baddeley, 2012; Hamblen, 2011; Leye, 2007). According to the 2014 NMC Horizon report, Bring Your Own Device (BYOD) promotes learner-centric learning environments where learner takes charge of his/her learning (Johnson, Adams Becker, Estrada & Freeman 2014, p. 34). Device ownership and use encourages "lecturer control" and self-directed learners (Sharples et al., 2014). The issue of device ownership in higher education is becoming more of a socio-cultural issue rather than a pedagogical issue. On the other hand, Oliver (2011) also contends that technology use in our educational landscape is exaggerated. Oliver's point may serve as a support to Witecki and Nonnecke (2015) and Bita's (2016) side of the debate.

There is a range of digital devices commonly owned and used by students. These devices include laptop and Smartphone or tablets (Sharples et al., 2014); cellphones (Witecki & Nonnecke, 2015). Compelling reasons such as convenience of getting connected to educational resources via portable devices may not be the only reason for device ownership. Other reasons include students’ ability to access news, calls, instant messaging, surfing, gambling, social media and data storage (Barry, Murphy & Drew, 2015).

Handheld devices

Handheld devices play various roles (educational and non-educational) in the dispensation of higher education. Despite ongoing debates on the prospects and limitations of educational use of handheld devices for higher education (Gupta & Koo, 2010); there are continuous exploration, promotion, integration and abolishment of handheld devices for teaching and learning in higher education (Gaskell, 2015).

Among the advantages, include the offer of handheld devices to current students a great opportunity to "vary their study location and to study 'on the move'" (Evans, 2008, p. 492). According to Gaskell (2015), the use of mobile technologies must be seen from two perspectives: Access and Administration; and Teaching and Learning. For instance, the use of handheld devices by students for access to library resources (Billings, 2003; Cummings, Merrill & Borrelli, 2010; West, Hafner & Faust, 2006), course management systems (Ally, 2009), and information dissemination and the total management of student communication (Motiwalla, 2007, p. 596) align with the former. Other beneficial uses of handheld devices include Microblogs (Paliktzoglou & Suhonen, 2014), Podcasts (Evans, 2008; Hsu, 2015), e-texts (Hsu, 2015). Four benefits of handheld devices for academic reasons are identified by Dahlstrom et al. (2011) as:

- Easy access to resources and reducing the burden of administration tasks;
- Improvement in productivity;
- Becoming more connected; and
- Enabling learning to be more creative, authentic and reflective.

Nonetheless, there are concerns as to the use of handheld devices in higher education. Concerns such as cost of devices and Internet are very legitimate. In Africa, some students will naturally find it difficult if not impossible to access Internet. Though there is a gradual paradigm towards free access to public Wi-Fi, it is still a major challenge for these facilities to be accessed by students for academic work. Accessing library resources may also be a barrier for students since some handheld devices may have smaller screens making navigation complex. More so, rotational functions of certain devices may pose accessibility problems (Falloon, 2015). Gupta and Koo (2015) also identified downloads as challenge for handheld users in education. On the contrary, McKnight, (2011, p. 4) argues that:

"Greater emphasis is being placed on rendering library digital content, including web pages providing access to online services, to formats that can be used by mobile devices, such as smart phones and personal digital assistants."
It is not clear if libraries are going to achieve their targets to allow access to library resources to be fully functional on Smartphones and personal digital assistants since challenges to digital access keep recurring in recent literature. While drawing on the strengths and limitations of handheld devices, Walmsley’s (2014) argument of students being isolated from each other by such devices raises another set of ‘dispute’. Other literature sources suggest that handheld devices promote student collaboration, effectiveness in access and administration of resources like library, course management and checking of grades (Falloon, 2015; Hwang, 2015; Lai & McKnight, 2011).

In a study to find out the effectiveness of integrating podcasting in teaching and learning in higher Education, Evan (2008) found out that the use of iPod for podcasting was widespread. Lai and Hwang’s experiment to improve students’ art design performance via handheld devices revealed that tablet computers promote "students’ learning achievement, learning motivation and meta-cognitive awareness." Students also learned best through an "interactive peer-assessment" (Lai & Hwang, 2015, p. 154). Recently Cross et al. (2015) reported a rapid increase the ownership of tablets among students. They further found changes in students’ study habit with the use of handheld devices with statistical significant differences between course areas.

Motiwalla’s (2015) exploratory study sought to find out about the students’ experiences with wireless/handheld (W/H) computing devices. The results indicated that students had major challenges with the W/H user-interface of the application therefore; Motiwalla proposed an improvement in user-interface of W/H applications with additional features such as interactive voice recognition. Though voice applications may be a source of distraction to some students depending on the learning environment (Falloon, 2015), Motiwalla’s findings can be corroborated by earlier suggestions by Evans (2008) who posits that voice in handheld applications for students allow them to associate text with voice. McKnight (2011) reveals differences in paradigm in terms of the kinds of students who access libraries; the diversity cover gender, age, mode of study sometimes due to barriers or varied experiences of students; however, digital devices somewhat bridge these gaps and differences.

Leeson (2006) posits that e-readers or tablets there are no differences between reading on Tablets or e-readers in comparison to reading on paper. Liang & Huang’s (2014, p. 218) research established that e-book reading has the propensity to encourage "student’s retrieval as compared with reading printed books." Piper, Jekpemei, Kwayumba & Kibukho (2015) also found statistically significant differences in the use of e-readers for teaching and learning of English and Swahili. On the other hand, Huang, Liao, Huang & Chen (2014) recommends that due to the larger screens of Tablet PCs than Smartphones and Personal Digital Devices, some educational activities such as reading texts and varied multimedia audiovisual purposes should be best performed on Tablet PCs. However, none of the above researchers explored device ownership and learning environment preferences of design students in UoTs or across two countries. Again, none of the researches sought to find out differences between two Design institutions in terms of enhancement of academic work via handheld mobile devices.

**Learning Environments in Higher Education**

"The term environment denotes the totality of the surroundings and conditions in which something or someone lives or functions” (Warger & Dobbin, 2009, p. 6). A learning environment defines the boundaries, resources, conditions and practices within which knowledge, skills and attitudes can be promoted. Face-to-Face, blended and online modes have been identified as learning environments by several authors (Boyd, 2014; Herrington, Reeves & Oliver, 2010; Salter, Pang & Sharma, 2009; Shelly et al., 2012; Warger & Dobbin, 2009). This research adopts EDUCAUSE’s definition of learning environment which goes beyond learning management systems but one with no online components or completely online or one with some online components (Eden & Bichsel, 2014). Discussions on learning environments in Higher Education are highly contentious issues since they immensely
affect students’ learning connections and behavior in a multifaceted technological environment (Aheto & Cronje, 2014).

Karchmer-Klein and Shinas (2012) believe that students’ reliance on the Internet as their ‘master teacher’ invariably assists their cognitive, affective and psychomotor performances (Karchmer-Klein & Shinas, 2012, p. 391-392). Sperber (2005) noted that the focus in institutions of higher learning is more towards cognitive development with little emphasis on the other aspects. Bridging this gap by UoTs calls for “successful deployment of educational use of technology depending on the technical proficiency and pedagogical techniques associated with it” (Warger & Dobbin, 2009, p. 7) which also strongly relates to design education. Properly planned learning environment are useful elements in the promotion of students engagement or participation in achieving learning tasks (Lee & Kim, 2016). However, the above studies did not highlight on learning environment preferences for design students in Higher Education.

OBJECTIVES

The objectives specified for the current study are:

1. To explore the extent to which device ownership and use play a role in the learning preferences among design students in the two universities of technology in South Africa and Ghana.
2. To identify differences between the two institutions’ design students in terms of their learning environment preferences.
3. To find out the differences between male and female design students in terms of their learning environment preferences in the two institutions.
4. To identify differences between the two institutions’ design students in the use of handheld mobile devices to enhance academic work.

Research Question

To what extent does device ownership and use play a role in the learning preferences among design students in the two universities of technology?

Hypotheses

The following null hypotheses guided the study:

1. There is no statistically significant difference between the two institutions’ design students in terms of learning environment preferences.
2. There is no statistically significant difference between male and female design students in terms of learning environment preferences.
3. There is no statistically significant difference between the two institutions’ design students in the use of handheld mobile devices to enhance academic work.

METHOD

This section covers how this study was carried out, people involved in study and how they were selected. The section also caters to what went into the analysis for the research.

Research Design

This study was guided by a research question and three hypotheses. The descriptive mixed methods research design was used in order to explore the differences in access to technology and configuration of preferences for learning environments among design students. The main aim of using the research design was to support findings from numeric analysis with narratives from the focus group interviews (Plowright, 2011; Yin, 2014). The use of the descriptive mixed methods was to get in-depth and adequate insight into the current state of digital device ownership and the learning preferences of students studied. Again, the study capitalized on the strengths of both numeric and narrative results to complement each other in the analysis of results. ‘ISA’ and ‘IG’ are pseudonyms used to represent the two universities of technology in South Africa and Ghana in this study. The
study followed ethical standards. Ethical clearance for the research was granted by the Faculty of Informatics and Design Research Ethics Committee of Cape Peninsula University of Technology.

**Data Collection Tools**

The survey instrument dubbed Survey Questionnaire was adapted with permission from EDUCAUSE Centre for Applied Research’s (ECAR) Study of Undergraduate Students and Technology Survey, 2014. The questionnaire was adapted because the survey items addressed digital device ownership and learning environment issues in Higher Education. To establish the validity of the questionnaire, the instrument was subjected to the researchers’ Faculty Research Committee for review and ethical clearance. The committee established whether the instrument was appropriate and comprehensive to meet the objectives of the study, taking into account, the population. A total of seventeen survey questions were used to solicit responses for the numeric data. Items ranged from questions on device ownership, uses and importance of digital devices for academic success and their preferences for learning environments. In selecting sample for the numeric data, the same set of survey questions were administered via Google Web-Based Survey Questionnaire (WBSQ) in ISA and Paper-Based Survey Questionnaire (PBSQ) mode in IG. The use of a WBSQ had some advantages over the PBSQ in that it was easier for respondents from ISA to access labs which they always use on a daily bases. As can be corroborated by Kiesler and Sproull (1987, p. 404), the WBSQ was cheaper in terms of cost, discouraged blank answers (mandatory fields) and also “eliminated human or technological transcription” relative to PBSQ.

The reliability co-efficient of Cronbach’s alpha (α) for the survey instrument was 0.81, this value is above the acceptable minimum level of 0.7 (Saunders, Lewis & Thornhill, 2012). Cronbach’s alpha is widely used to check the internal consistency for survey items (Mitchell, 1996). The questions also covered demographic details and 3 to 4-point Likert scale.

An in-depth questioning technique was employed to gather narrative data from two focus group interviews (Krueger, 1986). Each session, lasting for about 40 minutes in the two institutions was audio recorded and later transcribed for analysis lasted for about 40 minutes. The focus group interviews were in-depth and had unstructured questions to further probe issues on the ownership, uses and importance of digital devices and justification of their choices of learning preferences. Responses were categorized into themes that were used to support data discussions from the numeric analysis.

**Sample**

Data was used from an ongoing study on the characteristics and technological usage of students in their Personal Learning Networks. Two Universities of Technology from South Africa (ISA) and Ghana (IG) were purposely sampled due to the similar characteristics they possessed. The institutions were included in the study because they both offered design courses in leading Universities of Technology in their countries. Sample covered 121 students from a population of design undergraduate students in ISA and IG (second-year students). Two groups of the students (7 in a group) from each of the institutions who responded to the survey questionnaire agreed to be part of a follow-up focus group interview. They were randomly selected from the population for the interviews.

Due to the Paper-Based Survey Questionnaire (PBSQ) adapted for use in IG, Krejcie and Morgan’s sampling frame was used as a benchmark to arrive at a sample size for this study. Krejcie and Morgan (1970) suggest that for a population of 75, the sample must be 63 and for a population of 80, the sample must be 66. In this study, the sample of 70 for PBSQ for a population of 78 far exceeded the threshold suggestions by Krejcie and Morgan (1970). Since web-based surveys are not strictly obsessed about probability sampling techniques, sampling for the WBSQ was based on volunteer sampling with no such thing as sampling calculations (Lefever, Dal & Matthiasdottir, 2007).
Table 1. Population and sample of participants

| Institutions | Population | Sample | | | |
|--------------|------------|--------|---|---|
| | | Male | Female | Total |
| ISA | 72 | 12 | 39 | 51 |
| IG | 78 | 42 | 28 | 70 |
| Total | 150 | 54 | 67 | 121 |

Table 1 describes sample in the mixed methods study where the researchers used focus group interviews and survey.

**Data Analysis**

Descriptive and inferential statistics were used in analyzing numeric data from the survey questions. Data were analyzed and represented in table of percentages, means, charts and standard deviation and t-values. Questionnaires were coded such a Likert scale *(see Table 4)* ranged in value from Not at all important (1) to Very important (4). All three hypotheses were inferentially analyzed and interpretation done to elicit the kind of differences that existed between the variables. Data from the focus group interviews were treated as narratives and thematically categorized to support the results and discussions from the numeric data and analysis.

**RESULTS AND DISCUSSIONS**

**Demographic Details**

ISA (Institution in South Africa) and IG (Institution in Ghana) are pseudonyms for two Universities of Technology (UoT) used in this study. The two institutions are

"mandated to equip students to understand life, and not only become backroom theoretician with little understanding of the real world [sic] basically they endow students with the know-how to fabricate things (this includes creating and developing new technologies) through focusing on the study of technology from the viewpoint of various fields of study, rather than a particular field of study" *(SATN, 2008).*

The selection of the two UoTs was based on their shared mission. Both are in developing countries, but one is the only institution of its kind in its country (IG) and can therefore choose to set stringent criteria for existing knowledge on device ownership, while the other (ISA) has as a part of its mission the redress of past imbalances and thus less stringent criteria for entry qualifications and device ownership.

Currently, both institutions are diverse in terms of the design courses (up to postgraduate levels) offered. Though IG has existed for more than 60 years, they have two design departments: Communication Design and Architectural Design; ISA is fairly new and slightly above 10 years with up to six design departments: Graphic, Industrial, Interior, Jewellery, Surface and Fashion Departments. Student respondents for the study are all second year design students from both institutions.

The research question driving this paper states that: to what extent does device ownership and use play a role among design students in the two universities of technology?
Survey question 1
What are the devices ISA and IG design students own?

![Figure 1. Device Ownership](image)

As can be seen in Figure 1, a good number of students in both institutions own Smartphones followed by Laptops. Less than half of the population own Tablets or iPads while a good number of the participants have no plans of owning an E-Reader. Mobile phones and Laptops are widespread and effective technological tools for communication. The results are consistent with Shelly et al.’s (2012) report that students use computers, laptops to connect with their community which sometimes comprise parents, friends learning resources and other stakeholders. Results in Figure 4 differ from Caruso and Salaway (2008) who recorded Laptops (80.5%) as popularly owned.

Smartphones may be the most commonly owned technological tool because; they use applications that are tailored to specific needs such as capturing images, videos, notes. Results on Tablets or iPad (ISA=18%; IG=33%) and E-reader (ISA=8%; IG=10%) and inconsistent with findings of Cross et al. (2015) reported 72% and 37% ownership among respondents respectively. These differences may be attained because Cross et al. (2015) context was outside Africa. Perhaps in the future, design students will boast increase in Tablets or iPads ownership for a ‘handy’ design work and ideation since that may fall between functions of a phone and a laptop. But it must be mentioned that Smith and Caruso (2010) in a study in the United States of America reported 98% computer ownership of students (undergraduate) which is consistent ownership of Laptop computers of IG (97%).

In Sub-Saharan Africa, there are records of increasing support from organizations for ICT integration in Higher Education (Muianga et al., 2013). For instance, telecommunication
providers sometimes give free data packages to their clients for accessing certain platforms with educational values such as Wikipedia (Airtel, 2013; MTN Ghana, n.d). Since mobile phones and Laptops allow for multiple communications, students have found educational use for them. In IG there are no dedicated computer laboratories for design courses making ownership of a personal computer a basic requirement (Kong et al., 2014) which is not the same for ISA which has up to fourteen computer laboratories including four Mac laboratories for design courses with Internet connection and other facilities. Indeed, findings about dedicated computer laboratories are regular with Kong et al.’s (2014) second type of policy implication that affects ownership of personal devices. Most of the design students possibly do not own tablets or iPads and E-readers perform. Some of the design software are also not compatible with tablets, iPads and E-readers as compared to laptops. Ownership of Laptop results is consistent with assertions by Nilson and Weaver (2005) and Brown (2009) who see Laptop as transformative tool in education.

**Survey question 2**
How are the devices owned by ISA and IG design students important to their academic success?

<table>
<thead>
<tr>
<th>Device</th>
<th>ISA haven’t used in the past year (%)</th>
<th>ISA Use for academic and other purposes (%)</th>
<th>ISA Use for academic purposes only (%)</th>
<th>ISA Use for other purposes only (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laptop</td>
<td>8 (16%)</td>
<td>36 (71%)</td>
<td>2 (12%)</td>
<td>1 (2%)</td>
<td>47</td>
</tr>
<tr>
<td>Tablet or iPad</td>
<td>27 (53%)</td>
<td>16 (31%)</td>
<td>7 (12%)</td>
<td>2 (4%)</td>
<td>48</td>
</tr>
<tr>
<td>Smartphone</td>
<td>4 (8%)</td>
<td>37 (73%)</td>
<td>3 (6%)</td>
<td>3 (2%)</td>
<td>47</td>
</tr>
<tr>
<td>E-reader</td>
<td>32 (63%)</td>
<td>63 (52%)</td>
<td>8 (0%)</td>
<td>8 (16%)</td>
<td>123</td>
</tr>
</tbody>
</table>

Number of participants: ISA=51; IG=70; Total=121

Table 2, shows that more students use their Laptops followed by Smartphones for academic and other purposes as against academic work only. Though Tablet or iPad and E-readers are also used for same purposes by students, not many of them used it for academic work. The findings are inconsistent with Nilson and Weaver (2005) and Shelly et al. (2012) because Laptops are gradually becoming basic classroom necessities. The findings also highlight the capacity of students’ creative abilities (Eton, 2012; Farrant, 1980; Shelly et al., 2012). Although these tools enhance the creative abilities of students to promote learning, the numerous applications they offer also allow them to be multitasking, which is inconsistent with Farrant (1980) who does not recommend multitasking as a very effective way of learning. Other non-academic purposes that these tools bring are videos, games, music, chats, surfing the Internet, among others.

**Survey question 3**
How are handheld mobile devices important to ISA and IG design students towards academic success?
Table 3. Importance of devices used for academic success

<table>
<thead>
<tr>
<th>Device</th>
<th>Not at all important</th>
<th>Not very important</th>
<th>Moderately important</th>
<th>Very important</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ISA</td>
<td>IG</td>
<td>Total</td>
<td>ISA</td>
<td>IG</td>
</tr>
<tr>
<td>Laptop</td>
<td>7</td>
<td>1</td>
<td>8</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(14%)</td>
<td>(0%)</td>
<td>(6%)</td>
<td>(2%)</td>
<td>(3%)</td>
</tr>
<tr>
<td>Tablet or iPad</td>
<td>21</td>
<td>5</td>
<td>26</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>(41%)</td>
<td>(7%)</td>
<td>(21%)</td>
<td>(18%)</td>
<td>(10%)</td>
</tr>
<tr>
<td>Smartphone</td>
<td>11</td>
<td>0</td>
<td>11</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>(22%)</td>
<td>(0%)</td>
<td>(9%)</td>
<td>(20%)</td>
<td>(9%)</td>
</tr>
<tr>
<td>E-reader</td>
<td>22</td>
<td>4</td>
<td>26</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>(43%)</td>
<td>(6%)</td>
<td>(21%)</td>
<td>(14%)</td>
<td>(14%)</td>
</tr>
</tbody>
</table>

Number of participants: ISA=51; IG=70; Total=121

In Table 3, more students rated Laptop as a very important device towards their academic success than the other devices. Furthermore, Smartphone is important towards the academic success of 94(78%) of the participants. Importance of Tablet or iPad and E-reader towards participants’ academic success is marginal.

Students have argued that using the Laptop and Smartphone helps their research work since the Internet contributes to their academic success. "I am very comfortable whenever I have my phone or laptop with me and it is connected. It makes me confident" (ISA Participant). Design students again find need for the use of laptops for their practicals. Another participant also said that "I run a lot of software [sic] on my computer that allows me to produce my artifacts" (ISA Participant). Technology has simply modified every aspect of our educational systems including our cultural and belief systems (Nilson & Weaver, 2005) "These days, it is difficult getting people for studio art...People no longer want to pose naked to be drawn...with 3D programs, it is easier, neater beautiful to communicate a message through art" (IG Participant). Ownership of Laptops and Smartphones are very vital to the success of students’ academic work. Like the rhizome that has no center and structuralized connection, these devices used by students are used to connect to people and resources at different levels and for different purposes.

As indicated in Table 3, students value handheld mobile devices that promote communication with other students about class related matters outside class sessions because, it creates a much more convenient learning environment for them. This finding supports students’ inclination towards technology integration in their learning (Boyd, 2014; Goode, 2010).

Survey question 4
How are handheld mobile devices important to ISA and IG design students towards academic success?
Table 4. Importance of handheld mobile devices to academic success

<table>
<thead>
<tr>
<th>Item</th>
<th>Not at all important</th>
<th>Not very important</th>
<th>Moderately important</th>
<th>Very important</th>
<th>Mean</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Access library resources</strong></td>
<td>ISA</td>
<td>IG</td>
<td>Total</td>
<td>ISA</td>
<td>IG</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>11 (22%)</td>
<td>4 (6%)</td>
<td>15 (12%)</td>
<td>12 (24%)</td>
<td>11 (16%)</td>
<td>23 (19%)</td>
</tr>
<tr>
<td><strong>Check grades</strong></td>
<td>5 (10%)</td>
<td>2 (3%)</td>
<td>7 (6%)</td>
<td>7 (14%)</td>
<td>6 (9%)</td>
<td>13 (11%)</td>
</tr>
<tr>
<td><strong>Register for courses</strong></td>
<td>12 (24%)</td>
<td>5 (7%)</td>
<td>17 (14%)</td>
<td>5 (10%)</td>
<td>16 (23%)</td>
<td>21 (8%)</td>
</tr>
<tr>
<td><strong>Use the course or learning management system (e.g., Blackboard, Moodle, Sakai, etc.)</strong></td>
<td>14 (27%)</td>
<td>10 (14%)</td>
<td>24 (20%)</td>
<td>8 (16%)</td>
<td>22 (31%)</td>
<td>30 (25%)</td>
</tr>
<tr>
<td><strong>Access information about events, student activities, and clubs/organisations</strong></td>
<td>9 (18%)</td>
<td>0 (0%)</td>
<td>9 (7%)</td>
<td>12 (24%)</td>
<td>4 (6%)</td>
<td>16 (13%)</td>
</tr>
<tr>
<td><strong>Read e-texts</strong></td>
<td>12 (24%)</td>
<td>3 (4%)</td>
<td>15 (12%)</td>
<td>15 (29%)</td>
<td>4 (6%)</td>
<td>19 (16%)</td>
</tr>
<tr>
<td><strong>Communicate with other students about class related matters outside class</strong></td>
<td>4 (8%)</td>
<td>0 (0%)</td>
<td>4 (3%)</td>
<td>0 (0%)</td>
<td>1 (1%)</td>
<td>1 (1%)</td>
</tr>
<tr>
<td><strong>Look up information while in class</strong></td>
<td>4 (8%)</td>
<td>0 (0%)</td>
<td>4 (3%)</td>
<td>8 (16%)</td>
<td>7 (10%)</td>
<td>15 (12%)</td>
</tr>
<tr>
<td><strong>Capture static images of in-class activities or resources</strong></td>
<td>4 (8%)</td>
<td>2 (3%)</td>
<td>6 (5%)</td>
<td>7 (14%)</td>
<td>8 (11%)</td>
<td>15 (12%)</td>
</tr>
<tr>
<td><strong>Record your instructor’s lecture or in-class activities (audio, visual, or both)</strong></td>
<td>7 (14%)</td>
<td>6 (9%)</td>
<td>13 (11%)</td>
<td>11 (22%)</td>
<td>21 (30%)</td>
<td>32 (26%)</td>
</tr>
<tr>
<td><strong>Participate in interactive class activities</strong></td>
<td>8 (16%)</td>
<td>2 (3%)</td>
<td>10 (8%)</td>
<td>12 (24%)</td>
<td>9 (13%)</td>
<td>21 (17%)</td>
</tr>
<tr>
<td><strong>Use the mobile device as a digital passport for access or identification</strong></td>
<td>12 (24%)</td>
<td>5 (7%)</td>
<td>17 (14%)</td>
<td>9 (18%)</td>
<td>12 (17%)</td>
<td>21 (17%)</td>
</tr>
</tbody>
</table>

On the whole, Table 4 shows that participants use handheld mobile devices to communicate among themselves about class related matters outside class sessions ($M=3.69$) was ranked 1st. Participants ranked 2nd the use of handheld mobile devices to look up information while in class ($M=3.45$). Checking of grades ($M=3.39$) and the Capturing of static images of in-class activities or resources ($M=3.29$) were ranked 3rd and 4th respectively. Though moderately important, Accessing library resources ($M=2.93$), Recording instructors’ lecture or in-class activities ($M=2.83$) and the Use of course or learning management system ($M=2.52$) were ranked as the last three in terms of the uses of handheld mobile devices for academic success.
Despite the proliferation of online technologies, 59% of the participants prefer a learning environment that is blended. This may come on the backdrop that some of their lecturers still train them through the traditional mode of delivery while they on their own accord, explore to use media technologies to translate the traditional mode to the digital or online mode. According to a participant, “it is not prudent to put your whole life online. In this era of load shedding, one must be versatile in the use of traditional and offline platforms too” (IG Participant). Those students who prefer completely online learning environments may have been trained that way for a very long time since their infancy.

It is valuable noting that there is statistically significant difference between the learning environment preference of ISA and IG design students. This may be as a result of both environmental and pedagogical reasons that need further research. These reasons range from the processes of admission into such programs. In ISA, one does not need any basic formal qualification in Design at high school level while in IG, it is a requirement to pass some elective courses such as General Knowledge in Arts and at least one other course in Visual Arts to qualify you admission into a bachelor’s course in Design.

**Null Hypothesis 1**
There is no statistically significant difference between the two institutions’ design students in terms of learning environment preferences.

<table>
<thead>
<tr>
<th>Preferred learning environment</th>
<th>Institution</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>t-value</th>
<th>df</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>One with no online components</td>
<td>ISA</td>
<td>51</td>
<td>2.53</td>
<td>.946</td>
<td>-3.667</td>
<td>119</td>
<td>.000</td>
</tr>
<tr>
<td>One with some online components</td>
<td>IG</td>
<td>70</td>
<td>3.10</td>
<td>.764</td>
<td>-3.667</td>
<td>119</td>
<td>.000</td>
</tr>
</tbody>
</table>

In Table 5, the mean score of preferred learning environment by design students ISA ($M=2.53$, $SD=.946$) was statistically significant different from the learning environment of design students IG ($M=3.10$, $SD=.764$); $t(121)=-3.667$, $p<.05$, CI95%[-.879, -.262]. Therefore, we reject the null hypothesis that there is no statistically significant difference between ISA and IG design students in terms of learning environments preferences. The differences may be as a result of the Laptop policies in place in the two institutions. It may also be as a result of the admission requirements that exist in both institutions. While a course in design at the high school is no prerequisite for prospective students in ISA, it is mandatory to have passes in at least two design related courses for consideration of admission in IG.
The different entry requirements in both institutions may be attributed in the results in Table 5. This means that students admitted to read Design in ISA may have very short time, may be months to decide to do so whereas, in IG, students would have practiced and have the idea of basic terminologies in Design long before admission. The Internet bandwidth may also not be an issue for both categories of students. Though students are unhappy about Internet services in their institutions, as much as possible, students provide their own Internet to supplement what the universities offer them. The Learning Management Systems may also not be a favorable platform for such students. According to an ISA participant, the institutional Internet nor Learning Management System did not support design education. “...this Internet is so slow and blackboard will never work for design students. We have to be thinking about appropriate Leaning Management Systems for design students because blackboard is not for us."

Null Hypothesis 2
There is no statistically significant difference between the two institutions’ design students in the use of handheld mobile devices to enhance academic work.

Table 6. Comparison of gender influence of design students and their learning environment preferences

<table>
<thead>
<tr>
<th>Preferred learning environment</th>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>t-value</th>
<th>df</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>54</td>
<td>2.89</td>
<td>.945</td>
<td>.326</td>
<td>119</td>
<td></td>
<td>.056</td>
</tr>
<tr>
<td>Female</td>
<td>67</td>
<td>2.84</td>
<td>.846</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On learning environment preferences of design students and their gender, the mean score indicated that there was no statistically significant difference between Male (M=2.89, SD=.945) and Female (M=2.84, SD=.846); t(121)= .326, p>.05, CI.95 -.270, -.376. Therefore, we fail to reject the null hypothesis that there is no statistically significant difference between male and female design students in terms of learning environment preferences. The learning environment preferences between male and female present no differences, according to Table 6. Design students irrespective of gender perceive a common learning environment towards success in their academic work. Gender, in most cases influence decisions made in academia. This shows gender representation does not play a major role in a digitally mediated world. Students cope with mediating tools irrespective of their gender and preferred learning environments rather than their gender representation (Boyd, 2014; Warburton, 2010). The results in Table 6 have implications on curriculum development for design.

Null Hypothesis 3
There is no statistically significant difference between the two institutions’ design students in the use of handheld mobile devices to enhance academic work.

Table 7. Comparison of design students and their use of handheld mobile devices for academic success by institution

<table>
<thead>
<tr>
<th>Handheld mobile devices</th>
<th>Institution</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>t-value</th>
<th>df</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISA</td>
<td>51</td>
<td>3.33</td>
<td>.683</td>
<td>-3.523</td>
<td>119</td>
<td></td>
<td>.001</td>
</tr>
<tr>
<td>IG</td>
<td>70</td>
<td>3.70</td>
<td>.462</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The mean score for use of handheld mobile devices to enhance academic success by ISA (M=3.33, SD=.683) was statistically significant different from IG (M=3.70, SD=.462); t(121)= -3.523, p<.05, CI.95 -.573, -.161. Therefore, we reject the null hypothesis that there is no statistically significant difference between ISA and IG design students in the use of handheld mobile devices to enhance academic success. The differences in the use of handheld devices can be accounted for by the differences in their device ownership and
uses. It is not surprising that Table 7 reveals that IG Design students use of handheld mobile devices for academic success is more than their counterparts in ISA (3.70>3.33). This is so because, results in Figure 1 show an average number of IG participants who own and use mobile handheld devices in comparison to ISA participants. Again, Figure 1 clearly points that more IG participants own Smartphones than their ISA counterparts.

CONCLUSIONS

In summary, the study sought to explore device ownership, use and the configuration of learning environment preferences of design students in ISA and IG (South Africa and Ghana, respectively). This study was in response to Barry et al.’s (2015, p. 209) recommendation for continuous need to pay attention to how socio- technological advances affect teaching and learning among students. Design students in the two institutions own, utilize and rate Laptop and Smartphone as very important tools for their academic engagement. Furthermore, the students generally prefer blended learning environment followed online learning environment. The study revealed no statistically significant difference in learning environment preference and gender of design students.

Design students in the institutions own and use various devices to promote their learning. Device ownership influences the way students learn and connect with their learning environment. The majority of students own Smartphones and Laptops. From the data, these basic tools of communication support learning (Table 2), however, the study established statistically significant difference between the two institutions’ design students in the use of handheld mobile devices to enhance their academic work.

Design students use Smartphones a lot, but they do not use Tablets as much as they use Laptops and Smartphones. Smartphones have small screens, and library portals usually provide a lot of information. Using library portals from Smartphones is probably not the best navigation experience one can have in a Smartphone. Googling, on the other hand, is pretty easy form for a Smartphone. Students’ look-up information while in class much more frequently than they access library or LMS probably, because, the library and LMS interfaces are heavy and not suitable to small screens. Findings on lookup contravene results found by Motiwalla (2015) where students had challenges look up due to application interface. Nonetheless, Motiwalla’s (2015) findings strongly support reasons why the students did not rank high “Access library resources.” A more interactive or improved library portal interface with additional features may increase the patronage of use. The later can be supported by McKnight’s, (2011, p. 4) arguments on the need to “place greater emphasis on rendering library digital content” for better access and use on digital devices.

Checking of grades on handheld devices is high and may be attributed to the students’ expectations of quick feedback on their academic performances. Again, navigating a Smartphone to check grades may be less complicated as compared to libraries and LMS. It is possible that the institutions’ expectations, and investments, are higher in library resources, LMS development and faculty training that are bottom ranked. Perhaps, due to institutional policies, the institutions and lecturers probably do not put much effort to make lecture rooms a ‘nice stage’ to students capture still images from in-class activities that is well ranked. Looking at the various preferred learning environments for students, they are able to quickly adapt to what the institutions provide them based on the expectations of the institution. This is evident in the responses in Table 4. Nonetheless, this adaptation may have some consequences to creativity which underpins creativity and technology transfer.

RECOMMENDATIONS

It is recommended that Learning Environments for Design Education by UoTs viz-a-viz institutional device ownership policies be revisited. A blended learning environment is
recommended because: 1. The majority of design students prefer and are inclined towards blended learning environments. 2. Device ownership among design students is reasonably large and the fact that UoTs strive to promote teaching and learning via different technological perspectives. 3. Further research into the suitability of blended learning environment for design education can be explored for its potentials.

Further research needs to be conducted on why there were statistically significant differences between ISA and IG design students in the use of handheld mobile devices to enhance academic success. Fundamental courses in design as a pre-requisite for admission in UoTs must be re-examined since it impacts greatly on performance and commitment of design students. It is finally recommended that a blended approach in designing learning environments for design education is worthwhile and must be considered by curriculum developers. The re-examination will help bring some creativity in the delivery methods of the courses leveraging on students’ inclination to blended forms of delivery and learning.

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MOOC-BASED CURRICULUM MODEL VALIDATION IN HIGHER EDUCATION IN IRAN

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ABSTRACT

The aim of this study is to validate MOOC-based curriculum in higher education in Iran. The research method is mixed and of exploratory type. Method of grounded theory is used in the qualitative section and the Validation Test Pattern among the faculties and PhD students of Tehran's Universities is considered in the quantitative part. The statistical population of the qualitative section include 14 experts in educational technology and the quantitative section include 214 members of the faculties and PhD students of Tehran's Universities who were chosen by Stratified random sampling. To collect data, we used semi-structured interview in the qualitative section and scholar's questionnaire in the quantitative part. Results show that there are 28 general issues in paradigmatic model is obtained which included Terms of cause, Central phenomenon, Underlying conditions, Confounding conditions, Strategies and Implications that reflected effective factor in MOOC-based Curricula in higher education.

Keywords: Higher education, MOOC-based curricula, data-based approach, validation.

INTRODUCTION

Although from more than two thousand years till now, fields of teaching and learning in comparison with other categories has little changes, assisting information technology it has rapid developments (Jerry, 2000). In recent years, virtual training was mentioned as an important applications of new technologies of information and communication in the world and extensive activities was started in this regard. According to the sweeping changes which taking place around, implementation of virtual systems in order to provide new services and technologies in the field of teaching and learning has been proposed as a fundamental requirement (Ong and et al, 2004).
Virtual training makes new paradigm and provides possibility of learning in any aspect, for everyone, in any time and any situation (Khan, 2004). Between different forms of virtual training in recent years, extensive and free online courses (MOOC) has substantial expansion (Siemens & Kathleen, 2012). These courses, especially higher education for adults, caused significant changes. MOOC causes the fundamental positive changes in the curriculum of higher education and in spite of their benefits in providing learning opportunities, it could make challenges and threats for higher education especially in developing countries (McAuley and et al, 2010). The extensive online courses (MOOC) could be a threat to the independence and autonomy of traditional higher education by its flexibility and accessibility (Beránek & Remes, 2012). These challenges and opportunities imply necessity and validation for MOOC-based curricula in higher education and affect all components of this type of curriculum. With good management and good infrastructure these challenges in order to optimal use of the opportunities, we could take full advantage of MOOC capacity in curricula and increase the effectiveness of higher education.

Identifying these threats and adopting appropriate strategies for managing them would help custodians the authorities and program planners of higher education to achieve MOOC’s goals in education system. Thus, it is important the changes that caused by this phenomenon on MOOC-based curricula in higher education, considered in a deep study, so that we could investigate its implications and influences on the key elements of this type of curriculum in the country’s educational system which based on the results of this study. Policies adopted by the higher education strongly affected on curriculum as a subsystem of higher education and have influence on higher education and its functions. The vital role of curriculum for higher education caused the formation of an important research in the field of MOOC’s effects Curriculum in higher education systems in different countries. This issue looks very important; especially in Iran that strongly concerned about development and looked forward in the way of the mission of higher education and curricula which provided Twenty-Year perspective realization.

MOOC, not only could reach an important role in the world of teaching and learning as an online training tool, but also knew as an intellectual wave which attracted many authors and researcher attention. Although this issue is doubtful in Iran, because not only MOOC is not used as the most important tool, but also there is still no research about this issue.

Theoretical Foundations and Background
In the world of online education, Acronym “MOOC” is not a new principle, this term was proposed on online training course in Connectivism and Connective Knowledge Discussion from the University of Manitoba in 2008. Looking for nature of the pervasive training program, this university make MOOC courses available for audience (Students were free to join the training course) and unbelievably, more than 2000 students registered in these courses (Kathy, 2013).

MOOCs are an online learning environment in which you could have pleasant experiences by holding these courses (Salmon, 2013). Like to get the opportunity to participate in laboratories-discussions-meetings in low-cost or even free (Pappano, 2012). These courses are designed to Promoting and supporting a large number of students in informative and strategic way and it shows Significant results from the discussions and reports and calculations. In the past few years MOOC affected traditional teaching methods, online and widespread. Increasing the use of technology in order to apply teaching methods would challenge traditional notions of teacher and learner engagement. It seems that MOOC is another source for teaching and learning, while we could say that it has much more appeal than other techniques (Parry, 2013). As there is no complete way of training, MOOC has some Bugs and defects too, and it is suitable for those who are interested in learning a particular field and don’t want to get certain Certificate. There is always a doubt for replacing Face to face training in universities and colleges with MOOCs (Kirschner, 2012).
Most of MOOCs designed for short courses for adults, up to now. This makes courses available and Favorite for a wide range of learners (Koller, 2012). The initial wave providing courses on topics for staff and students, coordinated developments in online technology and with limited Support-Typically focused on computer science and other technology. However, details of courses are covering a wide range of topics and Coursera plans (Parry, 2013).

Parker also expects future versions of the MOOC platforms allowed to form small directed groups by Students properties (Parker, 2014). Changes and moves in MOOCs are toward self-manage in which students could say “I know how to do it”. For example, "I can do your statistics or data analysis and my MOOC-based Certificate shows that”. Students could improve their learning experience with engaging in certain types of MOOC-based courses and attend in some cases that lead to certification course (Kirschner, 2013).

Four competences could be effective in continuing to learn and participation in MOOC-based courses that contained Knowledge of English, Prior knowledge on the subject, Thought range, Self-regulation and self-efficacy, and communication skills (Abeer & Bara k, 2013). Student participation also could be effective by four features which obtained MOOC Value that contained Clear explanations, visualize abstract concepts, support and communications, and a variety of assignments for students who had Lack of information and basic qualifications for entry. Otherwise, there is possibility of leaving by students during courses even if organizers designed MOOC well. Similarly, highly qualified students, in learning in bad-designed MOOC, probably might fail at the end of terms (Abeer & Barak, 2013).

The role of teachers in MOOC-based curricula contained answer the questions and discussions and public debates, solve the problems that students do not understand in video lectures, send a message to encourage students to participate in the forums, advise and encourage students to read literature and resources, send e-mail and announcements about the courses (Abeer & Barak, 2014). Analysis show that the role of teacher in MOOC is different from his role in traditional courses, because these course need to deal with the massive number of students from different cultures.

MOOCs should move toward a developed model to encourage universities to create the course for free. Probably the thing that should happen is some charities pay the price of courses. In some cases, MOOCs should develop commonly with the country in which will be used. It should also be in indigenous language. It also should not be done only by the most famous faculty and it might be done by Faculty of Education or College of Teachers (Mintz, 2015). Ben Daniel represented “University education is reaching the point of decreasing returns, because staffing costs is growing unbearably and the necessary changes must be provided (Daniel, 2012). While it hardly seems that MOOCs presented a complete cure for “Cost disease” of higher education (Bowen, 2012), many identified ways in which MOOCs might affect the current economic model of higher education in United States and outside that. Kalbaugh in Wake Technical College believes that MOOCs could play the role of University of opportunities to learn about low-cost, low-risk and perpetuity more affordable and give this opportunity to adults who are not looking for certificate (Kalbaugh, 2014). Colleges and universities might continue to provide fundamental skills and knowledge, but the flexibility of online learning provide learning experiences “just in time” during a career for a person (Acemoglu, Laibson & List, 2014).

About the impact of MOOC on higher education, Billington and FranMueller (2013) presented the possible scenarios in terms of its effects on higher education:

- MOOCs overcomes higher education in many universities.
- MOOCs are Bubbles, Stopped and disappeared.
- Universities could use MOOCs as Complement to their classes.
- Universities will be Supervisors of MOOC tests.
- Universities Collaborate with MOOC.
- MOOC give official permit of universities.
- MOOCs are the key tool for competency-based training.
Peercy, and Cramer noted that there is severe shortage of academic members for fulfilling rising demand for engineering documents in University of Wisconsin-Madison and he believes that MOOCs could play an important role in working on this concern (Peercy and Cramer, 2011). Similarly, Mintz from University of Texas, predicted the developed-MOOC could handle unmet needs for higher education in developing countries (Mintz, 2014).

There is valuable research about MOOC in higher education in developing countries. In a study on 83 learners who participated in MOOC courses that held by CCK08 in title of “Connectionism and Linking knowledge”, Finy (2009) Concluded learners though that certificate is not enough to motivate them for completing online course. In this regard, Mac Nice (2010) in his research studied on comments of 23 people in MOOC courses in title of “Connectivism and Connective Knowledge” which held by MIT University. The results of their study shows that learners had different percent of satisfaction because of options to choose training routines. Some of them like autonomy cause they knew that they could do anything they want, without criteria for evaluating and grading hindered their work. Some of them strongly needed guidance from teacher and some believed interaction between classmates were weak.

Koop (2011) in a research on 55 learners that participated in MOOC courses which was held by PLENK in title of “Critical writing courses and personalized learning, networks and knowledge contexts”, found out 77 percent of students believed that provided sources like daily emails which related to courses were enough for understanding the course even before the start. Participants were satisfied with gathering and sharing sources together or be familiar with them, but some of them launched to create digital media like blogs and the majority was over 49 years. In another study, Breslow (2013) in a research on 7161 learners that attended in MOOC courses was held by (edX) in title of “electronic circuits” and participated in survey of research, represented that the goal of learners company was the acquisition of knowledge and a higher chance of proposed work, or a personal challenge to evaluate their ability with MIT courses. 90% activities belonged to learners who had active participation and observed the posts. There is no relationship between age, gender or individual’s motivation or success. However, learners who had offline work with someone, had higher scores than who act alone.

Goh, Kaur & Chion (2014) in study in title of “Perceptions of MOOC based on activity theory” in 160 Malaysian students found out that most learners insisted on usefulness of MOOC courses in their learning and they claimed that their learning is enhanced. They were satisfied with MOOC courses and advised them to their Counterparts. Overall, students believed that MOOC courses could be an effective process to complete traditional teaching methods. Ulrich and Nedelcu (2015) in a study entitled “MOOC in our university: Hopes and fears”, perused the effects of MOOC courses on students participating in the courses of the University of Bucharest. The main question posed in this study is that how we could transform a new trend of training like MOOC to realistic and inspiring process? The method of this research was a case study in comprehensive university in Hungary in which they data collected through content analysis, interviews and online questionnaires. Research community included 67 undergraduate students of Faculty of Psychology and 33 members of the faculty. The findings indicate that MOOC’s expectations are unrealistic and they are not aware of their duty in their field. The feel of disability must be eliminated, too. It will be shared as syndrome among the academic communities.

Mercado and et al (2017) in study in title of “Connectivity of Learning in MOOCs: Facilitators’ Experiences in Team Teaching” in 135 facilitators in hybrid courses (cMOOC + xMOOC ) found out that the collaborative construction of knowledge is the most widely used strategy to promote learning connections in MOOCs and that its design is the biggest challenge that facilitators faced while carrying out their activities. In another study, in title of “Community tracking in a cMOOC and nomadic learner behavior identification on a connectivist rhizomatic learning network” Bozkurt and et al (2016) studied the literature on connectivism, connectivist MOOCs (cMOOCs) and rhizomatic learning by
examining participant interactions, community formation and nomadic learner behavior in a particular cMOOC, #rhizo15, facilitated for 6 weeks by Dave Cormier. As an explanatory mixed research design, Social Network Analysis and content analysis were employed for the purposes of the research. SNA was used at the macro, meso and micro levels, and content analysis of one week of the MOOC was conducted using the Community of Inquiry framework. The macro level analysis demonstrates that communities in a rhizomatic connectivist networks have chaotic relationships with other communities in different dimensions (clarified by use of hashtags of concurrent, past and future events). A key finding at the meso level was that as #rhizo15 progressed and number of active participants decreased, interaction increased in overall network. The micro level analysis further reveals that, though completely online, the nature of open online ecosystems are very convenient to facilitate the formation of community. The content analysis of week 3 tweets demonstrated that cognitive presence was the most frequently observed, while teaching presence (teaching behaviors of both facilitator and participants) was the lowest.

Overall we can say Studies about MOOC, although it is a new phenomenon, each year followed an ascending line and the number of research that has been assigned to it, was impressive. the goal of this research is validation of MOOC-based curriculum model in higher education in Iran. Answering the following questions were in the agenda:

1) What is the proper model of MOOC-based curriculum model in higher education in Iran, from the perspective of educational technology experts and technology higher education?
2) Which Credit did designed model of MOOC-based curricula in higher education have?

METHODOLOGY

The present study is a qualitative and grounded theory research. The research method is mixed and of exploratory type, which consists of two major qualitative and quantitative stages. In the qualitative stage, a semi-structured interview tool was used and in the quantitative stage a researcher made questionnaire was used (Creswell, 2004). In an exploratory plan, a measurement tool will be developed usually through a qualitative research. In the present study, quantitative measurement tools have been developed through qualitative study. The researcher first collects the required information through the qualitative research method. The collection of qualitative information leads to the description of many aspects of the phenomenon. This basic knowledge allows for the formulation of a hypothesis about the occurrence of the phenomenon under study. After this stage of research, in order to test the developed hypotheses, the researcher can validate the data from the qualitative stage using quantitative methods and then modify, replace or eliminate the factors that were less effective (Bazargan, 2010).

The grounded theory also provides an abstract analytical framework of a process. Participants in this study must all have experienced the intended process and the elaboration of this theory can be useful in explaining their mode of action, or provide a framework for future research (Creswell I, 2014). Accordingly, the grounded theory is a qualitative research project in which the researcher provides a general explanation (or a theory) of a process, action, or interaction which is the result of many participants' views (Strauss & Corbin, 2015). The grounded theory is performed during the open, axial, and selective coding process and in the form of a paradigm consisting of underlying conditions, causative conditions, mediator conditions, Central phenomenon, outcomes and strategies. In the present study, due to the subject of research and due to its novelty in Iran, the grounded theory has been used in order to design a model for a MOOC-based curriculum in higher education in Iran, as well as identifying and understanding the factors involved in this process, and also providing an abstract analysis of each of the components and the relationships between them.
Participants and Sampling

The statistical population of the study consists of two groups. The first group is composed of experts in the field of educational technology and higher education technologies throughout the country. These people have executive records and are experienced in attending these courses. The second group consisted of faculty members and Ph.D. students in educational sciences sub-disciplines in the academic year of 2016-2017, in public universities of Tehran where offered a PhD degree in educational sciences. This group consists of 476 people, including 90 faculty members and 386 PhD students.

In the first group, selected samples were individuals who had the experience of participation in or implementation of these courses, who can introduce the components of the MOOCs, based on which, they will provide accurate comments on the quality of the educational services in these courses. Therefore, in the present study, the criterion of membership in the sample group for the first group of people is to have such an experience at the time of the research. In this research, the sample size has been determined in a qualitative way through targeted sampling. Sampling continued until data saturation, and by interviewing the 14th person, theoretical saturation in the categories was achieved. As a result, 14 people were identified as the sample size in the qualitative section. These people also have significant publications and research activities in the field of educational technology, as well as management and executive background in the field of educational technology in higher education.

The second research community composed of the faculty members and Ph.D. students of the educational sciences (all sub-disciplines) of the public universities of the Ministry of Science where offered a PhD degree in educational sciences in Tehran. This group comprised of 476 people (386 students and 90 faculty members). From this population, 214 people were identified as sufficient sample size using Morgan Table. Subsequently, using proportional stratified sampling, questionnaires were distributed among the statistical sample group. In proportional stratified sampling, the sample size is proportionate to the population size (Gull et al., translator Nasr et al., 2004). In this research, a number of members of each university were selected for the sample population according to the size of the population of each university in the statistical population, and research questionnaires were distributed among them.

Tools/ Instruments

In the present study, semi-structured interview was used in the qualitative section which included a total of 34 questions about: strengths, weaknesses, opportunities and threats of MOOC for higher education curriculum; facilitating factors in resolving weaknesses and threats; fortifying factors in realization of strengths and opportunities; Reasons and philosophy of designing MOOC -based curriculum in higher education; Objectives, content, teaching- learning method and evaluation of MOOC-based curriculum in higher education; Mock-based curriculum strategies in higher education; as well as the consequences of a MOOC-based curriculum. The validity of qualitative data was reviewed by five non- attendant specialists. And its reliability was calculated 0.81 through intercoder reliability (two coders) (Miles & Huberman, 1994).

Data Analysis Method

In the qualitative section of the present study, open, axial and selective coding method for analyzing the interviews has been used. In this regard, first, in open coding, verbal evidence, basic concepts, and categories were extracted, which were considered as the basic findings in the subsequent coding stages of the research. After the open coding and extracting the categories and also after the axial coding and finding the relationship between the categories in the form of paradigm components (underlying conditions, causative conditions, mediator conditions, Central phenomenon, outcomes and strategies), the next step was selective coding and interpretation of relationships between categories. In the quantitative part, using raw scores from a questionnaire in a range of 1 to 5 for each response, a conceptual model for measuring the interaction between structures was obtained from the correlation calculation method (SPSS), path
analysis, and structural equation modeling (AMOS software). So, firstly, the relationship between variables is calculated by Pearson correlation method and then, by path analysis and structural equation modeling, the conceptual model of the research is more precisely calculated. By modifying the model and calculating the final fitted model, the proposed model for the study of the process dimension of the MOOC-based curriculum was presented. In this stage, descriptive statistics were also used. To determine the fitting of models in AMOS software, the fitting indices recommended in Yalahua were used (2000: 452).

RESULTS

Question 1
What is the proper model of MOOC-based curriculum model in higher education in Iran, from the perspective of educational technology experts and technology higher education?

Open coding phase: 930 Proposition initial concept

Axial coding phase: 28 general categories

A) Causes terms: 1- Emphasis on active learning; 2- Attention to individual differences and intrinsic interest of learners; 3- Expand interaction between teachers and learners; 4- Achievable goals; 5- Emphasis on the exchange of information and increase the range of people's information; 6- Using various and multiple resources; 7- The feedback of the curriculum

B) Central phenomenon: MOOC-based curricula in higher education: 1- goal; 2- Content; 3- Procedures; 4- assessment

C) Underlying conditions: 1- Strengths; 2- weaknesses; 3- Opportunities; 4- threats

D) Confounding terms: 1-combination of MOOC-based curricula and traditional training; 2- Professional ethics and Professional principles are utilizing MOOC; 3- Creating a culture of learning MOOC and the necessity of using them in the curriculum; 4- increased support from universities for MOOC; 5- Active participation of experts in the field of education and e-learning in designing MOOC

E) Strategies: 1- effective curriculum for MOOC; 2- Increase international relationships in higher education; 3- Social and cultural infrastructure for MOOC utilization; 4- have Strategic planning for MOOC in the field of higher education; 5- Apply good mechanisms of management for MOOC utilization

F) Implications: 1- Dynamic curriculum of higher education; 2- the possibility of reloading efficient education structure and university curriculum; 3- the possibility of Expansion of international relations in the curriculum of higher education

Selective coding phase: 6 dimension of paradigmatic model
Causes (7 Categories); Central phenomenon: MOOC-based curricula (4 Categories); Underlying conditions (4 Categories); Confounding terms (5 Categories); Strategies (5 Categories); results (3 Categories)

Figure 1. The process of coding and data reduction
In order to answer this question, through interviews with experts, major and minor categories about MOOC-based curricula in higher education is identified and the final conceptual model codified. The following chart shows trends in data reduction and the number of open code, axial and selective categories, it represented The paradigmatic model. In fact, the grounded theory approach, Sub-categories and features of each one related to the central issue which included causes, central phenomenon, Underlying conditions (environmental), confounding terms (mediator), Strategies and Implications.

**Question 2**
Which Credit did designed model of MOOC-based curricula in higher education have?

According to findings of the qualitative research obtained from paradigm pattern, hypothetical model is considered. Then, after removing non-meaningful routes, due to its compatibility with the findings of the qualitative analysis, satisfying model estimation indices and being meaningful statistical estimates are considered for provided data.
Table 1. Descriptive statistics and Pearson correlation coefficient based on the dimensions of the phenomenon, strategies, and outcomes

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<td>3. Opportunity</td>
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<td>0/649</td>
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</tr>
<tr>
<td>6. Mediated Terms</td>
<td>0/401</td>
<td>0/453</td>
<td>0/519</td>
<td>0/626</td>
<td>0/879</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Goals</td>
<td>0/483</td>
<td>0/526</td>
<td>0/609</td>
<td>0/635</td>
<td>0/729</td>
<td>0/656</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Content</td>
<td>0/393</td>
<td>0/424</td>
<td>0/519</td>
<td>0/572</td>
<td>0/624</td>
<td>0/643</td>
<td>0/596</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>9. Teaching</td>
<td>0/376</td>
<td>0/453</td>
<td>0/466</td>
<td>0/524</td>
<td>0/511</td>
<td>0/494</td>
<td>0/512</td>
<td>0/671</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Assessment</td>
<td>0/275</td>
<td>0/283</td>
<td>0/406</td>
<td>0/476</td>
<td>0/466</td>
<td>0/533</td>
<td>0/437</td>
<td>0/602</td>
<td>0/513</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Strategies</td>
<td>0/520</td>
<td>0/498</td>
<td>0/646</td>
<td>0/774</td>
<td>0/567</td>
<td>0/657</td>
<td>0/601</td>
<td>0/545</td>
<td>0/437</td>
<td>0/551</td>
<td></td>
</tr>
<tr>
<td>12. Consequences</td>
<td>0/397</td>
<td>0/458</td>
<td>0/476</td>
<td>0/522</td>
<td>0/790</td>
<td>0/694</td>
<td>0/550</td>
<td>0/534</td>
<td>0/442</td>
<td>0/446</td>
<td>0/567</td>
</tr>
</tbody>
</table>

As Table 1 shows, all relationships between variables in conceptual model were positive and meaningful; min= 0/275, max=0/879, M=0/540, SD=0/115. For a more accurate calculation model, estimation calculated with Structural equation modeling in the study sample data. According to proposed corrective measures in AMOS software, Conceptual Model corrected for achieving higher estimation levels.

![Figure 3. Estimated conceptual model](image)

Note: *: Coefficients were significant at levels of alpha 0/01 to 0/05; **: Coefficients were significant at smaller levels of alpha 0/01; Solid lines represent meaningful routes and Dots represents routes in the conceptual model; Errors and dimensions of latent variables didn’t draw to avoid the complications.
As specified in Figure 3, straight path of Underlying conditions has not shown statistically significant results. On the other hand, causes terms mediated relationship of central phenomenon with underlying conditions, Confounding terms, Strategies and results. Central phenomenon in spite of impress from underlying conditions, causes terms and Confounding terms, in mediation impact of these variables on strategies had significant role. As you can see results were mostly impressed directly by causes terms. Causes terms also related indirectly to underlying conditions and results (b= 0/471, p < 0/05). Finally, Strategies just had 0/18 relation with results.

Table 2 Shows The results of the Estimating of Figure 2.

<table>
<thead>
<tr>
<th>CMIN/DF</th>
<th>P</th>
<th>SRMR</th>
<th>GFI</th>
<th>AGFI</th>
<th>NFI</th>
<th>RFI</th>
<th>IFI</th>
<th>TLI</th>
<th>CFI</th>
<th>RMSEA</th>
<th>PCLOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowable Amount</td>
<td>5&gt;</td>
<td>&gt;0/05</td>
<td>0/08&gt;</td>
<td>0/90≤</td>
<td>≤0.90</td>
<td>≤0.90</td>
<td>≤0.90</td>
<td>≤0.90</td>
<td>≤0.90</td>
<td>0/08&gt;</td>
<td>&gt;0/05</td>
</tr>
<tr>
<td>Observed</td>
<td>0/936</td>
<td>0/422</td>
<td>0/007</td>
<td>0/996</td>
<td>0/970</td>
<td>0/997</td>
<td>0/987</td>
<td>1/000</td>
<td>1/000</td>
<td>1/000</td>
<td>0/001&gt;</td>
</tr>
</tbody>
</table>

As Table 2 shows, all estimating indicators were within the allowable range. Thus conceptual model after correction showed good estimation with data. The corrections included removing direct route to the consequences of the underlying condition; added direct route from causes terms to confounding terms, Strategies and results; and adding direct route of confounding terms to Central phenomenon.

DISCUSSION AND CONCLUSION

Nowadays, increasing the volume of knowledge and information, rapid Obsolesce of lessons, rapid changes in societies and unpredictability of the future, needs for education and continuous learning instead of Sectional training. In this regard, efficient and effective use of educational technologies contributed in lifelong learning and facilitate its realization. Therefore, the importance and necessity of putting together comments of experts are a way for using new, critical and important technologies so that we can achieve the maximum benefit from new educational technologies like MOOC.

As revealed in this study, an important strategy in MOOCs is developing efficient curricula. While technical and scientific infrastructures are necessary, learning and teaching are not possible without efficient performance of the curricula. This means that online curricula in general and MOOCs in particular need constant revision in terms of plans and ceaseless accumulation of knowledge by, not only the professors but also, the planners. It is easy to understand from the results that any useful performance requires scientific, technical provisions and facilities and teachers who promote their knowledge along with these novel technologies to ensure high quality teaching. All these requirements are possible with a proper planning and an efficient organization of the curricular elements.

Another major strategy in applying MOOCs in curricula has to do international relations in higher education. This is particularly significant considering the need to keep up with present level of knowledge by developing countries like Iran. In fact, higher education plays a vital role in national development since it is responsible for creating innovations and training committed educated human power for various sections. This development is realized only if higher education undergo radical reforms and its activities attain international standards. Professors and curricular planners must base their efforts on this and lead students toward the goals, a success achieved by excellent supervision and management of higher education and planning curricula according to international criteria and effecting proper changes in knowledge, skills, and attitudes of learners. International criteria such as increased interactions between professors and academia worldwide, following pioneer excellent campuses, emphasizing international educations, etc., rely on strengths and performance of professors and officials.
Socio-cultural preparation for using MOOCs is another strategy in applying MOOCs in curricula. Socio-cultural contexts in higher education must be shaped in order to be able to accommodate novel attitudes. Despite being free of charge, MOOCs do not consider local culture and milieu and this makes them difficult to understand for oversea learners (Obeer and Barak, 2014; Chafkin, 2013).

Through MOOC-based curricula, planners, designers and managers have access to communication technology, new tools and methods. Thus, conventional teaching methods change and users encounter vast spectrum of info and knowledge. Wrong perceptions and misunderstandings among professors affect the application of MOOCs in curricula. No educations take place in void. The education including MOOCs takes place in the social context of the life of students and professors, both influencing the environment and influenced by it. This reciprocity has more to do with culture. Culture does shape the beliefs and attitudes of professors and students. This means that an open flexible culture encourages professors and students to cultivate positive views toward new technologies.

Strategic plans in application of MOOCs in higher education is another major strategy. Higher education in Iran has considerable growth recently and has brought about radical transformations in a number of scientific fields. Higher education in Iran is about to enter to a new era thanks to new technologies like MOOCs. One major challenge for this higher education is to sustain self-sufficiency and financial reward while offering high quality education in form of MOOC-based curricula. Thus, it is necessary to develop vivid strategies to attain this. Offering MOOCs makes higher education in Iran define and justify its audience, value, and e-commerce. In other words, strategic planning is a way to effect the roles and actualize the goals of higher education. Strategic planning is not limited to designing MOOCs and applying them in higher education but is a tool to determine the multiple grand policies in higher education and to reform and strengthen them. This has to do with harmonizing various activities of various sections in higher education and developing capacities and opportunities based on institutionalizing MOOCs in higher education.

One of the most basic strategies that determine efficient application of MOOCs in higher education is proper management of optimal use of MOOCs. In order for higher education to develop by exploiting new technologies like MOOCs and in the shortest time possible with the least expenditures, all national and local resources and facilities must be arranged accordingly. Here, a comprehensive considerate perspective toward human/non-human aspects can be useful. Therefore, identifying and employing all factors, potentials, capacities and abilities within higher education stands as the primary effort in efficient application of MOOCs. Human and societal elements, on one hand, and exploiting all local, social, and cultural capacities and infrastructures and supports, on the other hand, are important. Identification of these capacities both helps planners and developers and helps specify the proper kinds of businesses in higher education as a primary step.

All in all, it is fair to say that these strategies are vital to an effective application of MOOC-based curricula in higher education and to get positive results. In what follows, three chief consequences of MOOC-based curricula in Iran are explained: One consequence that research subjects noted is the increased dynamism in collegiate curricula. Downs (2008) stresses flexible educational experience for learners. Flexibility created by MOOCs allows students to use them wherever accessible (Levi, 2011). This initiates a Feedback cycle. Another consequence that present paper anticipates for MOOC-based curricula has to do with increased international ties in higher education. As Potter (2013) understands it, MOOCs plays a significant role in making education international and developing oversea educational projects.

An effective revision of education system and collegiate curricula is another consequence of higher education curricula examined in this study. With emergence of MOOCs and the shift from qualification by degree to qualification by institutions producing MOOCs, a
reconsideration of education system and educational quality is inevitable. This hopefully means more efficient education.

This research led to design the model of MOOC-based curricula in higher education according to grounded theory. MOOC-based curricula as a central issue that other Components (Causes terms, Central phenomenon, Confounding terms, Strategies and Implications) Organized with its centrality. The mission of these components is help for realization elements of curriculum. According to conceptual research model, elements of MOOC-based curricula in higher education included purpose, content, teaching-learning methods and assessment which are in a cyclical relationship with each other. The elements of curriculum are based on causes terms and has some results. In fact, effective realization of elements and their relationship with each other is possible through results; Terms of intervention affected this process. These terms and procedures had results in higher education. All these interactions happened in situation in which strengths, weaknesses, opportunities and threats prepared necessary condition for it.

The model obtained in this research is a feasibility study on implementation of MOOC in Iran's higher education system. Aspects and the possibility of realization and implementation of it have been examined from the perspective of experts. The point to be addressed is that in addition to the designers view, the users' views are very essential. Students' views as key users of MooCs play an important role in the successful implementation of MOOC and models of this kind. In this regard, we can refer to a model in the field of MooCs designed by Xiao and Pardamean (2016) in Indonesia, which is consistent with the needs and demands of both developers and users.

On validating model of research in order to determine the amount and nature of that relationship, it is shown that central phenomenon affected by causes terms, confounding terms and has medium role on the impact of these variables on strategies. This indicates that Central phenomenon which is formed by elements of MOOC-based curricula, has a pivotal role in the model that matched with its mission in Strauss and Corbin paradigm pattern (2016). In this pattern, Central phenomenon is an axis that other elements and their relation organized by it and around it. Furthermore, it was observed that results mostly affected from causes terms. Probably it is because determine the logic of curriculum at the time of its design, is very important and it could obtain curriculum’s path and its results. This importance become clear when we see in estimated model, causes terms are mediator in connection between Underlying conditions and Central phenomenon, mediated conditions, strategies and results. The validity of the findings, relations between components shows that MOOC-based curriculum take place during the process of action / interaction among components. Actions and relationships between model components, represents a systematic plan that should be considered in any type of MOOC-based curriculum. Determine the severity of the impact and effectiveness of each component of the model could be helpful in decision-making and process design in the curriculum of higher education administrators and planner's curriculum.

We should consider some important points in using MOOCs; that there is not The growth and assimilation in developing countries in comparison with developed countries in MOOCs and these countries in the near future according to the spread of MOOC in education, would suffered from challenges posed by the import of it. This issue for all developing countries is highly likely and inevitable and Iran also is not an exception. The continuation of this problem will form a new colonialism in the world which in this time, shown in the form of training and education of the younger generation that is far more dangerous than the old colonial. Therefore, it is necessary to perform Indigenous production and sharing global production and stay ahead in this area, along with utilizing MOOCs in higher education and Took advantage of its benefits.
At the end, we mentioned Operational research proposals which include:

- The proposed conceptual model in research could be paced as a basis for the development of MOOC-based curriculum in University of Tehran and other centers of higher education.
- Curriculum inferred from this study performed in one of the Public Universities of Tehran, for trial.
- We recommended to directors and administrators of universities and centers of higher education to launch necessary support as mediator terms which obtained in this research.
- Based on the results of this study, it is very important to consider underlying conditions and to plane for strengthen and optimize its procurement, as Conditions affecting all components and factors involved in the MOOC-based curriculum design.
- According to the crucial role of causes terms in the MOOC-based curriculum in this study, legitimizing and Justifying the beneficiaries of higher education in the design and implementation of such program, would help Enhance functionality and effectiveness.
- According to the regulation authority in compiling and reviewing the curricula of universities having an audit board, we suggested that MOOC Designed Curriculum Within each university perform with the participation of educational technologists, faculty, planners and administrators in it. These partnerships inside the university in Codifying MOOC-based curriculum, reduce possible resistance that could happen by some people within the university and facilitate MOOC curriculum in university.

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REFERENCES


MODELLED THE DETERMINANTS OF EFFECTIVE ONLINE TUTORING PROGRAMS

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Tangerang Selatan, Indonesia

ABSTRACT

Determinants of effective online tutoring program were modelled and elucidated in this report. It was aimed at clarifying influential factors, how and in what behaviors they were interrelated observed by Universitas Terbuka students. Exploratory-design was adopted; it was qualitatively ascertained first that conceptually five foremost factors involved. They were operationally instigated as: perception of technology, rational for using Internet, perception of media support; tutor learning strategy; effective online tutoring support. Quantitatively, they were independent, moderating and dependent variables respectively. Instruments in the form of list of queries and questionnaires for qualitative and quantitative purposes respectively were elaborated related to those five variables involved. Respondents were proportionally selected by distributing 600 questionnaires to 5,500 students under scholarship scheme, 283 were finally completed. Seven out of nine hypotheses established were validated using structural-equation model (SEM). It was detected that effective online tutorial was influenced by tutor learning strategy followed by rational for using Internet and perception of technology. Tutor strategy was influenced by rational using Internet and perception of technology. Perceptions of technology and media support were influenced by rational using Internet. Inattentively, qualitative approach was improperly verified by quantitative, since effective tutoring and tutor strategy were not influenced by media perception.

Keywords: Exploratory-design, online tutorial, tutor learning strategy, SEM.

INTRODUCTION

This study is an augmentation of comparable piece of work on the determinants of effectual online tutorial support in Open Distance Learning (ODL) setting as reported by Rustam, Haliman, Susanty, and Sembiring (2015) with modified initial operational framework and different respondents. This kind of study is still pertinent to be sustained as global stream of an online learning and its advantage as a result of how Internet technologies integrated well with ODL are extensively explored within this couple of decades. With an exponential advancement in information and communication technology (ICT), online tutorial has become increasingly well-liked approach for most of distance learners (Zang, Perris & Yeung, 2005). This represents various prospects for the continued progression of ODL by providing current prospective students with larger flexibility and prospect for obtaining quality education (Devine & Lokuge, 2012). Integration of Internet technologies will potentially enhance student connectivity in ODL ambience and strengthen the learning environment with emerging accepted technologies and tutor contributions (Susilo, 2014; Price, Richardson & Jelfs, 2007), including on the online technology self-efficacy related to the type of media used (Kobayashi, 2017).

Up to the mid of 1990’s, including in Indonesia milieu, learner isolation issues have been revealed as a common problem in ODL framework and it is ordinarily remarked as the driving force of student dropout or attrition (Bean, 1985; Tinto, 1993; Sembiring, 2014).
By a fastidious understanding, approaching to the end of 1990’s, Universitas Terbuka familiarized the online tutorial services to bridge student gap in accessing and acquiring information, services, and academic supplies. The University has endorsed prominent roles within the country as well as in the neighboring regions by offering 179 courses through the online tutoring regularities as the beginning of a real online learning scheme. Since then more than 800 courses totaling of plausible courses offered have been switched into entirely or partly incorporated into online delivery mode (Universitas Terbuka, 2017). These numbers are complied harmoniously with respect to what was quantified in the University’s strategic and operational plan earlier (Universitas Terbuka, 2015).

Student body in 2016 for instance was totaled to 297,897. Given those facts, it is more likely that the number of students participating in this service would probably be approaching to a million student-course. These numbers come from calculating student takes three to four courses per semester. In realization nonetheless, around 600,000 student-course were participated during 2016 academic year (Universitas Terbuka, 2017). All the same, the final grade was contributed up to 30% from the online tutorial activities. It implies that the participation rate on this service was considered to be low.

It is therefore right to anticipate how the online tutorial service did support a flexible and rich learning environment to deliver a high quality and efficient ODL operations through Universitas Terbuka tradition. Additionally, there is a limited revelation in how to create and upgrade those tutorial supports substantively by means of online technologies so that the supports are entirely effective, accessible, and beneficial to all students as users. The study was therefore aimed at explicating variables and dimensions engaged that influencing to the effectiveness of the online tutoring scheme. It was also important to distinguish how all factors engaged were interrelated one another and in what behaviors. Investigation is guesstimated utilizing mixed methods, i.e., exploratory-design.

THE CONCEPTUAL FRAMEWORK

The significance of long-established traditional teaching and learning schemes has been challenged ever since as more educationalists are searching for alternate approaches of presenting learning materials, engaging more students, and concurrently increasing their academic performances. As a consequence, the use of both computers and Internet had become an integral part of teaching and learning process. This prologue is recapitulated by Guy and Lownes-Jackson (2012) and also adding to which that computers and Internet had facilitated the growth of online tutoring support as the media of learning for student across countless branches of disciplines.

Referring to the objective of the study, factors and associated dimensions of effective online tutorial supports are expansively investigated. Effectiveness of online tutorial is in general determined by various factors. Qualitatively, it was limited to four main factors, partially and comparatively inspired by Zhang, Perris and Yeung (2005), Rossel-Aguilar (2007), Shin and Kang (2015) and Mbatha (2015). They are: perception of technology, rational for using Internet, perception of media support and tutor learning strategy.

Effectual online tutorial support is referred to as having prearranged design (Mitchel, 2005), highly interactive (MacKinnon & Williams, 2006), with quick-response feature (Varnhagen & Digdon, 2002) and positively contributive to students final grade (Wilson & Harris, 2002). Perception of technology is denoted of possessing comfortable and gainful procedure (Sweeney & Ingram, 2004), promptness (Lee, Cortney & Balassi, 2010), accuracy (Koch & Gobel, 1999) and embeded traceability trait (Bliwise, 2005).

Rational for using Internet is described as retaining effectiveness or efficacy (Bolliger & Supanakorn, 2011), accessibility (Jain, 2006), communication (Elicker, O’Malle & Williams, 2008) and simplicity or easiness when utilized by students (Osborn, 2010).
Perception of media support is expressed as preserving aspects on availability and friendliness (MacKinnon & Williams, 2006), integration or methodical (Lenz, 2010) and connectedness (Talmadge & Chitester, 2010). Tutor learning strategy is extracted to conserving discussion (Dawson, 1998), initiating group work (Cheng & Swanson, 2010), the style of tutor in teaching and learning process (Benham, 2002; Keefe, 1979), and providing related referral sources (Talmadge & Chitester, 2010) for rendering students appreciating the online tutoring sessions.

Having acknowledged and amalgamated the results as the follow up of interviews and focus group discussions with respect to the literature review accomplished in advance (as part of qualitative process), it comes to rectify them comprehensively. They are systematized to ease the establishment of the research framework as illustrated in Table 1. The ultimate of these processes will be ending up with the research framework and hypotheses that will be taken care of statistically afterward. This table is used as the basis of establishing the operational framework of the study for quantitative method.

<table>
<thead>
<tr>
<th>No</th>
<th>Variables</th>
<th>Dimensions</th>
<th>No</th>
<th>Variables</th>
<th>Dimensions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Effective online tutorial support</td>
<td>Y&lt;sub&gt;1&lt;/sub&gt;: Contributive, Y&lt;sub&gt;2&lt;/sub&gt;: Interactive, Y&lt;sub&gt;3&lt;/sub&gt;: Responsive, Y&lt;sub&gt;4&lt;/sub&gt;: Prearranged</td>
<td>2</td>
<td>Perception of technology</td>
<td>X&lt;sub&gt;1&lt;/sub&gt;: Promptness, X&lt;sub&gt;11&lt;/sub&gt;: Accuracy, X&lt;sub&gt;12&lt;/sub&gt;: Traceability, X&lt;sub&gt;13&lt;/sub&gt;: Gainful</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Rational for using Internet</td>
<td>X&lt;sub&gt;21&lt;/sub&gt;: Accessibility, X&lt;sub&gt;22&lt;/sub&gt;: Easiness, X&lt;sub&gt;23&lt;/sub&gt;: Expansiveness, X&lt;sub&gt;24&lt;/sub&gt;: Efficacy</td>
<td>4</td>
<td>Perception of media support</td>
<td>X&lt;sub&gt;3&lt;/sub&gt;: Methodical, X&lt;sub&gt;31&lt;/sub&gt;: Friendly, X&lt;sub&gt;32&lt;/sub&gt;: Availability, X&lt;sub&gt;33&lt;/sub&gt;: Connectedness, X&lt;sub&gt;34&lt;/sub&gt;: Connectedness</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Learning strategy of tutor X&lt;sub&gt;4&lt;/sub&gt;</td>
<td>X&lt;sub&gt;41&lt;/sub&gt;: Style, X&lt;sub&gt;42&lt;/sub&gt;: Group work, X&lt;sub&gt;43&lt;/sub&gt;: Referral source, X&lt;sub&gt;44&lt;/sub&gt;: Discussion</td>
<td></td>
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</tbody>
</table>

Having considered the summary exhibited in Table 1, it is now on the right step to establish the operational framework and hypotheses of the study. The framework, as illustrated in Figure 1, will be analyzed afterwards under quantitative procedures with the help of structural-equation model (SEM). SEM is a multivariate statistical analysis technique that is utilized to analyze structural relationships. SEM is the combination of factor analysis and multiple regression analysis. It is applied to analyze structural relationship between measured variables and latent constructs. It is preferred by most researcher for it estimates the multiple and interrelated dependence in a single analysis.

**THE DESIGN AND HYPOTHESES**

This study is conducted following mixed methods, i.e., exploratory-design (Creswell & Clark, 2011). The research is predetermined instigated using qualitative procedure first and then followed by quantitative series. Two kinds of instruments are prepared. The first is in the form of list of systematic and unified questions for in-depth interviews and focus group discussions for qualitative purpose. The second is an instrument in the form of questionnaire for quantitative purpose to gather required data from eligible respondents by survey. The ultimate objective of qualitative series is to establish the operational framework and hypotheses of the study as illustrated in Figure 1.

Figure 1, as an auxiliary elaboration of Table 1, authorized highlights of four identified variables influencing effective online tutorial support (as the dependent variable, Y). They are: perception of technology (X<sub>1</sub>), rational for using internet (X<sub>2</sub>), perception of media support (X<sub>3</sub>), and tutor learning strategy (X<sub>4</sub>); where X<sub>1-3</sub> and X<sub>4</sub> are the independent and moderating variables respectively.
The quantitative instrument consisted of 60 questions; Likert Scale 1-5 and related to the five variables engaged. It implies that each variable has four dimensions and each dimension is measured by three questions. This approach is meant to quantitatively address the conceptual framework in operational level to be better organized on the model, design, hypotheses, survey and sampling techniques, data collection and analysis, and inferring the final remarks.

Variables are explored through questionnaire following Tjiptono and Chandra (2011). Six hundred questionnaires were provided and distributed to 5,500 Universitas Terbuka students under scholarship program through entirely 39 operating regional offices all over Indonesia. A survey is started to assemble acquired data (Fowler, 2014). A purposive sampling technique for qualitative procedure was chosen to determine eligible resource persons as experts in the study. Proportional sampling technique was preferred to determine eligible respondents for quantitative purpose by providing 600 questionnaires (Cochran, 1977; Sugijono, 2012). Each regional office acquires 15 set of questionnaires to be completed by selected students during March 2017.

After cautiously verifying, 283 out of 600 distributed questionnaires are finally completed and processed. SEM is then applied to distinguish the pattern, power and behavioral relations amongst all variables and dimensions engaged as the reflection of those 283 complete returned questionnaires (Hair, Black, Babin & Anderson, 2009). Processed data were then arranged in the form of related figure and table completed under Lisrel version 8.80 as the end upshots of the study (Wijayanto, 2008).

The study therefore scrutinizes nine hypotheses (Figure 1). They are: effective online tutorial is influenced by perception of technology ($H_1$), tutor learning strategy ($H_2$), rational for using Internet ($H_3$), and perception of media support ($H_4$). Additionally, tutor learning strategy is influenced by perception of technology ($H_5$), rational for using Internet ($H_6$), and perception of media support ($H_7$); perception of technology ($H_8$) and perception of media support ($H_9$) are also influenced by rational for using Internet.

**RESULTS AND DISCUSSIONS**

Before depicting the final quantitative results, it is valuable to show the characteristics of respondents as illustrated in Table 2. This will amplify our understanding related to the qualitative and quantitative procedures utilized sequentially. The results of analyses are detailed in the following interpretation accordingly with relevant figure and table.
Having observed the characteristics of respondents as illustrated in Table 2, we are now moving to the results of SEM analysis especially on the results of hypotheses assessment and the loading factors analysis as illustrated in Figure 2.

![Figure 2. Results of hypotheses and the loading factors](image)

Before describing and interpreting the results, it was confirmed under SEM output that the data is statistically valid and reliable. This implies that further step can be performed. Figure 2 obviously exposes that two out of nine hypotheses scrutinized are not validated by the analysis. They are: (1) perception of media support to effective online tutorial (X3 to Y where $H_4=-0.78$) and (2) perception of media support to tutor learning strategy (X3 to X4 where $H_7=0.88$). These two hypotheses are not authenticated by the analysis since the $t$-values $\leq 1.96$ (for $\alpha=5\%$). This means that statistically the effectiveness of an online tutorial scheme and tutor learning strategy are not positively and significantly influenced by perception of media support respectively. We will observe later whether or not the gap found in this stage is in a highly contradictory degree; whether they differ in conceptual and/or operational frameworks or partly only in the rank of the dimensions (in a lower level of meaning).
In addition, the other seven hypotheses are positively and quite significantly validated by the analysis. They are: (1) $H_1=3.59$ (perception of technology to effective online tutorial; $X_1-Y$), (2) $H_2=4.41$ (tutor learning strategy to effective online tutorial; $X_4-Y$), (3) $H_3=2.99$ (rationale for using Internet to effective online tutorial; $X_2-Y$), (4) $H_5=2.32$ (perception of technology to tutor learning strategy; $X_1-X_4$), (5) $H_6=2.51$ (rationale for using Internet to tutor learning strategy; $X_2-X_4$), (6) $H_8=6.39$ (rationale for using Internet to perception of technology; $X_2-X_1$) and (7) $H_9=5.42$ (rationale for using Internet to perception of media support, $X_2-X_3$), since all of the $t$ values $\geq 1.96$ (for $\alpha=5\%$). These imply that from statistical outlooks effective online tutorial support is significantly influenced by perception of technology, tutor learning strategy and rational for using Internet. Besides, tutor learning strategy is influenced by perception of technology and rational for using Internet; rational for using Internet influences both perception of technology and perception of media support.

Having confirmed the results of hypotheses testing, we are now in the position of relating the loading factors behavior. They are applied to tangibly discern the relations power of each of the participating variables and their comportments. They are accomplished under SEM, in the frame of factors affecting effective online tutorial support, to work out the end results by following Wijayanto (2008) and Hair, Black, Babin and Anderson (2009). Now, let us focus again on Figure 2. There are five details need to be methodically elaborated prior to concluding the final ends under the quantitative approach.

The first is related to the utmost influential factor to the effective online tutorial variable. The analysis obviously confirmed that tutor learning strategy ($X_4$ to $Y=0.68$) is the most influential factor to effective online tutoring program then successively followed by perception of technology ($X_1$ to $Y=0.44$) and rational for using Internet ($X_2$ to $Y=0.32$); whereas perception of media support was excluded by the analysis. This means that most respondents considered strategy of tutor and how they managed activities in each and every session of tutorial session was exceptionally a big deal. This also implies that effective online tutorial support to certain extent was forced by external force and out of student control; as rational for using Internet, perception of technology, and perception of media factors are intrinsically within student controls.

Besides, the dimensions within tutor learning strategy placed style ($X_{41}=0.89$) by most respondents as the highest aspect in controlling tutor learning strategy. This is consistent to what was previously obtained from the qualitative inquiry. The other three dimensions are successively described as follows: group work ($X_{42}=0.85$), discussion ($X_{44}=0.82$) and referral source ($X_{43}=0.72$). These results imply that most of respondents believed tutor strategy, especially the style, was able to motivate students to be more involved in the group work, induce discussion among themselves and search for related academic source by their own way and available time. Reasonably, these are also the general impressions obtained from the preceding qualitative inquiry.

The second is associated with factors affecting tutor learning strategy ($X_4$). Conceptually, it was influenced by perception of technology ($X_1$), rational for using Internet ($X_2$), and perception of media support ($X_3$). Having carefully assessed, however, perception of media support ($X_3$) had no effect on the tutor learning strategy ($X_4$). Tutor learning strategy was influenced by rational for using Internet ($X_2=0.29$) and then followed by perception of technology ($X_1=0.27$). This means that rational for using Internet clearly had more effects than that of perception of technology with respect to the tutor learning strategy. Students positioned rational for using Internet is more likely to have influenced on the online tutorial support directly and/or indirectly as compared to the perception on the technology.

Some respondents not only agreed upon quantitative effects at the variable level but also in the ranks of the dimensions. Respondents concurred that by having a good sense on rational for using Internet will certainly help them to get hold the easiness ($X_{22}=0.82$),
access ($X_{21}=0.80$), expansion ($X_{23}=0.80$), and efficacy features ($X_{24}=0.79$) related to the chances of obtaining interactive and contributive online tutorial support. Moreover, respondents viewed accuracy ($X_{12}=0.84$) as the most influential dimension of rational for using Internet and then followed by gainful ($X_{14}=0.81$), traceability ($X_{13}=0.77$), and promptness respectively ($X_{11}=0.76$) in conjunction with an interactive and contributive online tutoring support.

The third consequence, on the rational for using Internet which affected perception of technology ($X_2$ to $X_1=0.63$) and perception of media support ($X_2$ to $X_3=0.56$). These two outputs show that perception of technology was much more affected by rational for using Internet rather than that of perception of media support. Most of respondents learned that to get advantages of interactive and contributive online tutorial support are more likely to have achieved by having a good rational for using Internet as compared to perception of media support. They were true in most cases. Given that to certain extent the ICT were characterized by various advantages, student would be more entertained by the online tutorial support. It is essentially critical to possess the perception of media support but in fact it had no effect on the online tutorial in this inquiry.

The fourth is relationships between perception of media support with tutor learning strategy and effective online tutorial scheme. It was actually disturbing that under statistical procedure the perception of media support has no effects to both tutor learning strategy as the moderating and effective online tutorial scheme as the dependent variables. Theoretically, at least perception of media support influenced either effective online tutorial supports directly or indirectly through the moderating variable, i.e., tutor learning strategy. It seems that further prudent inquiry is necessary to envisage how and why it unpredictably just goes like that.

The fifth is a gap between qualitative versus quantitative results. Initially, it was established four main variables associated with the effective online tutorial support. Based upon that basis, the conceptual framework was developed to be quantitatively validated. Nine hypotheses were statistically scrutinized. After all, two of them were not statistically validated by the analysis. This implies that the quantitative results were not comparatively harmonious with the qualitative structure as formerly established.

Having perceived the quantitative and qualitative upshots, the results were distinct and somewhat contradicting one another. Is it so? Effective online tutorial support was not directly influenced by one of independent variable. Under quantitative routines, there are three motives why it might happen so. The first is on the elaboration process of the variables. The second is on the transformation process of variables into dimensions as the bases to construct questionnaires. The third is on the data collection processes. These deduce that further guarded inquest under quantitative procedure is significant implemented by noticing those three aspects previously explained. Despite the distinctive ends did take place, the quantitative outcomes are still useful (tutor learning strategy is positively a hint to effective online tutorial support). From qualitative procedure, it implies that the online tutorial can be firmly disclosed as summarized in Table 1.

Prior to justifying the closing line from qualitative versus quantitative results, it is reasonable to think over whether the SEM output is in ‘good fit’ category or not. If yes, it is dependable to consider the hypotheses and engender the loading factors to confirm the power of all behavioral interrelations. The analysis confirmed that they actually are in the ‘good fit’ category except for Normal Fit Index (NFI) as illustrated in Table 3; NFI was however in a marginal fit category. This implies that the quantitative model validated is methodically dependable. The conceptual and operational framework implied having a substantial and technical harmony in theoretical and methodological outlooks.
Table 3. Goodness of fit of the tested framework

<table>
<thead>
<tr>
<th>Goodness of Fit</th>
<th>Cut-off Value</th>
<th>Results</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMSEA Root Mean Square Error Approximation</td>
<td>≤ 0.08</td>
<td>0.08</td>
<td>Good Fit</td>
</tr>
<tr>
<td>RMSR Root Mean Square Residual</td>
<td>&lt; 0.05 or &lt; 0.10</td>
<td>0.74</td>
<td>Good Fit</td>
</tr>
<tr>
<td>GFI Goodness of Fit</td>
<td>≥ 0.90</td>
<td>0.91</td>
<td>Good Fit</td>
</tr>
<tr>
<td>AGFI Adjusted Goodness of Fit Index</td>
<td>≥ 0.90</td>
<td>0.94</td>
<td>Good Fit</td>
</tr>
<tr>
<td>CFI Comparative Fit Index</td>
<td>≥ 0.90</td>
<td>0.96</td>
<td>Good Fit</td>
</tr>
<tr>
<td>NFI Normal Fit Index</td>
<td>≥ 0.95</td>
<td>0.94</td>
<td>Marginal Fit</td>
</tr>
<tr>
<td>RFI Relative Fit Index</td>
<td>≥ 0.90</td>
<td>0.93</td>
<td>Good Fit</td>
</tr>
</tbody>
</table>

Despite one goodness of fit is in marginal category (the NFI; Table 1), it is still helpful to utilize them as a point of reference to bridge understanding between the qualitative and quantitative endings. Three underlying evaluations need to be opened up to make use of the corollaries. The first consequence is the dispute on the different results under exploratory-design used. The second is reason adjacent to respondent characteristics. The third is on the implication of findings for future consideration if conducting further research with a comparable theme.

After completing the procedures, tutor learning strategy is mutually supporting with rational for using Internet and perception of technology along with their dimensions (as two independent variables). Likewise, moderating variable partly interconnected with independent variables. Remarkably, despite perception of media support has no effect to the online tutorial support, it was influenced by rational for using Internet. Fortunately, independent variables are interrelated one another with significant power of relations. This implies that the qualitative and quantitative results are considerably varies; however, it is providential are not absolutely contradict each other.

Exploratory-design, as part of mixed methods, was conducted by collecting and analyzing qualitative data first and then building the quantitative structure prior to interpretation (Creswell & Clark, 2011). It aims at measuring qualitative exploratory findings. Prior to building operational framework under quantitative procedure, the conceptual framework (qualitative outcomes) should be first established as the framework of the study that will be statistically scrutinized afterwards. Therefore, connecting the two strands with respect to theoretical and/or instrumental elaboration become crucial details. In fact, the end results show that two out of nine hypotheses established are imperfectly verified by the analysis. Besides, the order of dimensions is partly not in harmony as well. Again, this is to make more observable that the quantitative approach is still unable to perfectly approve prior qualitative exploratory findings.

Referring to the respondent characteristics (Table 2), it can be definitely enlightened that most of respondents are young and they were highly literate in ICT, full time students and having a good academic performance (GPA) as well. These facts explain why most respondents did not regard media support aspects, as one of independent variable, as a chief clue leading to effective online tutorial support; as well as to the moderating variable, i.e., tutor learning strategy. What is primarily critical to them as distance learners and users is how tutors plan, organize and monitor all tutorial activities in a good and well-regulated quality procedure primarily in providing and maintaining an online tutoring program accordingly.

Anticipating corresponding research for further judgement is prominent to be explored. The magnitude of respondents is not solely restricted to the scholarship students but also by welcoming all other 297 thousand students. Having involved them, it will enlarge the effects obtained with respect to the framework resulted from qualitative inquiry; related to searching for the determinant of effective tutorial comprehensively under ODL setting. Sensible insight is required to be identified to avoid restraint retrieving harmony between
qualitative and quantitative conclusion. Most of all, searching for and adopting appropriate methods are certainly urgent to define an authentic determinant of effective online tutorial service that mutually supporting each other, both under qualitative and quantitative procedures.

CONCLUDING REMARKS

The results of this inquiry encountered slight considerable variations between what had been achieved from qualitative routines as opposed to the quantitative approach. Two out of nine hypotheses assessed are not validated by the analysis. This implies that established qualitative frame is imperfectly approved by the quantitative approach. Yet, they only differ, not necessarily contradicting in a high influence. The end result is therefore still useful for the University and related stakeholders in respecting critical variables that should be carefully taken into account to provide effective online tutorial scheme along with their dimensions in accordance with student needs.

It is worth to note that most respondents classified tutor learning strategy in the first spot as a tip-off point. This is becoming more crucial, according to Lee and Martin (2017), despite online discussions are a common component of most online courses, how to engage students in online discussions has been an everlasting challenge. This entails that the University should take this upshot by spotting imaginable constraints which might be real, especially how to motivate students being much more active in a group work and discussion through common acceptable style of tutors. The University is well-recommended to get ahead on four dimensions in this variable so that tutors would have comparable perception on that issue. Additionally, imagining this know-how is unanimously typical in a wide-ranging of ODL ambiance, the management, faculty, and tutors would then be well-advised to reflect on the variables discussed along with their associated dimensions explained earlier. It is aimed at offering beliefs that tutor learning strategy grows to be straightforward aptitude to endeavor great online tutoring scheme as expected by students for their academic performance and persistence as distance learners (Sembiring, 2015). Although online tutoring idea is phenomenal, primarily in ODL environment, because of its flexibility and convenience, it is truly important to address those issues that adversely impacting on retention with respect to the success of the vast majority of students.

Further comprehensive study should be aggressively and regularly organized in terms of instructional design necessity and learning styles endorsement relative to the virtues of online tutoring structure in ODL perspectives with much broader perspectives. All these endeavors lead to satisfying student need and expectation.

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Awards by the International Council for Open and Distance Education (2013 and 2015). Moreover, in 2017, he was awarded three Best Paper Awards, i.e., two from the Educational Technology World Conference, Indonesia and one from the International Conference on Open and Innovative Education hosted by the Open University of Hong Kong.

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ACCOUNTING EDUCATION
IN AN OPEN DISTANCE LEARNING ENVIRONMENT:
CASE STUDIES FOR PERVERSIVE SKILLS ENHANCEMENT

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ABSTRACT
Distance learning institutions allow access to many students who do not enjoy the luxury of studying fulltime at contact-based universities by providing flexibility in terms of time, space and finances. Globally, accountants are vital for the economy and it is important that higher education institutions empower them with the necessary skills to face the volatile working environment. Equipping accounting students with only discipline-specific knowledge, does not result in practice-ready accountants, which cause great concern for professional accounting bodies as well as employers. Pervasive skills are soft skills, also sometimes referred to as personal attributes allowing effective interaction between people. Using case studies to develop pervasive skills in accounting education, specifically in Open Distance Learning (ODL) institutions, is regarded as a fairly unexplored area. A qualitative research approach was followed whereby interviews were conducted with management members of the College of Accounting Sciences (CAS) at the University of South Africa (UNISA). The interviews provided insight into how ODL accounting educators in a developing country perceived the need to introduce a case study-based module to develop pervasive skills. It is recommended that the training of distance education accounting students should be adapted to include case studies for pervasive skills development.

Keywords: Distance learning, accounting education, case studies.

INTRODUCTION
Globally, there is a tremendous need for distance education because individuals with time, geographical and financial constraints, are provided with equal education opportunities. Distance education students usually have fast and easy access to their study material, anywhere, anytime allowing them to retain their jobs and simultaneously save on various education-related costs such as transportation, accommodation and catering (Sad, Goktas, & Bayrak, 2014). Especially in the accounting field, there is increased pressure on distance education institutions to deliver enough students with all the necessary skills to match market expectations. Tucker (2014) explains that students must be equipped to live in a “multifaceted, multitasking, technology-driven world” and “regardless of their economic background, we must also ensure that all students have equal access to this new technological world”.

In recent years, numerous changes in the workplace have increased the demands placed on accountants. These changes include the rapidly changing business environment, globalization, new legislation, continuous improvements in information technology (IT) and the economic
meltdown. Consequently employers are now looking for accounting graduates with a diverse set of skills and attributes to cope with these demands (Albrecht & Sack, 2000; De Lange, Jackling, & Gut, 2006; Gammie, Gammie, & Cargill, 2002; Hassall & Milne, 2004; Howieson, 2003; Tucker, 2014; Wessels, 2008). Therefore, tertiary institutions are called upon to deliver well-rounded graduates (Cullen, Richardson, & O’Brien, 2004; Mohamed & Lashine, 2003; Tucker, 2014; Van Romburgh & Van der Merwe, 2015; Wolcott, Baril, Cunningham, Fordham, & St Pierre, 2002; Boyce, Williams, Kelly, & Yee, 2001). Meeting the demands of employers and professional bodies, accounting graduates require, in addition to discipline-specific skills, a range of other skills, hereafter referred to as pervasive skills (Arquero Montano, Cardoso, & Joyce, 2004; De Lange et al., 2006; Gammie et al., 2002; Palmer, Ziegenfuss, & Pinsker, 2004). In their article, Strauss-Keevy and Mare (2015) refer to pervasive skills as inter alia "employability skills, behavioral skills and interpersonal skills". For purposes of this article, pervasive skills also include other skills such as higher-order skills (Wilton, 2008; CIMA, 2012) and soft skills (Barac, 2009; De Villiers, 2010).

Subsequent to the publishing of the Bedford Committee Report (AAA, 1986), numerous calls to improve accounting students’ pervasive skills, in particular their critical thinking, echoed in the literature (Boyce, 2004; Wolcott et al., 2002; Siegel & Sorenson, 1999; Stout, 1996; Kimmel, 1995). Conventional accounting pedagogy, emphasizing discipline-specific development, leave little scope for the inclusion of pervasive skills in the curriculum. Penn, Currie, Hoad and O’Brien (2016), proclaim that various invaluable skills, such as communication, leadership, and team-related skills can be developed by teaching with case studies. Therefore, introducing case studies could achieve a closer alignment between accounting education and accounting practice (Cullen et al., 2004).

In order to bridge this skills gap the Chartered Institute of Management Accountants (CIMA), has for instance, endeavored to help students develop both their discipline specific knowledge as well as their professional capacity by incorporating a case study-based final examination in their new curriculum, effective from January 2015 (CIMA, 2014). This examination assesses the students’ ability to demonstrate higher-level skills, for instance synthesis, analysis and evaluation, and skills in effectively presenting and communicating information to users in a way that promotes professionalism (CIMA, 2012). In 2012, the South African Institute of Chartered Accountants (SAICA) also published their intention to implement a multidisciplinary case study-based final examination for trainee accountants eligible to become qualified Chartered Accountants (CAs) (SAICA, 2013). Subsequently, SAICA introduced their Assessment of Professional Competence (APC) examination in November 2014. The case study-based examination allows SAICA to increasingly assess professional and pervasive skills (Oliver, 2012).

Although the use of real-world case study material has become a standard teaching method in many disciplines, for instance business, law and medicine (Penn et al., 2016), limited empirical research has been conducted to support the perceived usefulness of case studies for teaching pervasive skills (Boyce, 2004; Weil, Oyelere, Yeoh, & Firer, 2001; Wolcott et al., 2002). In order to approach reform in accounting education, it is imperative to gain an understanding of the environment in which students reside (Morris, Burnett, Skousen, & Akaaboune, 2015). For instance, an open distance learning (ODL) environment differs from a residential, classroom-based environment. Therefore, the objective of this article is to specifically explore whether accounting educators at an ODL institution perceive that there is a need to introduce a case study-based module to prepare accounting students for the professional bodies’ case study examinations. The article further endeavors to determine if accounting educators are of the opinion that a case study module would improve ODL students’ pervasive skills.

In the remainder of the article, the prior literature concerning the pervasive skills gap and the teaching of pervasive skills in an ODL environment in accounting education is firstly reviewed. Thereafter, a discussion of the research method is presented, followed by the limitations of the study. After the analysis section, conclusions are finally drawn and recommendations are made.
A survey conducted among accounting graduates from three Australian universities and Australian practitioners suggested that extensive training was needed before accounting graduates were regarded as having an innate work-ready capacity (Kavanagh & Drennan, 2008). Professional accounting bodies and employers of accounting graduates have called for accounting education to bridge the identified skills gap by attending to the supposed skills shortages (Ballantine & McCourt Larres, 2004; Bui & Porter, 2010; Hassal, Joyce, Arquero Montano, & Donoso Anes, 2005).

In a study among accounting academics involved in SAICA-accredited academic programmes, Keevy (2013) found that despite a supposed obligation to teach pervasive skills, academics do not perceive themselves as best suited to equip graduates with the required pervasive skills competencies. However, educational institutions have a critical responsibility in delivering practice-ready accounting graduates who are knowledgeable, ethical, responsible and financially literate. Enhancing pervasive skills through formal education is therefore no longer voluntary (Shuttleworth, 2012). The gap between accounting education and the work place is expanding (Rebele & St. Pierre, 2015) and current literature does not reflect how to best prepare students for the work place.

The debate on whether universities adequately prepare students for the work place is ongoing and it should be emphasized that “universities cannot be all things to all people” (Howieson, Hancock, Segal, Kavanagh, Tempone & Kent, 2014). Many authors contend that the adopted accounting pedagogies should move away from students’ passive mastering of content knowledge, to a more student-centered approach, where they play an active role in their own learning process (Morris et al., 2015; Chu & Libby, 2010). That being said, a survey of accounting programs in the New York City metropolitan area conducted by Diller-Haas (2004) found that the majority (71%) of programs still used a traditional curriculum, focusing on memorization and the mechanics of recording transactions. Some authors (Woronoff, 2009; Albrecht and Sack, 2000) are of the opinion that universities mostly only focus on discipline-specific competencies, instead of pervasive skills as well. Cooper, Everett and Neu (2005) support this view, stating that there is too much emphasis on repetitive learning of discipline-specific material with a lack of attention to broader educational issues. Boyce, Williams, Kelly and Yee (2001) argue that the accounting profession has a predilection for discipline-specific development of their students and seems to be less interested in pervasive skills development.

However, the literature has examples of researchers who do not believe that educators are solely responsible for pervasive skills development. Gammie et al (2002) are of the opinion that employers’ demands for education institutions to equip students with the necessary pervasive skills should not be blindly accepted. They argue that employers are also accountable and should include pervasive skills development in their training programs (Gammie et al., 2002). Donovan (2005) suggests collaboration between universities and the accounting profession in pervasive skills development, and argues that the profession can provide a real-world environment for learning. Howieson et al. (2014) suggest that awareness should be raised among employers regarding limitations within university programs to develop students’ pervasive skills and that employers should endeavor to advance learning opportunities within the working environment.

The ability of higher education to develop practice-ready graduates is therefore a contentious matter (Cranmer, 2006; Wilton, 2008). In a study conducted by Bui and Porter (2010) employers signaled that university courses provide students with a conceptual understanding of business, but they also indicated that “real” business knowledge can only be acquired by on-the-job experience. The studies conducted by Cranmer (2006) and Lucas, Cox, Croudace and Mildford (2004) support this finding, as they conclude that it is unrealistic for universities to claim that they can teach the pervasive skills required by practice.
Institutional constraints are often the reason why accounting education cannot always deliver accounting graduates with the pervasive skills required by employers (Bui & Porter, 2010). At an ODL institution, such as the University of South Africa (Unisa), student numbers are large when compared to residential universities (Ryan, 2008). Unisa has to cater for students from different generations, namely adults and school leavers, who have different views, knowledge levels, experience levels and expectations (Heydenrych & Prinsloo, 2010). There is limited face-to-face contact with students (Martin, 2007) and group discussion classes usually happen on an ad-hoc basis once per semester with large numbers of students attending these classes. Consequently, it is perceived as highly unlikely that distance-education lecturers would be able to fit pervasive skills training into the limited available face-to-face time. In addition, the workload of academics has increased (Bezuidenhout, 2013) and they experience time constraints, work constraints and the burden of continuously updating the curriculum.

The borders between distance learning and residential institutions are “becoming increasingly blurred due to the use of technologies” (Heydenrych & Prinsloo, 2010). Distance education consists of multiple dimensions aiming to overcome any form of distance between students and the institution, educators, study material and fellow-students (Kamanja, 2007; Mbatha, 2015). Although ODL offers flexibility by minimizing limitations on study in terms of time, access, place, pace of education and method of study (Dzakiria, 2012; Vakoufaris, Christina & Mavroidis, 2014), students face other distinct challenges.

ODL students often experience challenges such as time management, coping with personal stress, deficient IT skills and lack of proficiency in English as instructional language (Geduld, 2013). Geduld (2013) goes so far as to say that critical thinking, organizational and emotional skills are a prerequisite for success in an ODL environment. In addition, lecturers need to consider the demographics of the generation of learners in their classes (Fouche, 2013). Unisa’s student profile is diverse in terms of income (ranging from high-income earners to poor students who do not even have electricity at home), age, educational background and working experience (Dzakiria, 2012; Ryan, 2008). Many of the students who study part-time experience a time management problem because they are also employed on a full-time basis. In ODL many learners are faced with the expectation that they already have independent learning skills and the capacity to “engage in activities that require self-direction and self-management of learning” (McLoughlin & Marshall, 2000). Although it is assumed that learners operating in the 21st century should already have these attributes, this generalization is not applicable to all ODL learners (Dzakiria, 2012).

Despite these many unique challenges in the ODL environment, there are also opportunities to develop accounting students’ pervasive skills. For instance, writing skills are improved when students attempt their compulsory written assignments and examinations and also when they e-mail their lecturers. There is an increasing shift to online learning, and this will potentially enhance students’ IT skills (Nti, 2015; Kamanja, 2007). Video and satellite conferencing as well as Skype technologies can be utilised for case study discussions in a distance learning environment (Kashora, Van der Poll, & Van der Poll, 2016). Distance learners have been found by some researchers to be more positive about lifelong learning opportunities than face-to-face students (Sad, Goktas, & Bayrak, 2014). The use of distance education materials in a traditional accounting course revealed a positive effect on student success (Bozok, 2011).

As far back as 1986, the use of case studies in accounting has been regarded as one of the best methods for developing pervasive skills (AAA, 1986). A study conducted by Ballentine and McCourt Larres (2004) among 84 final-year undergraduate management accounting students in the United Kingdom, showed that the most significant benefits of using case studies were an awareness that there are several solutions to a problem and insights into the complexity of “real-world” business decisions. Boyce et al. (2001) point out that the most important benefit of the case study method is that theoretical issues are grounded in
a practical context. This promotes an active learning approach with a higher level of understanding. Therefore, teaching ethical conduct principles, professionalism and pervasive skills can be accomplished through case study-based teaching (Fortin & Legault, 2010).

Although researchers in general perceive the use of case studies in accounting education as efficient for pervasive skills development, these benefits are also questioned in the literature. For instance, Wolcott et al. (2002) challenge the findings of some researchers who argue that students’ critical thinking skills are enhanced through teaching strategies such as case studies. They posit that researchers should examine empirically whether critical thinking skills are developed and achieving the desired effects (Wolcott et al., 2002).

Whilst the literature outlines the benefits of using case studies to enhance accounting students’ pervasive skills (Ahmad & Sulaiman, 2013; Ballantine & McCourt Larres, 2004; Van der Merwe, 2013), most of these studies were conducted at residential universities. Brenner, Jeancola and Watkins (2015) suggest that mini-cases may be a solution in “time challenged” accounting courses. They explain that mini-cases are more efficient and effective than traditional, lengthy case studies, and thus allowance is made for flexibility in transferring various skills. In general, there is a belief that case studies could be used as a useful teaching method in the ODL environment (Wessels & Binza, 2012). However, in the literature there is a paucity of studies on how case studies develop pervasive skills in the field of accounting in an ODL environment. Apostolou, Dorminey, Hassell and Rebele (2016) conducted a literature review of accounting education literature published in 2015, and although they found 20 cases, these were not presented in an ODL environment. The same authors also conducted a literature review of accounting education literature published in 2013 and 2014 and yet again, no mention was made of any cases in an ODL environment (Apostolou, Dorminey, Hassell, & Rebele, 2015). The empirical research reported on in this article therefore focused on the use of case studies in an ODL institution.

METHOD

Apart from conducting an extensive literature review, an explorative qualitative approach was followed which, according to Henning, Van Rensburg and Smit (2004) provides an understanding of the phenomenon under study. Semi-structured, in-depth interviews were the primary instrument used. By conducting an interview, the prospect of offering rich data occurs (Newton, 2010). An interview is a controlled exchange of words effective for exploring people’s opinions (Hofstee, 2006; Wiid & Diggines, 2015).

Participants

A pilot interview was conducted with an ODL specialist, Professor Paul Prinsloo of Unisa. His insights, ideas and suggestions were valuable in designing the final interview schedule. In order to gain an understanding of their perception on the viability of introducing case studies or a case study-based module in an ODL Accounting environment, purposive sampling was used to conduct interviews with management members of the College of Accounting Sciences (CAS) who represent ODL academics. In 2015, 33 069 students were enrolled in this college (Unisa, 2017c). A key advantage of purposive sampling is that it is planned and aimed at a targeted group of people (Tongco, 2007). Figure 1 below provides an overview of the structure of CAS at Unisa and indicates the management positions in the College. Eleven members of the CAS management were chosen because they could be regarded as the “voice of the academics” (Barac & Du Plessis, 2014) representing the respective departments. Only members of management directly involved in the tuition portfolio were interviewed. Nobody in the management group was excluded based on race, age or gender.
Unisa was selected, since it is Africa’s leading and largest ODL institution (Dhunpath & Dhunpath, 2015; Letseka, 2015) attracting students from 130 countries in Africa and globally (Unisa, 2017c). Unisa is the furthermore the longest standing dedicated distance education university in the world, “enrolling nearly one-third of all South African students” (Unisa, 2017b) providing study opportunities to more than 400 000 students from across South Africa, Africa and other parts of the world (Unisa, 2017a). Although Unisa is not the only distance learning institution in South Africa, it is the only distance education institution operating on a university level (Gerber, 2013). In addition, Unisa is accredited with SAICA and from the published APC 2014 results document available on SAICA’s website, it is evident that Unisa delivers the largest number of students who pass their final test of competence examination (SAICA, 2015). Unisa is also accredited with CIMA, the largest management accounting body in the world (Unisa, 2015).

Data Collection and Analysis
The interview questions were clearly structured (Cohen, Manion & Morrison, 2007) and trust was kept intact during the interviews by professionalism and showing respect for the participants (Newton, 2010). Ethical clearance for the study was obtained from the Ethics Review Committee of the College of Accounting Sciences (CAS) (ref no.: 2015_CAS_001) and permission for the study was granted by the Unisa Senate Research and Innovation Higher Degrees Committee (ref no.: 2015_RPSC_008).

The anonymity of the participants was guaranteed and they were informed that they could choose not to participate at any point during the interview. Participation in the study was voluntary and participants were invited to access the results of the study if they wished to do so. All of the interviews were conducted in English. The interviews were recorded with a digital voice recorder, transcribed and profiled. The transcription of the data remained strictly confidential and the data was analyzed through an inductive thematic analysis method.

Interviewees were asked whether they believed that there is a need for the introduction of a case study-based module (focusing on enhancing certain pervasive skills) with the purpose of delivering better prepared, practice-ready students. The interviewees were also asked whether ODL accounting educators within the respective departments have such a
module in place, and whether they perceive such a module as beneficial to students as well as future employers of these students.

The results in this study were limited to the perceptions of the use of case studies in accounting education in one South African ODL institution, albeit the largest ODL institution in Africa. Therefore, the results of this study could inform accounting education in other distance learning institutions. Additionally, this study only focused on the conceptual frameworks of two professional accounting bodies actively involved in South African accounting and management accounting education, namely SAICA and CIMA. As in the study of Van der Merwe (2013), this study is based on the perceptions of participants, and does not contain empirical evidence of actual skills development.

Operational measures were applied to ensure trustworthiness. The primary researcher conducted the interviews (credibility). In-depth discussions were held and the results were contextualized in the literature (transferability). The researcher kept an audit trail of the study in case an auditor wished to verify the trustworthiness of the findings (conformability). The research process was clearly presented and all aspects of the study were described (dependability). No interviewees were excluded on the basis of race, age or gender (authenticity).

FINDINGS

In order to determine if accounting educators in an ODL institution perceive a need for the introduction of a case study module to enhance the pervasive skills of prospective accounting professionals, responses were interpreted according to the following themes that emerged during the interviews:

Unisa’s Responsibility to Develop Accounting Graduates’ Pervasive Skills

In accordance with the literature (De Lange et al., 2006; Dixon, Belnap, Albrecht, & Lee, 2010; Gammie et al., 2002; Howieson, 2003), it was clear from the interviews that the respondents generally agreed that the work environment requires students to develop pervasive skills during their accounting studies.

All save one of the interviewees strongly felt that the university has a responsibility to develop graduates’ pervasive skills. While one interviewee was skeptical about the ability of an ODL institution to actually assess pervasive skills, another said that “these skills are only obtained at the end of the graduates’ practical training period”. One interviewee clearly stated that students must be assessed for their “competencies to fit into practice”. From the responses, it also became clear that the university should not only address the incorporation of pervasive skills because the professional bodies have changed their approach, but because it has a responsibility to turn out graduates with pervasive skills, especially critical thinking skills.

One interviewee posited that pervasive skills are not only needed by SAICA, CIMA and other professional bodies, but also by broader society—hence Unisa’s responsibility to instill pervasive skills in all graduates, whether or not this is specifically required by professional bodies.

The Current Practices at Unisa Incorporating Case Studies in the Accounting Curriculum

Although interviewees involved in teaching postgraduate modules responded that they did embed real-life scenarios in their study material, as well as formative and summative assessment practices, those involved at undergraduate level mostly stated that they did not really use case studies as part of their curriculum. This is mainly because they teach semester modules and the two-hour examinations do not allow for case studies, where a lot of reading time is required. With regard to the postgraduate CIMA modules, it was clearly stated that there is a strong emphasis on case studies. Three of the five postgraduate CIMA modules use one comprehensive case study that integrates all three modules’ study material for summative assessment purposes. When compared to the case
studies set by the professional bodies, one interviewee responded that specifically on the undergraduate level, case studies are far too limited to test pervasive skills. This is in line with another interviewee’s opinion that the case studies in their postgraduate degree program are “not totally integrated because they only focus on one field”.

The interviewees responded in a similar way to the question of whether case studies should be included in the current accounting curriculum and if so, should they be integrated into an existing module or rather developed as a separate module? Respondents mostly felt that case studies should be integrated into existing modules. This is consistent with the findings of Hassall et al. (2003), who support this view, as both CIMA employers and students were of the opinion that pervasive skills should be integrated throughout the accounting curriculum currently being taught at universities. However, one participant suggested that it should be a separate module in the final year of the postgraduate qualification, a module that will integrate the knowledge acquired in all the modules offered at that level. One interviewee shares the view of Krause (2005) whereby the integration of case studies in existing modules in order to ground the theory in practice is encouraged. Another reiterated that students need practical examples in order to better understand some of the topics.

The question of at which level case studies should be introduced to accounting students received a broad response from interviewees. While some felt that it should be introduced from first-year level, others strongly responded that it should only be introduced from third year or at the postgraduate level. One interviewee responded that because of, for instance, the deterioration of language and writing standards at high school level, case studies should be implemented as early as possible so that students can practice writing properly. According to some interviewees, at the third-year level students should at least be able to integrate knowledge and at postgraduate level they should “think outside the box” and be able to give advice based on the information given in the scenarios.

Challenges with the Implementation of Case Studies for Accounting Education in an ODL Environment

While some interviewees regarded the caliber and profile of ODL learners as making it difficult to incorporate case studies, others said that students who are already working will more easily relate to real-life scenarios and be able to incorporate the pervasive skills deemed necessary in the workplace. Some interviewees felt that apart from the full curriculum and lack of notional hours, the two-hour examinations pose a challenge for including case studies in the summative assessments and that it would also be difficult to mark comprehensive case studies in a short space of time due to the vast student numbers at Unisa. Some interviewees remarked that some Unisa students lack access to internet facilities to download case studies and upload answers. This is in line with the fact that internet connectivity and IT skills of ODL students in South Africa are a challenge (Kamanja, 2007).

One interviewee said that ODL students feel isolated and do not have contact sessions and discussions with lecturers or fellow students. Tucker (2012) also found that distance learners often feel isolated and deprived of peer-to-peer learning that takes place more easily in contact-based learning environments. Another interviewee mentioned that it is difficult in an ODL environment to do case studies as part of group work. Some interviewees said that an ODL institution did not face specific challenges regarding the implementation of case studies, while one interviewee even said that they could be a solution for non-venue-based assessments.

Benefits of Teaching Accounting Case Studies in ODL Institutions

One interviewee stated that good content and level-appropriate case studies can be “very rich to also teach pervasive skills”. Since many of the ODL students already work, exposure to case studies will not only prepare them for the professional examinations they have to write, but also improve their performance in the workplace. Another interviewee remarked that case studies would improve students’ higher thinking or critical thinking skills and teach them to reflect on and integrate information in order to take better decisions. As
mentioned by one participant, ODL students already work independently and working on case studies can strengthen that independence and enhance their problem-solving skills. It was also mentioned that the written communication skills of ODL students would be enriched by case studies.

Case studies were perceived by the interviewees to enrich various pervasive skills of ODL students such as communication, critical thinking, problem-solving, decision-making and thinking independently and on their feet. However, one interviewee mentioned that students often do not understand the basics of business, while another mentioned that case studies do not always teach integration of different disciplines. Overall, however, they felt that the inclusion of more case studies in the current accounting curriculum would better prepare ODL students for the professional examinations to be written and for the working environment.

**DISCUSSIONS AND CONCLUSION**

The literature clearly showed that the work environment requires pervasive skills that accounting graduates should, but do not always, have. The challenge of reform in accounting education is therefore to enhance teaching techniques to also include pervasive skills development. From the interviews it can be deduced that the ODL accounting lecturers perceive a case study-based approach to be effective in developing the pervasive skills of accounting graduates. They agreed that tertiary institutions, including ODL institutions, have a responsibility to develop accounting graduates’ pervasive skills and equip them to be practice-ready. Case studies should increasingly be incorporated throughout the undergraduate and postgraduate accounting curriculum, focusing on honing the pervasive skills required of accounting graduates.

Case studies should assist students to better understand certain topics by putting theory into practice. Case studies should be included in existing study material, formative and summative assessments. A staggered implementation approach of case studies, tailored for different difficulty levels would be suitable for pervasive skills enhancement.

In the ODL environment, some institutions might find large student numbers challenging, because it is difficult to assess students by means of case studies when there is limited time for grading tests and examinations. Other challenges that ODL institutions should consider include: the readiness of faculties and the capacity of lecturers to develop more case studies; the curriculum; a possible lack of notional hours; the structure of examinations; the geographical spread of their students; the profile, caliber and diverse backgrounds of their students; the authenticity of the work their students submit; a possible lack of skills; and internet connectivity.

In contrast to residential universities, group work is more challenging in an ODL environment because of the vast geographical spread of students and the fact that many distance learners have limited internet connectivity. However, if case studies could be assigned to ODL students in a group context, this could facilitate peer learning and increase motivation. An “educational blog” or online discussion forum can be used by distance education institutions whereby students can engage with each other on an online platform that can be monitored by the educator. This will promote socialization; create an atmosphere of online community whilst developing important pervasive skills of the students, such as communication skills. Distance education institutions should seek more opportunities for students to collaboratively interact with other students and educators.

It is therefore recommended that the training of accounting students should be adapted to include pervasive skills training through case studies. Case studies should increasingly be incorporated into the study material. In an ODL environment, case study discussions should provide an opportunity for students to do self-assessment, allowing for the improvement of their interpersonal and self-directional skills and also to participate in online group discussions, allowing for the improvement of their communication skills. A set of online
model answers could assist students to identify their possible lack of comprehension and how to modify their learning strategies. Case studies based on real-life scenarios can potentially increase student’s analytical, critical thinking and judgement skills. Incorporating case study group assignments in an ODL environment can furthermore also cater for students’ need for peer learning.

Suggested directions for further research are:

- ODL institutions should conduct research in order to understand their students’ perception of the need to introduce more case studies or a case study-based module to develop their pervasive skills.
- Future research could potentially investigate actual skills improvement experienced by ODL students because of case studies.

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THE ROLE OF STUDENT SUPPORT SERVICES IN ENHANCING STUDENT PERSISTENCE IN THE OPEN UNIVERSITY CONTEXT: LESSON FROM INDONESIA OPEN UNIVERSITY

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ABSTRACT

The high number of non-enrolment students had decreased the retention rates in the Indonesia Open University. Prior studies revealed that student support had a pivotal role in enhancing student persistence. Therefore, this study was aimed to explore contribution of student support in increasing student persistence by employing mixed methods approach. Student persistence in this study refers to continuation of enrolment within four consecutive semesters. This study used sequential explanatory design by collecting the quantitative data from surveying 153 students and then followed by semi-structured interviews with 13 purposefully selected participants. In the quantitative phase, the results of the study revealed that student support had important contribution to student persistence. Meanwhile, the qualitative findings supported the survey results that student support had a pivotal role in influencing student persistence. Moreover, this study suggested the improvement of student support at the level of affective, cognitive, and systemic in order to enhance student persistence.

Keywords: Student supports, student persistence, open university, mixed methods, open and distance learning.

INTRODUCTION

Low retention is a big problem for distance education institutions. Student persistence in the distance education contexts according to various prior studies, is lower than in conventional or face-to-face programmes (Diaz & Cartnal, 2006; Simpson, 2003). Carr (2000) showed that persistence in distance education programmes has been often 10 – 20 percentage points lower than in conventional programmes and less than 50% of distance education students finish their courses. Furthermore, Simpson (2003, 2013) also demonstrated that student persistence in open and distance learning courses is typically no higher than in conventional learning and is often worse.

There are many factors influencing low retention in distance education. Lee & Choi (2011) reveals three significant factors contributing to student retention: student factors, course/programme factors, and environmental factors. Student factors refers to personal reasons encompassing students’ characteristics, academic backgrounds, relevant experiences, skills, and psychological attributes. Course/programme factors is related to course design and implementation as well as institutional student supports. Meanwhile, environmental factors talks about supports received by students from others, such as family members, friends, peer group, or colleagues.

Universitas Terbuka (Indonesia Open University) also encounters low retention rates as a big challenge to resolve. Universitas Terbuka delivers open and distance learning in which the students are encouraged to learn independently by using written or electronic based materials (Darojat, 2016; Herman, 2017). Several prior studies have shown that
Universitas Terbuka has been noted for having a low rate of completion and a low level of achievement (Belawati, 1998; Kadarko, 2003; Ratnaningsih et al., 2008). Universitas Terbuka, in 2017, enrolled about 286,757 students, spread out in different parts of the country and some overseas locations. Over 90% of these students are working adults (Universitas Terbuka, 2017). Moreover, since its foundation in 1984, Universitas Terbuka has enrolled over 1.4 million students and has produced about 700,000 alumni, working in various professional fields (Puspitasari & El Anshori, 2016). This data indicated that the Indonesia Open University has high enrolment, but low completion rates.

The significant role of student support in increasing student persistence in Open University contexts has been acknowledged by prior empirical studies. Fozdar & Kumar (2007) indentified student support related reasons as the barriers of student persistence at Indira Gandhi National Open University. These reasons include insufficient academic support from study centres; study centres too far from residence; insufficient counselling sessions; difficulty in attending laboratory session; lack of proper intimation regarding theory and lab counselling sessions; lack of responsiveness from study centre, regional centre and head quarter; and lack information regarding course material, assignment, and other relevant information. Moreover, Barnett (2011) insisted the importance role of faculty validation in enhancing student persistence. Faculty validation refers to interaction with students initiated by faculty and others in the campus community, that engender feelings of self-worth and a belief in the students’ ability to succeed in the college community. However, student persistence is a complex issue involving changing factors as the needs and expectations of students and institutions change. In other words, student persistence is context dependent or culturally bounded (Astin, 2003; Hagedorn, 2011; Holder, 2007; Rovai, 2003).

By considering the variations in educational and organisational cultures, geography, technology, programmes of the study, and student characteristics, the development of student support system in one institution or country could not simply transferred to another institution or country. The objective of this paper therefore is to explore the roles of student support in enhancing student persistence in the context of Universitas Terbuka Indonesia.

**STUDENT SUPPORT IN OPEN AND DISTANCE LEARNING**

In this study, the term student support refers to the range of services both for individuals and for students in groups which complement the course material or learning resources that are uniform for all learners (Tait, 2000). Meanwhile, the term of student persistence relates to the behaviour of continuing learning in the course programme by continuation of enrolment within four consecutive semesters. In the Indonesia Open University, the students who are enrolled within four consecutive semesters are grouped into active students; otherwise those who do not enrol and do not register for any new course within four consecutive semesters will be classified into inactive students. A review of prior studies on student persistence in the Open University contexts revealed that student support has a pivotal contribution for increasing student persistence (Choi et al., 2013; Dzakaria, 2005; Fozdar et al., 2006; Ibrahim, Rwegasira, & Taher, 2007; Tait, 2004).

Alan Tait (2000) identified two main factors determining the direction of Open and Distance Learning (ODL) development, and the way how student support is delivered: the revolution of Information Communication Technologies (ICT) and the marketization of education. ICT revolution has provided many options for ODL institutions in offering student support regardless time and place through virtual environments. In the meantime, the marketization of education has shifted the old perspective on how to deal with students in ODL into a new perspective as ‘customer’. By admitting a customer culture in ODL inevitably lead to speeding up in delivering student support services.

Furthermore, Tait (2000) described three primary interdependent functions of student support in a ODL programmes:
Cognitive: supporting and developing learning through the mediation of the standard and uniform elements of course materials and learning resources for individual students;

Affective: providing an environment which support students, creates commitment, and enhance self-esteem; and

Systemic: establishing administrative processes and information management systems which are effective, transparent and overall student-friendly.

In addition, Tait (2000) also recommended to consider several core elements to develop student support system in ODL programmes, such as students characteristics; course or programme demands; geography; technology; scale; and management system. Student characteristics represent a matrix of qualities that need to be assessed when establishing which services particular cohorts of students will need. In assessing student characteristics, it is proposed to include the main feature of student identity: gender; age; employment or unemployment; disposable income; educational background; geographical situation; special needs; language; ethnic and cultural characteristics; communication technology connectedness.

Technological infrastructure, scale and geography are also important in developing student support system. To know which technologies used by students is essential in delivering student services. In making any assessment of the use of technologies by students, it is important to distinguish further between three modes: the domestic, the workplace, and social availability of technologies. Further, scale refers to the intended volume of activity, and is a significant determinant of the ways in which systems for student support should be constructed. Meanwhile, the geography represents not only as a geographical distance, the density of population in rural and urban areas but also as a social and cultural dimensions (Tait, 2000; 2014).

RESEARCH METHOD

This study employed a mixed methods research which focused on collecting, analysing, and integrating both quantitative and qualitative data in a single study (Creswell & Clark, 2011; Hesse-Biber, 2010). According to Creswell and Clark (2011, p.5), the definition of a mixed methods research includes the following several characteristics that the researchers should do:

- Collect and analyse persuasively and rigorously both qualitative and quantitative data (based on research questions);
- Mix (or integrate or link) the two forms of data concurrently by combining them (or merging them), sequentially by having one build on the other, or embedding one within the other;
- Give priority to one or to both forms of data (in terms of what the research emphasises);
- Use these procedures in a single study or in multiple phases of a programme of study
- Frame these procedures within philosophical worldviews and theoretical lens; and
- Combine the procedures into specific research designs that direct the plan for conducting the study.

In terms of a mixed methods design, this study used the explanatory sequential design in two distinct interactive phases (Creswell & Clark, 2011). This design started with the collection and analysis of quantitative data, which has the priority of explaining the relationship between student support and student persistence in the Indonesia Open University. In this first phase, the quantitative data were collected by using a web-survey. The population of this study was the undergraduate students of Faculty of Social and Political Sciences who enrolled from admission period of 2009/2010 to 2011/2012. The
total number of 6,095 students were invited by email to participate in the web-survey. Out of 6,095 invited students, only 153 respondents completed the questionnaire.

In the second phase, a multiple case study was employed to collect qualitative data through individual semi-structured interviews to help explaining deeper the relationship between student support and student persistence. In this qualitative phase, Purposeful sampling was employed in this case study design by drawing samples from volunteered participants through the quantitative survey. There were 69 participants who volunteered to participate in the interview by providing their email addresses and phone numbers. Considering a representation of diverse cases, a sampling strategy of maximum variation was used to represent enrolment status and gender across the cases (Creswell, 2007). However, of 69 participants who had been contacted through email and telephone, only 13 participants volunteered to participate in the interviews.

RESULTS OF THE STUDY

Quantitative Phase
The majority of participants in this study undertook the course programme of English for Translation, followed then by Government Science. They were predominantly registered in the regional office of Jakarta and were identified as the active students. Moreover, the most typical age of participants was between 25 and 29 and the majority of them were men. Moreover, their ethnicity was predominantly identified as Javanese; they were mostly graduated from Senior High School; they were mostly employed full-time; and they were primarily married and had children under 18.

Table 1: Students’ employment status by enrolment status and gender

<table>
<thead>
<tr>
<th>Category</th>
<th>Full Time Employment</th>
<th>Part Time Employment</th>
<th>Self-Employment</th>
<th>Unemployment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enrolment Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active students</td>
<td>63 (55.8%)*</td>
<td>27 (23.9%)</td>
<td>13 (11.5%)</td>
<td>10 (8.8%)</td>
</tr>
<tr>
<td>Inactive students</td>
<td>12 (50%)</td>
<td>7 (29.2%)</td>
<td>2 (8.3%)</td>
<td>3 (12.5%)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>51 (54.3%)*</td>
<td>24 (25.5%)</td>
<td>11 (11.7%)</td>
<td>8 (8.5%)</td>
</tr>
<tr>
<td>Female</td>
<td>30 (53.6%)*</td>
<td>14 (25.0%)</td>
<td>7 (12.5%)</td>
<td>5 (8.9%)</td>
</tr>
</tbody>
</table>

*% within enrolment status and gender.

Furthermore, regarding the reasons of non-enrolment, the most cited reason of non-enrolment for at least one registration period or more was workloads (42.9%). The next reason was lack of support from the University (20.4%), financial problem (14.3%), delivering or caring for babies (8.2%), family problem (4.1%), time management (4.1%), health issues (2%), and other reasons (2%). These findings indicated that the majority of participants had difficulty to allocate their time for studies and they needed support from their employers during their studies.

The majority of participants had positive experiences pertinent to student support and learning services. However, apparently most of participants were unsure about their experiences for several issues, such as the role of regional offices in solving academic problems, feedback from tutors, and academic supervision. Meanwhile, the logistic regression analysis revealed that the variable of student support and learning services were two of 12 variables (age, gender, prior education, intrinsic motivation, extrinsic motivation, self-efficacy, volitional strategies, student support services, learning services, interaction, family & friends, and work environment) contributing to the goodness of fit of student persistence model at the Indonesia Open University (Universitas Terbuka).
Figure 1. Reasons of non-enrolment (%)

Qualitative Phase
All participants from active and non-active student groups (13 participants) talked about quality of student services positively and negatively. The participants’ perceptions varied and most of the students were satisfied with the student support services provided by the Indonesia Open University. The student support services consisted of the quality of services including student services, modules, tutors, and registration services.

Student services
Student services in this context related to examination and student support provided by the Regional Offices. In the active students group, all participants cited that the student services provided by the Regional Offices were in general satisfactory. Meanwhile, nine out of 13 participants narrated that they had positive experiences regarding the services, such as timely response to students’ complaints, accurate information, hospitality, and friendly interaction.

However, Haril and Ina reported negative experiences regarding student services provided by the Regional Offices. Haril mentioned that the service was not friendly to male students. He saw discrimination between male and female students in which female students received more priority in service than male students. As Haril said:

...when staff served female students, they were more proactive and with a warm-hearted. However, when turned to serve the male students, their services were not as good as when they served the female students, so there was favouritism in serving students (Haril).

For Ina and Wati, the registered students at the Regional Office of Malang, East Java, they found that the services at their Regional Offices were disappointing and did not ease student’s needs.

...I initially had registered as a new student at the Regional Office of Malang, East Java. I found their services were complicated and uncomfortable, and then I decided to move to Surabaya city...for me, student services in the regional office did not provide complete information and I did not get information what I needed (Ina).
...I ever experienced several disappointments about services provided by the staff of the regional office. They provided less friendly services and could not provide information exactly about what I needed ...so this made me reluctant to communicate a lot with the staff except for registration purpose only (Wati).

In the non-active students group, Amri and Fahri mentioned that both were satisfied with the student services at the Regional Office. In contrast, Devi had low satisfaction regarding the registration services at the Regional Office. Devi witnessed that the registration service was not fully computerised process and some of the staff officers did not have the computer skills. This also contributed to Devi’s decision to withdraw from her study.

According to me, the registration service was not a computerised process and then the staffs were looked too old ... some of them were not having computer skills and made the registration process little bit messy with many papers everywhere on the table....(Devi).

Modules
All participants from active and non-active student groups talked about the quality of modules. Eight out of ten participants from active students group were satisfied with the quality of modules in the Indonesia Open University. They were satisfied also with the easy online order and fast delivery of modules. However, Santoso mentioned that several modules needed revision promptly regarding the change of new rules. Zulki also revealed that some modules contained a lot of spelling mistakes, as he said:

....some modules had a lot of spelling mistakes and that seemed to lack of proofreading. Furthermore, some parts of modules were confusing and less communicative, and impressed that the writing had been done in a hurry to catch the publication deadline for the modules in order to achieve the target for launching the new course programmes (Zulki).

In the non-active students group, Devi commented on the content of modules that she had read. Devi found most of the modules only containing theoretical explanation and lack of implementation of theories in the form of cases analysis. In the meantime, another inactive student, Amri, had a dissenting opinion and stated that the modules had good qualities pertinent to its content and layout.

Tutors
Nine of 13 participants discussed the quality of tutors in online tutorials. Three participants from active student group (Ina, Rama, and Wati) viewed that tutors of online tutorials had provided prompt responses, but the other six participants (Zulki, Wawan, Indra, Santoso, Danu, and Haril) indicated that such tutors were less responsive in providing feedback or comments on students’ questions and assignments. For instance, Zulki stated that tutors of online tutorials must provide timely feedback. Meanwhile, Wawan reported no feedback from the tutors in the discussion forum and on assignments.

....sometimes tutors only gave a case and allowed students to discuss without any feedback at all. Then another complaint was tutors assigned assignments to the students, but did not want to show the assignment markings to the students. Therefore, the students remained to wonder about the assignment results (Wawan).

In terms of the quality of tutors in the face-to-face tutorial, four participants (Indra, Santoso, Wati, Danu) who attended the face-to-face tutorials deemed that the tutorial was helpful in understanding the modules and contributed to final score of course programme. However, Santoso had a negative experience regarding he thought of as incompetent tutors, as he said:
There were several the selected tutors in the Regional Office of Semarang who did not master the subject field of teaching. The tutors sometimes could not answer questions from the students. For example, it ever happened when I attended the course for preparing a final comprehensive assignment (Tutorial Akhir Program-TAP)....(Santoso).

Meanwhile, two of three participants from non-active student group did not mention the quality of tutors either in online or face-to-face tutorials services because they did not participate online tutorials regularly. Only Devi who attended the face-to-face tutorials several times and she believed that tutors had poor qualities and the university should recruit other more competent tutors. For Amri, less interaction with other students while studying at Indonesia Open University had contributed to his decision to suspend his study. Therefore, face-to-face tutorials perceived to have an important role to keep students motivated for persisting and completing their studies.

Registration Services
Registration services refers to services that support academic process in the Indonesia Open University, including three phases of registration. The registration system at the Indonesia Open University is an integrated system consisting of three major phases: initial registration, course registration and final registration stage. Initial registration is designed to record, manipulate and update data concerning the admission of a new student; course registration is used to maintain and update active student records; and lastly final stage registration is designed to classify and determine student eligibility to take the final examinations.

Out of 13 participants, 12 participants both from active and inactive students groups talked about the good quality of registration services in the Indonesia Open University. Since the implementation of online registration, the majority of participants agreed that the registration service was easier and helpful. For Haril, an active student, online registration had helped him to keep enrolled in the University even he had no enough money to pay tuition fees.

Since online registration was available, it was easier for me ... I was able to register despite I did not have the cost of tuition fees. Therefore, this service was quite helpful ... in addition, when we did not have enough money to pay the tuition fees, we were still allowed to enrol in advance so we would not miss the registration deadline (Haril).

Meanwhile, Devi, an inactive student, criticised the complicated registration process in which she needed to register manually by visiting the regional office. Manual registration had contributed to her decision to suspend her study. However, what Devi mentioned about the registration process was understandable because it happened before online registration applied in the registration system in the Indonesia Open University.

DISCUSSION

Student support system in the Indonesia Open University includes procedures, policies and structures of the educational institution that enable or discourage student persistence. In this study, student support deals with students’ perception of learning services and student services. Quantitative results reported that the majority of participants were satisfied with the learning and student support services provided by the Indonesia Open University. The logistic regression analysis indicated that “student support services” and “learning services” contributed to the goodness of fit of the student persistence model.

These quantitative findings were supported by qualitative multiple case study analysis that the quality of student support services had significant contribution on student persistence in the Indonesia Open University. However, the multiple case study found positive and negative perception regarding the quality of institutional supports. Below are two major
sub-themes that emerged within the multiple case study analysis: quality of academic services and quality of registration services.

Quality of Academic Services
All 13 participants from both active and inactive student groups talked about the quality of academic services including student services, modules, and tutors in relation to their student persistence.

Student Services
These support services included examination and academic services provided by the regional offices. The qualitative findings demonstrated that nine of 13 participants from both active and inactive groups were satisfied with the quality of student services. In contrast, the multiple case study analysis found negative perceptions from three active students (Wati, Haril, Ina) regarding the student services in the regional offices, but those perceptions did not undermine their motivation to continue their studies. Similarly, one of three inactive students (Devi) had revealed negative perception about the quality of institutional supports, which contributed to her decision for withdrawal.

The role of regional offices in the Indonesia Open University is very important in enhancing student persistence. The pivotal role of regional offices on student persistence supported another study conducted by Fozdar et al. (2006) at Indira Gandhi National Open University. Fozdar’s study demonstrated that insufficient academic supports and lack responsiveness from study centres affected largely students’ dropout decisions. Therefore, the regional offices must provide the proactive supports including cognitive, affective, and systemic supports (Tait, 2000). Simpson (2013) asserted that students in distance education settings most often dropout because they lack proactive support. Therefore, change are required in institutional attitudes by providing supporting environments for improvement and proactive, rather than reactive, support. In the same way, Ivankova & stick (2007) also reported that student persistence had a positive relationship with the faculty’s roles pertinent to the support and encouragement, the willingness to accommodate the students’ needs, and the capability to deliver personal assistance.

Modules
All participants had different views about the quality of modules. 12 participants agreed with the good quality of contents and layouts of the modules in Indonesia Open University. However, two participants (Santoso and Zulki) from the active student group suggested further improvements for certain modules, such as requiring updated administrative rules and the correction of many spelling mistakes. Meanwhile, an inactive student (Devi) provided another comment that most modules needed additional materials about the relevant empirical researches and assignments aimed to increase students’ abilities to analyse real cases.

Tutors
Nine of 13 participants addressed the quality of tutors. Four of nine participants indicated that the tutors of online tutorials were less responsive in providing feedback or comments on students’ questions and assignments. However, these negative perceptions had different effects on their decisions regarding student persistence. For Devi, an inactive student, the low quality of tutors along with other issues had affected her decision to withdraw. Meanwhile, for active students (Wawan, Zulki, and Santoso), the unsatisfying quality of tutors did not contribute to withdrawal decisions probably because they held personal goals as the most important reasons to stay in the university, such as the motivation to learn new things and the expectation that the university degree lead to better career prospects.

The negative perceptions about the performance of tutors indicated that the tutors’ qualities did not meet students’ expectations. Lack of awareness of cognitive student support, such as tutoring, feedback, supervision, and assignment (Tait, 2000) by open university institutions will likely negatively affect student retention. A mixed method study
conducted by Ivankova and Stick (2007) demonstrated that students’ satisfaction toward instructors’ accessibility and promptness of the feedback encouraged students to persist in their programme. Therefore, it is important to enhance the tutors’ performances by following several strategies (Tait, 2004): 1) the tutors/facilitators should make proactive contact by creating a welcoming environment in the moment of initial contact between the student and the tutor. Likewise, the tutor should provide encouragement for the submission of a first assignment by giving prompt feedback on assignments. 2) It is important to develop strong relationships amongst students, tutors, and the institution in order to overcome distance, manage students’ expectations and ambitions, and enable students to make effective choices in a context of open learning. Additionally, the research report indicates that successful learning derives from good relationships and from well-timed and structured interventions. 3) As an effort to enable student retention, it needs strong commitment from tutors to their own development and to student persistence.

Moreover, the qualitative findings demonstrated the negative perceptions among participants toward the quality of services provided by regional offices and the quality of tutors. However, these negative perceptions did not undermine their motivation to keep studying and be enrolled as active students. This phenomenon possibly indicated that their intrinsic or extrinsic related goals were the most important factors in retaining them as active students. Furthermore, the Indonesia Open University had been assumed by employed participants as the most suitable place to learn and to pursue a university degree due to its flexibility.

Quality of Registration Services
12 participants talked about the good quality of registration services in the Indonesia Open University. They agreed that online registration service was easier and more helpful rather than the manual registration service. Only Devi, an inactive student, criticised the process of registration services. However, her perception will probably be different if the online registration services had been implemented during her study.

The quantitative and qualitative findings in this study highlighted the essential role of the institution in affecting student persistence in the Open University contexts. The students, though, might continue or withdraw as active students because of personal reasons (i.e., self-motivation), the low quality of institutional services would be the main barriers for increasing student persistence, as indicated by the quantitative findings that the second major reason of non-enrolment was lack of supports from the institution. In addition, the high quality of student support services will enormously contribute to the reduction of dropout (Tait, 2003).

These results strengthened prior studies on student persistence in the Open University contexts that student support services played a pivotal role in increasing student’s persistence and performance (Choi, Lee, Jung, & Latchem, 2013; Dzakaria, 2005; Bharat Inder Fozdar et al., 2006; Ibrahim, Rwegasira, & Taher, 2007; Tait, 2004). In the same way, Barnett (2011) insisted the significance of the faculty’s role in student persistence decision. In this case, Barnett (2011) endorsed the faculty validation in order to influence intent to persist. Faculty validation denotes to “interactions with students, initiated by faculty and others in the campus community, that engender feelings of self-worth and a belief in the students’ ability to succeed in the college environment”.

Furthermore, a reviewed study on student dropout in online courses conducted by Lee and Choi (2011) found that student support services had an important role in improving student persistence in online courses. Lee & Choi (2011) differentiated student support services into three sub-factors: course design, institutional supports, and interactions. Course design encompassed quality of course materials, interactivity of course content, and relevance of courses with students’ careers (Bocchi, Eastman, & Swift, 2004; Ivankova & Stick, 2007; Perry, Boman, Care, Edwards, & Park, 2008). Institutional supports were related to students’ satisfaction regarding administrative structure, student support infrastructures, orientation, and tutorial attendance (Cheung & Kan, 2002; Clay, Rowland,
In the meantime, interaction factors consisted of three types of interaction: student to student (peer interaction), student to teacher/faculty, and student to content. All of these interactions had significant effect on student persistence in online courses (Bocchi et al., 2004; Dimri, 2015; Ivankova & Stick, 2007; Morris Wu, Sz-Shyan and Finnegan, Catherine L, Morris, Wu, & Finnegan, 2005; Pigliapoco & Bogliolo, A., 2008; Tello, 2007).

CONCLUSION

The quantitative and qualitative findings demonstrated that student persistence could be enhanced by endorsing all three primary functions of student support running in a good quality level. These three functions include cognitive, affective, and systemic supports (Tait, 2000). The cognitive support encompass all learning support services through the variety of media, such as the delivery of high quality of learning materials and learning resources, and timely feedback on students’ assignment. The affective support plays the pivotal role in providing the supporting environment in enhancing students’ motivation, self-commitment, self-esteem, and self-efficacy. Finally, the systemic support provides a friendly administrative process for students and effective and transparent information management systems.

However, these three primary functions should be supported by the transformation of institutional attitudes that involves all staff at all levels in an effort to setting retention goals and developing the strategies, motivators and rewards to achieve them. The empowering institutional change absolutely requires considerable energy and is linked to institutional learning and feedback, planning processes, resource, a willingness to challenge entrenched attitudes and rewards for individual endeavour (Johnston & Simpson, 2006).

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MOOCS: INNOVATION OR STAGNATION?

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ABSTRACT

Issues of the phenomenon of Massive Open Online Course (MOOC) and its integration into current online and campus education to enhance higher education quality in universities is gaining importance. This large scale form of online education has the potential to escalate the reputations of universities and increase the global access to their institutions. However, the design and implementation of MOOCs is not easy. Thus, many higher education institutions take time for careful consideration before running them. Otherwise, this new online learning phenomenon, which is also called disruptive innovation, might cause some unintended negative economical and reputational results. This study aimed to examine the strengths and weaknesses as well as opportunities and threats of MOOCs in higher education. The data from the document analysis was examined by SWOT method to put insights on MOOCs internal and external standing. The electronic data including books, research reports, conference papers, journal articles, blog posts, discussion boards, and web forms were considered as a sample of the study. The findings show that accessibility, lifelong learning and brand extensions are some of the strengths of MOOCs, whereas dropout rates, poor pedagogy and low-quality assessments are major barriers for their effectiveness. Alternative education and collaborative learning are some of the outstanding opportunities MOOCs present, which worth the efforts to create more democratic and innovative higher education. Results indicated that it is worth to explore the ways to improve the completion rates, weak pedagogical structure, degree provision, quality insurance and assessment as well as to discover the needs of new generation in online learning.

Keywords: Connectivism, disruptive, higher education, Massive Open Online Courses, novelty, SWOT.

INTRODUCTION

Massive Open Online Courses (MOOCs) are one of the most recent developments in the field of online learning. This distributed innovation was rooted in Massachusetts Institute of Technology (MIT) Open Course Ware platform to provide free web access to MIT Course materials and was considered as a promising initiative for democratizing higher education. In 2008, the online open course “Connectivism and Connective Knowledge (CCK08)” which was introduced by David Comer and Stephen Downes in the University of Manitoba was considered the first MOOC which is free, open, and online with 2200 participants all around the world. In the year 2011, over 6.1 million students took at least
one online course. Actually, 2011 was the year in which MOOC was re-born in Stanford University by Dr. Sebastian Thrun, computer science professor. This first MOOC “CS221: Introduction to Artificial Intelligence” was a graduate level course with more than 160,000 students. Its duration, the interaction tools it provided, certificates it presented and the fact that it no course credit offered were some of the features of Open Courseware. Since 2012, which was announced as the year of MOOCs by New York Times, this new phenomenon has been placed in the vision statement in most of the leading universities in both USA and Europe. These new teaching and learning online platforms currently attract huge number of adult learners from all around world with various learner background and characteristics. MOOCs classically share some common features: open access using the Internet, free of charge, asynchronous, interactive user forums, and the opportunity to receive a certificate. These massive and open online courses do not only provide new approaches to course delivery methods in higher education platforms but also bring new evolutionary pedagogy that changed the conventional learning theories into third generation learning approaches.

This new phenomenon which is called “connected age” make everybody and everything connected via openly available knowledge, human, hardware and software resources over the network (McAuley, Stewart, Siemens, & Cormier, 2010). Thus, connectivism is the underlying idea of this dramatic transformation from traditional learning theories into innovative learning theories. Although the new version of MOOCs is not likely to represent the same pedagogical features with the first released connectivist MOOCs, no one can deny that this new development has an impact on how we think about higher education. Likewise, Bozkurt, Keskin, de Waard (2016) argued MOOC phenomena is already entered the Plateau of Productivity phase after the year 2015 due to the rapid progress of MOOCs, emerging business models, high rate of registration of lifelong learner and expanding educational adoption by higher education.

From a distance education point of view, some researchers do not see the further significance of massive open online courses in online learning, since there are still unsolved issues that damage their reputations such as high-drop-out rates, weak assessment methods, and accreditation. Reports and research studies have indicated high enrolments rates and attributed it to multifarious advantages and possibilities for students to gain new skills and knowledge through life-long and self-directed learning experiences. However, the same sources also highlight low retention rates of these courses (Jansen & Schuwer, 2015; Kleiman, Wolf, & Frye, 2015). Apart from the high dropout rates, MOOCs are also criticized by some bodies of researchers for their less credibly evaluation strategies employing to assess the students’ learning outcomes (Admiraal, Huisman, & Pilli, 2015). For instance, peer-assessment and self-assessment are two commonly used evaluation methods to cope with the disadvantages due to the extraordinary number of students, but they are considered not sufficient to grade students in order to get recognized credits in most of the universities.

Additionally, MOOCs as disruptive innovation are going to disrupt traditional education in higher education (Bower and Christensen, 1995). Yuan & Powell (2013) argue that online teaching innovations such as MOOCs are announcing a change in the business world as well as it might pose a threat to existing university courses. Although numerous types of MOOCs are listed in the MOOC providers’ web sites, the origin of this new phenomenon has been based on the connectivist theory. Therefore, the first MOOCs are considered cMOOCs that rooted in the connectivism. Despite known limited empirical output the real potential of MOOCs, unlike traditional online education programs, they present some advantages to the learners such as high-quality courses, high-quality digital learning materials and instructors who have worldwide reputation from prestigious universities (Dillahunt, Wang, & Teasley, 2014). With all those advantages listed above MOOCs are standing in a promising position in higher education institutions.
Currently, besides many universities that run MOOCs, many more universities are on the stage to understand, prepare infrastructure and be ready to offer new MOOCs in the upcoming semesters with full of hopes and expectations to profit from global recognition. For instance, Dennen and Chauhan (2013) explored the conditions related to designing and delivering a MOOC at the program level in Florida State University. Similarly, Odom (2014) questioned the potential impact of MOOC on the higher education institutions of Maryland University College. Another study was explored the usability of MOOC on Business English teaching in China (Jin-hui, 2015). Bozkurt, Akgun-Ozbek and Zawacki-Richter (2017) identified that learner support services; management and organization; access, equity and ethics are still unexplored research areas on MOOCs research over the time period from 2008 to 2015. However, considering the limited empirical studies on the real outcomes of this new phenomenon, rushing to implement these courses might be ended up with frustration if it is considered as an innovation that is completely different from the traditional e-learning.

In this respect, this paper aims to explore the potential innovative position of MOOCs in higher education. Therefore, on the early stage of MOOC evolution where the universities and providers are trying to understand its effect on students’ learning, this paper provides another perspective on the extend to what MOOCs bring innovation in higher education by considering the strengths, weaknesses, opportunities and threats by conducting SWOT analysis to reveal a clear picture of MOOCs in higher education within the framework of analytical evidence of their innovational effects. Therefore, it is aimed to answer the following research question: To what extend do MOOCs bring innovation in higher education?

METHOD

Research Design
This document analysis was conducted to identify the innovative aspects of MOOCs. Document analysis provides essential facts about MOOCs, as well as helps to understand why MOOCs are playing an innovative role in higher education.

Research Sample
Books, research reports, conference papers, journal articles, and electronic documents (i.e., blog posts, discussion boards, and forms) were examined to understand the innovative position of MOOCs in higher education. To identify scientific studies reporting strengths, weaknesses, opportunities or threats to the innovative aspect of MOOCs, we conducted computerized keyword searches in the digital catalogue search of Leiden University which contains multiple databases related with educational and social sciences; Academic Search Premier (EBSCO), ProQuest, Annual Reviews, Science Direct, Cambridge Journals, DOAJ, SAGE, Web of Science, and Wiley Online Library.

Research Procedure
The search was carried out using keywords such as MOOC (or MOOCs) and innovation. Our research provided 97 documents of which we eliminated 45 because they were either duplicated or in languages other than English and a further 52 including dissertations, peer-reviewed articles, conference papers, and e-books, besides, other electronic documents that came up through Google search by using the same keywords (e.g. MOOC(s) + innovation) were included in the data analysis.

Data Analysis
The next step was to screen the documents and compile a SWOT analysis method to provide the insights of the potential innovation aspects of MOOCs into higher education. This is a general analysis including various kinds of MOOCs since we did not utilize any inclusion or exclusion criteria regarding the type of MOOCs while selecting documents. As a methodological framework, SWOT analysis is considered a useful tool for the strategic planning process of strategic planning and policy of organizations (Geneletti, Bagli,
Napolitano, & Pistocchi, 2007). SWOT analysis is used in different fields including health education, business and management, vocational education (Sharma, 2005; Westhues, Lafrance, & Schmidt, 2001), and online education (Cojocariu, Lazar, Nedeff, & Lazar, 2014). Furthermore, some studies used SWOT analysis to decide on program level and to investigate possible outcomes of designing and delivering a MOOC (Deale, 2015; Dennen & Chauhan, 2013). The SWOT analysis can be utilized either as an icebreaker tool during strategic planning meetings (Pailwar & Majan, 2005) or as a tool for building strategy or exploring innovation (Elmansy, 2015). In this study, we examined the second approach, which is exploring innovative aspects of MOOCs, to make an evaluative resolution of whether or not the higher education intuitions should continue to focus on investigating the ways to design and run the MOOCs. We believe that this study adds different perspective and insight into how MOOCs bring innovation in higher education by providing general outcomes of SWOT analysis.

The following SWOT analysis tool (see Table 1) is used to explore the important internal and external factors of MOOCs with the prospects of examining the innovation by asking questions and finding answers related to each factor: strengths, weakness, opportunity and threats. The questions in each category presented in Table 1 were derived from the main questions of SWOT analysis (Bartol & Martin, 1991).

Table 1. The SWOT analysis tool to evaluate the MOOCs as an innovation in higher education.

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• What strength points do stakeholders see in MOOCs?</td>
<td>• What weakness could be improved in the design of MOOCs?</td>
</tr>
<tr>
<td>• What are the advantages of MOOC over higher education?</td>
<td>• What issues should be avoided?</td>
</tr>
<tr>
<td>• What are the advantages of MOOC over traditional online education?</td>
<td>• What are the factors that reduce the quality of MOOCs?</td>
</tr>
<tr>
<td>• Do stakeholders believe MOOCs are innovative?</td>
<td>• Does the production process have some limitations?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• What are the opportunities for MOOCs in higher education?</td>
<td>• What issues can threaten MOOCs in the higher education?</td>
</tr>
<tr>
<td>• What are the trends to take advantage of?</td>
<td>• What are the factors that can put higher education institutions into risk?</td>
</tr>
<tr>
<td>• How can we turn strengths into opportunities?</td>
<td>• Will there be any shifts in students’ and instructor behavior, universities or education system that can affect the students’ success?</td>
</tr>
<tr>
<td>• How do government and policy makers see MOOCs?</td>
<td>• Are there any changes in the higher education which can lead to opportunities?</td>
</tr>
<tr>
<td>• Are there any changes in the higher education which can lead to opportunities?</td>
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instance, MOOCs can be useful for opening access to high quality content, mainly in developing countries.

**Lifelong learning**
Second, the self-directed learning components of MOOCs have the ability to promote lifelong learning and continuing education among adult learners (Steffens, 2015). MOOCs allow changes in learning styles to occur and enable lifelong learners to acquire more and various knowledge with no time and money constraints. The fact that MOOCs do not require any particular expectations for completion or achievement is a motivating factor students to continue to learn by gaining understanding of new knowledge (Yuan & Powell, 2013).

**Online learning communities**
Third, creating large online communities of interests with various backgrounds, nations, and languages is difficult to obtain in face-to-face education and is extremely impractical through on-campus education. However, MOOCs are valuable of founding online learning communities through which learners generate knowledge for developing basic conceptual learning (Glance, Forsey, & Riley, 2013). According to connectivist theory, individuals learn and work in a networked environment. Based on this theory, how MOOC is designed to enable learning in a connected and networked world with ubiquitous access to the learning devices (e.g., mobile devices), using the most appropriate content and social networking tools are illustrated (Andersen & Ponti, 2014).

**Experimentation**
Fourth, MOOCs can be considered as an experiment in education that charms gifted teachers, technicians, and businesspersons (Educause, 2012). In this experimentation standpoint of MOOCs, many institutions use MOOCs to provide instruction for large on-campus undergraduate courses by recording students’ interactions. Besides, this data analyzing encouraged learning analytics to analyze large amounts of data which empowered researchers by providing deeper data on how specific experiences and interactions would be influential on students’ learning (Knox, 2014). For instance, how different approaches such as standalone versus hybrid courses or how different time schedules of courses such as courses with fixed time duration versus courses to be taken anytime are influential on students’ performance.

**Brand extension**
Fifth, mainly among elite research institutions, MOOCs have become a way of enhancing the institution’s brand and signaling innovation. Therefore, this way of brand extension improves the international triteness and reputation of institutions (Gerber, 2014). As a result, by offering MOOCs, many universities have certainly become more noticeable to public. They also created their brands and gained a global recognition (Hollands & Tirthali, 2014).

**Weaknesses**
Several weaknesses of MOOCs have been pointed out, for example, an electronic open book by Tony Bates listed some issues including dropout rates, expensive infrastructure, pedagogy, and assessment (Bates, 2015).

**Dropout rates**
Firstly, the high registration numbers for MOOCs are misleading; less than half of registrants actively participate, and of these, only a small proportion completes the course successfully. Nevertheless, absolute numbers are still higher than for conventional courses (Jordan, 2015). The meaning and the impact of very low course completion rates is sometimes misleading since students have no intention of completing the courses; instead they are more interested in participating and learning (Reich, 2015).
Expensive infrastructure
Secondly, MOOCs are expensive to develop, and although commercial organizations that offer MOOC platforms have opportunities for sustainable business models, it is difficult to see how publicly funded higher education institutions can develop sustainable business models for MOOCs. Though MOOCs are open and free to administration, the charges to higher education institutions can be noteworthy which can be easily understood by the cost-benefits outcomes of those on the front lines of MOOC developers and implementers. For instance, course development assistance through edX can reach upwards of $250,000 per course with an additional $50,000 fee each time the course is offered (Hew & Cheung, 2014).

Pedagogy
Thirdly, many researchers criticize MOOCs that they are scaling up existing poor practices (Rolfe, 2015) since they demonstrated limited ability to develop high level academic learning and intellectual skills needed in a knowledge-based society (Toven-Lindsey, Rhoads, & Lozano, 2015). Some of the pedagogical weaknesses include lack of instructional structure, poor quality, more focus on teaching (course) and less on learning, non-individual instruction (Maringe & Sing, 2014). Besides, some MOOC materials may be limited by copyright or time restrictions for re-use as open educational resources that can be considered as drawback.

Assessment
Last but not the least, assessment is one of the most criticized issues of MOOCs (Sandeen, 2013). Assessment of the higher levels, affective and psychomotor types of learning remains a challenge for MOOCs. The challenges involve supporting more interactivity and avoiding the restrictions by the limitations of the current technologies available to multiple choice questions and problems which have simple right-and-wrong answers. Besides, cheating stands as a major challenge of online education (Chen, 2014). Furthermore, validation of original work that is not plagiarized is a potential hot topic under assessment challenges in MOOCs (Maringe & Sing, 2014). There are some attempts to verify students’ contributions, avoid cheating and plagiarism (Baggaley, 2014), otherwise most MOOC providers will continue to not recognize their own MOOCs for credit.

Opportunities
MOOCs bring an opportunistic approach to education by opening windows for the conversation, sharing and discourse for global educators, researchers, and learners in a wider context and a global community. The key opportunities identified for the MOOCs listed as a game changer in online education by Mak (2013), Fowler (2013), and Fasihuddin, Skinner, and Athauda (2013). Expend reach, collaborative learning, personalized learning, and alternative education are the opportunities of MOOCs.

Expand reach
MOOCs have the potential to shift the education and business model from the notion that a professor lectures students, to a more connectivist, interactive model where global network of practice and community of practice emerges. They will have the possibility to reach the large numbers of educated people with shared knowledge and build a global community with the people who do not have the opportunity to study at top universities.

Collaborative learning
The underlying pedagogy of cMOOCs is to shift from teacher-centered learning in online education, to more cooperative and collaborative learner-centered learning. Furthermore, MOOCs promote decisive pedagogy to support human beings and connectivist pedagogy to enable global communication by promoting learning communities. For example, as a part of course regulation, many MOOCs ask students to form groups for projects and discussions. Thus, by providing such opportunities to students, MOOCs encourage them
to work collaboratively with a diverse set of people and engage in a process of knowledge building (Kizilcec & Schneider, 2015).

**Personalized learning**
Due to technological innovations and media affordances, the use of different learning technologies allow more individualized and personalized learning. MOOCs can provide experiences better personalize content to students. Thus, learners with different learning preferences and needs are provided with the possibility to learn in a more effective way.

**Alternative education**
With regard to the perspective of continuous education, MOOCs offer alternative prerequisite education to early university students as a third generation distance learning model (Gerber, 2014). Some MOOCs as an alternative education aim to prepare students for future education by providing a supportive learning environment that focuses on increasing academic and pro-social behaviors and skills.

**Threats**
Finally, the analysis included potential threats, including sustainability, quality of education, business model, the identity of the students, and non-credential courses. Besides, the issues on degree have caused struggles to both students and providers.

**Sustainability**
One key threat to MOOCs is a possible uncertainty of their real potentials and their sustainability in the market place. Furthermore, many more universities have started to plan, design and deliver a MOOC. However, the main threat is building a MOOC and having no students enrolled in it. In the case of designing a MOOC that received no attention from students all around the world, it could harm the institution’s reputation as well as cause financial problems (Toplechuk, 2013). Thus, in order to eliminate the sustainability threat, universities should conduct a need assessment before running MOOCs.

**Quality education**
Secondly, some limitations that made MOOCs insufficient to provide quality education are considered as threats. Since there is little data about whether MOOCs are more effective than other learning models, both providers and students may not be able to evaluate the real impact of them in terms of quality. Thus, exaggerating the positive role of MOOCs generates negative effects such as: ignoring students and placing more focus on content, which is common in xMOOCs.

**Business model**
Third, these open online courses truly threaten and disrupt the business model of traditional universities. MOOCs cannot just be developed as an advertising vehicle for universities. Money is needed to create the content. There is a possibility of eventually professors who will stop creating content if there will be no funding source. In fact, MOOCs have a place in life-long learning; but there is a need to reconsider the current business model to develop a sustainable solution. Although, a business model of MOOCs is fully developed with demonstrated positive net gains, some universities still doubt about their sustainability in terms of cost effectiveness when running MOOCs and their impact on their long term business goals, objectives and growth with MOOCs (Hill, 2012). Eventually, once MOOC is initiated, there would be pressure to develop revenue models to make the concept self-sustaining.

**Identity**
The student identity and security of the instrument itself are critical during administration. While some MOOC providers verify the identity of those taking their courses and proctor their end-of-course examinations, more attention must be paid to
the security of the assessment instruments (Fischer, 2014). There is a need for the authentication of students’ contributions to avoid cheating and plagiarism.

**Credibility**

Credentials are not provided to students who participate and complete MOOC programs. From a badge perspective, there is little to show from participation in the courses. Hill (2012) proposed that delivering valuable signifiers of completion such as credentials, badges or acceptance into accredited programs should be accomplished to reach an innovative act in higher education.

**Teacher who against the change: fuddy-duddy instructors**

A final threat to higher education involves the faculties who are the ones eventually accountable for surviving with disruptive learning technologies (Lucas, 2013). In some cases, instructors do not feel secure to participate in MOOCs and try to keep away. Simply, they deny being a part of it. Instead, they tend to wait and see their sustainability in higher education.

**DISCUSSION AND CONCLUSION**

The overall aim of this study is to provide an examination of a clear overview for strengths, weaknesses, opportunities and threats of MOOCs for higher education within all stakeholders’ perspectives. The matrix below (Table 2) denotes a summary of the crucial concerns that have been recognized above within the SWOT analysis.

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Accessibility</td>
<td>• Dropout rates</td>
</tr>
<tr>
<td>• Life-long learning</td>
<td>• Expensive infrastructure</td>
</tr>
<tr>
<td>• Online learning communities</td>
<td>• Pedagogy</td>
</tr>
<tr>
<td>• Experimentation</td>
<td>• Assessment</td>
</tr>
<tr>
<td>• Brand extension</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Expand reach</td>
<td>• Sustainability</td>
</tr>
<tr>
<td>• Collaborative learning</td>
<td>• Quality education</td>
</tr>
<tr>
<td>• Individualized learning</td>
<td>• Business model</td>
</tr>
<tr>
<td>• Alternative education</td>
<td>• Identity, credential and degree</td>
</tr>
<tr>
<td></td>
<td>• Fuddy-duddy instructors</td>
</tr>
</tbody>
</table>

Table 2 provides much clear observation of the strengths, weakness, opportunities and threats that MOOCs can face during design and development stages. It also allows drawing suitable conclusions which could support future development of MOOCs in higher education institutions as well as pre-college education. Thus, the stakeholders may try to overcome the weaknesses and threats to turn the project into a successful product. MOOCs have expanded and quickly spread into many higher education institutions across the world in recent years. So, several prestigious universities have started running courses on MOOC platforms providing free higher education courses open for enrollment for any Internet user. Although true innovation lies in the large-scale, open-access component (Rolfe, 2012), MOOCs promise opening up higher education by providing accessible, flexible, affordable and fast-track completion of university courses for free or at a low cost for learners who are interested in learning. Although there are potential drawbacks and threats, it is dreadful to disregard the impression of MOOCs in online learning. Although Dennen and Chauhan (2013) emphasized the greatest risks at local level, they also indicated the similar results to this study such as “reputation, recruitment and research.” The results of this study also confirmed the other study which reported similar weaknesses and opportunities namely accreditation, assessment and innovative interaction (Bozkurt, Akgun-Obek, Zawacki-Richter, 2017).
MOOCs have been evolving in different aspects including formats, designs, and functions and this evolution will continue in near future. Thus, all the MOOC stakeholders; providers, instructors and students will need to look more closely at and learn more about MOOCs. Having comprehensive knowledge about new opportunities for innovation in higher education, establish a common understanding of the needs of new aged learner profiles. Furthermore, the outcomes of this SWOT analysis identified the innovative potentials of MOOCs including accessibility and online learning communities.

In conclusion, innovation aspects of MOOCs were examined with SWOT analysis. Without ignoring the real impact of MOOCs on higher education institutions in their short life, stakeholders should take cautions the threats that created by these disruptive changed within higher education.

We acknowledge the limitations of this paper. Firstly, this cannot be a comprehensive analysis as it is only based on content analysis of the published documents. Additionally, the MOOCs in the reviewed published studies were in different types but this SWOT analysis was conducted by regarding them as one type. Thus, this also limits our study, that is to say, the same SWOT analysis would offer slightly different outcomes for cMOOCs or SPOCs. In addition, since only the English language documents are included in this review, there is a possibility that articles from non-English resources that examined MOOCs from an innovative framework may have been unintentionally excluded. Finally, the researchers faced the difficulties in categorizing the characteristics of MOOCs into four quadrants of SWOT table since some factors act as strength and opportunity at the same time such as experimentation.

Further studies should explore the innovative aspects of MOOCs in higher education by using other forms of analysis framework. As it was stated in the limitation part, we are aware of the issue of single data source. Therefore, multiple data sources such as personal reflections of stakeholders, providers, institutions, instructors and students who already participated or acted significant roles in making MOOCs well-known should be included into further research studies. Furthermore, other higher education institutions should conduct the same analysis considering their own resources and infrastructures. Additionally, it is worth to explore the ways to improve the completion rates, weak pedagogical structure to discover the needs of new generation in online learning. The funding for higher education institutions, degree provision, quality insurance and assessment should also be analyzed to find possible solutions. Thus, time will show whether MOOCs are going to stay on the stage as an innovation and shape the future of higher education.

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STUDENTS AWARENESS AND UTILIZATION OF EDUCATIONAL BROADCASTS TO LEARN IN OGBOMOSO, OYO STATE NIGERIA

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ABSTRACT

Radio and Television are broadcast media meant to disseminate audio and video signal, messages, information or programs to wide range of audience. Radio and television are already playing a role in educating the populace non-formally through various educational channels and programs, but there is significant potential to capitalize on their ability to enhance development and learning curriculum content among secondary school students. This study: 1) Find out the awareness of educational radio and television programs by secondary school students in Ogbomoso 2) Investigate secondary school students access to educational radio and television programs in Ogbomoso and 3) Investigate problems militating against students’ use of educational radio and television programs for learning.

Questionnaire was used as instrument to elicit responses from 100 secondary school students on their awareness-on and access to seven educational radio and television programs. The findings revealed that the students were not aware of the educational radio and television programs even though they have access to it. The study recommends that teachers in secondary schools should include educational broadcasts as forms of stimulus variation that they could apply to their classes and educational programs producers on both radio and television should create enough awareness about the programs to enable students follow the programs at appropriate time.

Keywords: Educational radio and television programs, Multichoice (DSTV), Startimes, educational broadcasts.

INTRODUCTION

Modern technology has transformed the way students learn and interact with their environment. Radio and Television are broadcast media meant to disseminate audio and video signal, messages, information or programs to wide range of audience. Broadcast media are regarded as eye and hear of the people because they look for information on behalf of the general public. Media have always formed an important part of modern education since the beginning of the twentieth century. From print to radio, television, and today's Web-enabled e-learning, each medium has been seen as a potential solution for the problems, inadequacies and certain ills of education. Invariably, the purpose of inducting
media into education has been two-fold: to increase the reach and thereby access; and to enrich the quality of educational content. The birth of a new medium has not however, supplanted the previous one; since each has found its own niche.

Broadcast media on its own help the populace to be conscious and aware of various events near and far away from them. Radio and television are now inseparable with the society because of the numerous roles they play including educational function. Educational broadcasting refers to television programming and radio programming providing or related to courses of study. The term “educational” is also applied at times to other programs that are particularly enlightening, informative or intellectually stimulating. Educational broadcast is the term given to the medium’s use in formal learning systems, whether primary or higher education (Berman, 2008). It is typically used as a means for course material delivery, and often integrated with various kinds of interaction: for example, in classrooms, discussion groups, or via the telephone. Community radio, on the other hand, involves informal learning processes whereby communities plan, own, and operate their own radio stations. The informal learning topics of community radio typically include child nutrition, family planning, and agricultural tips. Community radio necessarily involves a non-profit enterprise, community ownership and participation, and usually a participatory approach to learning.

Wherever the mass media have been established, education has been put at the forefront of the fruits to be reaped or as an objective for the development of the mass media. Since education has been linked to the creation of communication systems that can reach wide populations, educational broadcasting has been identified with development and nation building. However, they are powerful socializing agents to reach large heterogeneous and widely dispersed audience. It is observed that millions of people over huge areas can be reached very quickly via radio and television by spreading news, information, entertainment and so on. Indeed, they represent powerful tools of socializing people and students in particular through their different educative programs which increase the level of literacy in the society.

Sambo (2012) noted that broadcast media are tools that invest the past with an air of reality. They provide the learners with realistic experience, which capture their attention and help in the understanding of the historical phenomena. They appeal to the mind through the visual auditory senses. Also, Ortyoyande (2006) noted that we receive knowledge through our senses; they also noted that if we hear we forget, if we see we remember, and if we do something we know it. So, access to educational radio and television makes learning process more effective and productive. Also, those educational programs can be recorded to benefit learners by listening and viewing the lesson programs severally, hence aids their retention. Therefore, educational radio and television encourage learning, make it easier and interesting.

It should be noted that radio and television can effectively be utilized to teach individual or public the norms and values of society and reinforce same. Recent development in television has drastically affected educational procedure for improved quality of education offered to students. Television resource in instructional delivery will serve dual purposes and more efficient classroom instruction (Onabajo, 2000). The advancement which radio and television offer in education can be evident through accessibility to educative programs and instructional delivery like quiz, debate and so on. Productive situational delivery enhances learners’ creative and intellectual development through the use of television images, graphics, audio, test motion for high quality learning. Babalola (2005) states that radio and television offers five distinct roles in education which are: Socialization, Religion, Subject, Brain test and Sex Education.

Educational television has been discovered to have profound effect on speech training among young learners (Gocen & Okur, 2013). According to Gocen and Okur (2013) learners mimic what they see on television and as such remember more of the things they watch than the ones they learn in the classroom. Also, their study after studying the attitudes of
students involved in the survey of effect of TV on speech, it is obvious that they do imitate how people talk on TV and thereby think that their friends will like them better that way. Also, students who took this survey point out that they like when their friends imitate TV characters.

One of television’s most obvious characteristics is its visual aspect. Humans intuitively grasp the power of images to convey meaning, as can be seen in the old adage that values a picture at a thousand times the value of a word. Research in the past two decades has proven what we intuitively know: our brains deal with images differently than print (Saglik & Ozturk, 2001). Words are processed in the neocortex where the higher thinking capability of the brain resides. Pictures, however, are handled in the limbic system, rapidly, and trigger instinct, emotion, and impulse (Omenesa, 1997). Because brains are programmed to remember experiences that have an emotional component, television has a powerful ability to relay experience through the emotions evoked by images.

Local Radio stations in Nigeria have specific programs aired to educate the audience on different contents related to Basic science and technology curriculum. For instance, the radio programs “Abule Oloke Meje” and “Auto-maintenance” broadcasted from Ajilete 97.5 FM in Ogbomoso teaches the listeners about sexually transmitted diseases, community development and topics on several parts of a vehicle, the functions of the parts and how they can be maintained. Listeners are given ample opportunity to participate in the programs through phone calls. Likewise, the television program “Where there is no doctor” aired by Broadcasting Corporation of Oyo State (BCOS), Ibadan, teaches the listeners on various diseases and the causative micro-organisms. The program also enlightens viewers on sex education and effects of drug abuse.

Another local television station, Nigerian Television Authority (NTA) Ogbomoso airs a program that sensitizes the learners on their environment and how to preserve the environment. The program enlightens the listeners on pollution, different energy sources and their resultant effects on the environment. Similar programs that are educational can be accessed by students on satellite television stations like Learn-TV and Ed television on Multichoice cable also known as DSTV or Da-Vinci, NTA-Knowledge and BBC-Knowledge on Startimes cable television. Hence, this study intends to examine students awareness-of and utilization of educational broadcasts to learn in Ogbomoso, Oyo State.

**Importance of Educational Radio and Television**

Adediran (2004) states that radio and television offers five distinct roles which are: following as basic roles of radio and television in education:

- **Socialization**: They help to socialize children on cultural values in their domain especially how to know about past, great personalities, ceremonies, dressing, and behavior. Through program like and some print contents dedicated to culture and education.
- **Religion**: A lot are learnt today on radio and television about one’s religion which presented by religion analysts, while religion leaders are invited to educate and sensitize their followers. Such programs carry titles like ‘religion faith’, ‘time for paradise’, ‘words of God’ est.
- **Subject**: Various subjects like mathematics, English language, Yoruba and technological-based subjects are disseminated on radio and television to teach children. This can have titles like ‘my TV teacher’, ‘TV education show’, EST.
- **Brain Test**: Children are also educated and tested through brain test competition shows such as TV quiz, who wants to be a millionaire, work it out, and so on.
- **Sex education**: Sex education is presented to children on television and radio especially on how to protect themselves from unwanted pregnancy and diseases like HIV/AIDS, such as a radio program called Abule Oloke meje and many more.
Educational radio and television are very important for several reasons. First, it helps in the delivery of quality educational programs to audience. Learners have the opportunity of listening or viewing relevant educational programs which indirectly enhance their understanding and stimulate their interest towards learning.

Second, it helps to increase access to formal education. Educational radio or television can offer a distance education secondary equivalency program for out-of-school youth and adults. Such people can thereafter register for internal final senior secondary school exams like NECO, WAEC or NABTEB in any school of their choice.

Third, educational radio and television programs help to support classes with under qualified teachers. It has been observed that most of the educational Radio or Television channels teach effectively and interestingly various secondary school subject topics. This has been particularly true in the science subjects where teachers are scarce. Fourth, educational radio or television programs expand the experiences of the children. For example, in sciences, the programs can demonstrate many experiments that would not be possible to do in regular classrooms or even in laboratories. Thus, strengthens the teaching and learning process.

Effects of Educational Radio and Television on the Remembering Ability of the Students

Previous studies revealed the positive impact of broadcast media (radio and television) on enhancing the achievement and performance of students and in gaining significant improvement changes in all areas (Kulik and Kulik, 1991; Kulik, 1994; Rutz, 2003; Baker, 1994). For instance, many studies of comprehensive effort investigated the impact of educational radio or television on secondary school students and reports show an increase in test scores by the students. Also, students gain more knowledge in less time because lessons become more enjoyable and interesting (Kulik, 1994).

Similarly, Sivin-Kachla (1998) found that students studying in a technology rich environment achieve higher marks in all subject areas, gain a positive attitude towards learning, are able to generate new ideas and build self-confidence. More so, Braun in 1990 indicated that educational media particularly radio and televisions improve students’ motivation and attitudes about learning and also about themselves. Also, it increases students’ attendance and decreases dropout rates. Preschool children who watched a few hours a week of educational programming perform better on achievement tests over time than their peers who watch more general entertainment shows (Huston & Wright, 2014).

The researchers found that younger children, especially those aged 2 and 3, who watched a few hours a week of educational programs had higher scoring on academic tests 3 years later than children who did not watch the programs. Younger children who spent many hours watching entertainment programs had lower test scores than those who watched fewer hours. "Viewing of educational programming was associated with better school readiness and better academic skills," Huston noted. "Watching educational television may be an important vehicle for children to get some early learning that can really make a positive contribution." Huston notes that she and her colleagues took into account possible influences such as the family's level of education and socioeconomic factors. Empirically, radio and television are capable of delivering high quality educational program to highly diversified audience located across broad geographical expanses—all at a low per unit production cost (couch, 1997). Also, United Kingdom Universities have demonstrated that when used as supplementary learning tools, they benefit weaker students (Tripp and Roby, 1996). The Agency for International Development has shown educational radio and television to be more cost effective and capable of exerting greater learning effect on secondary school students than textbook or teacher education (Tripp and Roby 1996).

Furthermore, Zanguyi (2011) showed that teachers’ attitudes towards new educational technologies such as radio and television in process were positive. Similarly, Dogruer,
Eyyam and Menevis (2010) found that teachers agreed that the educational radio or television has a positive impact on their experience. In the same way, Ozcinar, Hursen, Ozdamli (2009) observed that teacher trainees believed in positive effects of educational radio and television. More so, educational radio and television can provide instruction for one group of students whilst the teacher is occupied with another. As a medium that can be listened to in the privacy of one’s home or room, they are often the preferred choice for those seeking information on culturally taboo topics such as HIV/AIDS or STDS.

Jaminson and MC Anancy (1978) report four main advantages of educational radio and television: improve education quality and relevance; lower per student educational costs; Improve access to education particularly for disadvantaged students or groups and ; It provides a crystal clear audio and visual signal, which is particularly important in instructional programs. Therefore, the broadcast media (radio and television) remain a channel that had proven educational worth in terms of both pedagogical importance and geographical reach.

Interactive radio instruction (IRI) consists of broadcasting lessons to audience on a daily basis, on a particular topic and aimed at specific level. It provides regular structure assistance to teachers and serves to improve the quality of teachers and serves to improve the quality of teaching and enhance learning. IRI also serves to expand access to education, by bringing ready-made lessons to remote schools and learning centers which have few resources and teachers. It is also a cost-effective means of delivering educational content to a large number of people.

Television lessons can be used to supplement other course materials or can be stand-alone lessons. Such lessons have progressed over the years from simply being television programs showing teachers talking, to being more engaging and interactive programs which incorporate issues relevant to the learners. Educational television programs are often accompanied by printed materials and other resources to enhance learning and interaction. These are mostly practiced in advance country or any civilized world.

More so, educational broadcasting, aside from being used for broadcasting specific lessons, radio and television can be used to broadcast general educational programs. Basically, any radio or television program with educational value can be considered a ‘general educational program’. While general educational programming consists of a broad range of program types - news programs, documentary programs, quiz shows, educational cartoons est., that afford non-formal educational opportunities for all types of learners. In a sense, any radio or television program with informational and educational values can be considered under this type.

Statement of the Problem
Basic Technology as a subject has been affected by the use of information and communication technologies which radio and television are key components of and this have undoubtedly affected the teaching and learning of the subject (Yusuf, 2005). The reason for this could be ascribed to the fact that there are topics in basic technology that pose serious problem of comprehension to students. These topics cannot be taught effectively without the use of relevant channel/media such as broadcast media (radio or television) which provides not only audio or audio-visual images but also make learning practical and interesting.

Radio and television are already playing a role in educating the populace non-formally, but there is significant potential to capitalize on the ability of the broadcast media to enhance development and learning among secondary school students. Their use in education have the potential to innovate, accelerate, enrich, and deepen skills, to motivate and engage students, to help relate school experience to work practices, create economic viability for tomorrow’s workers, as well as strengthening teaching and helping schools change (Davis and Tearle, 1999). Therefore, this research examined the effectiveness of educational radio and television on learning basic science and technology.
Research Questions

- Are secondary school students in Ogbomoso aware of educational radio and television programs around them?
- Do secondary school students in Ogbomoso have access to educational radio and television programs?
- What are the problems militating against students’ use of educational radio and television for learning?

METHODOLOGY

This study was a descriptive research of survey type. It is meant to ensure that the evidence obtained enables this research to answer the research questions as unambiguously as possible. This study ascertained the status quo of secondary school students’ awareness-of and use-of educational broadcasts for learning purposes. Questionnaire was utilized as instrument for the study to enable the researcher gather responses from a reasonably large number of secondary school students in Ogbomoso.

Participants

The population for this study were all students in secondary schools in Ogbomoso. The target population for the study constitutes the students of junior secondary school in five selected public secondary schools in Ogbomoso randomly selected through ballot system. 20 students were taken from each selected secondary school. It should be noted that a total of one hundred (100) respondents constitute the sample element. Therefore, one hundred questionnaires were administered to the students to obtain data for the study.

Research Instrument

Researcher designed questionnaires tagged “Students Awareness-of and Utilization of Educational Broadcasts to Learn Questionnaire (SAUEBLQ)” was distributed among respondents. It was constructed after a careful and extensive study of the related literature. The questionnaire was divided into four sections (A to D). Section ‘A’ contains background information which requires each respondent to indicate the gender and class. Section ‘B’ of the instrument required the students to indicate their awareness of listed educational radio and television programs and also indicate whether they have access to the programs or not. Section ‘C’ requires the students to indicate the extent to which they agree or disagree with the statements that listed problems militating against students’ use of educational television and radio to learn. The instrument was validated by experts from the field of Educational Technology at the University of Ilorin to check the instruments appropriateness to measure what it was intended to measure and how adequately it was going to measure it. Wording problems, ambiguity and sentence structure of the questionnaire were improved following the suggestions of these experts.

Data Collection and Analysis

The consent of the school authorities whose students formed the sample for the study was obtained to administer the questionnaire to the respondents. The administration of questionnaires was done with the assistance of the school teachers and responses were collected immediately from each of the selected secondary schools. The researcher explained the purpose of the questionnaire to respondents as well as emphasizing the importance of their responses and assured them that their responses would be kept confidential and used solely for the purpose of this research. Data collected for this study were analyzed using simple percentages and means.

FINDINGS AND DISCUSSIONS

Table 1 shows the awareness of secondary school students on educational television and radio programs in Ogbomoso. The analysis shows that generally students in Ogbomoso were not aware of educational television and radio programs available to them with a mass response of 63%.
Table 1. Awareness of Secondary School Students on Educational Television and Radio Programs

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Programme</th>
<th>Station</th>
<th>% Yes</th>
<th>% No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Abule Oloke Meje</td>
<td>Ajilete FM</td>
<td>26</td>
<td>74</td>
</tr>
<tr>
<td>2</td>
<td>When there is no doctor</td>
<td>BCOS, Ibadan</td>
<td>57</td>
<td>43</td>
</tr>
<tr>
<td>3</td>
<td>You and Environment</td>
<td>NTA, Ogbomoso</td>
<td>63</td>
<td>37</td>
</tr>
<tr>
<td>4</td>
<td>Sex Education</td>
<td>Learn TV (DSTV)</td>
<td>40</td>
<td>60</td>
</tr>
<tr>
<td>5</td>
<td>Technology and Energy around us</td>
<td>Da-Vinci (Startimes)</td>
<td>32</td>
<td>68</td>
</tr>
<tr>
<td>6</td>
<td>21st Century Innovations</td>
<td>BBC Knowledge</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>7</td>
<td>Basic Science and Technology</td>
<td>Ed television (DSTV)</td>
<td>15</td>
<td>85</td>
</tr>
</tbody>
</table>

Average %

37

63

The findings have strong implications on the mass media or distance teaching and learning process especially in secondary schools in Oyo State. The finding that majority of the secondary school students in Ogbomoso town in Oyo State were not aware of the educational television and radio programmes around them is an indication that there are still lots of grounds to cover with regards to educational broadcasting in the state. There is need to sensitisise the students to tune in to particular programmes that would benefit them academically. The teachers and producers that air such programmes also need to visit schools to intimate the students about such programmes. Likewise, this finding suggest that students in Ogbomoso were more aware of contents on local channels (BCOS and Ajilete FM) than those on the satellite cable dishes (Startimes and DSTV).

Overall, Table 1 shows that majority of the secondary school students in Ogbomoso were not aware of the educational television and radio programmes around them with an average percentage of 63% and only 37% of the students were aware of educational television and radio programmes around them. This finding is in tandem with that of Familusi and Owoeye(2014) who showed that residents of Ekiti (another town in Nigeria) utilises radio broadcast majorly for entertainment and current affairs purposes. However, This finding is in contrast to that of Akhter (2011) who revealed that students in Pakistan showed mass awareness of educational television programmes(ETV) for effective distance learning. Majority (92%) of these distance learners were aware about the ETV programs. This difference in the findings could be because the study in Pakistan was conducted on University students.

Table 2 shows the secondary school students access to educational radio and television programmes in Ogbomoso. It indicates that majority of the secondary school students in Ogbomoso can access educational television and radio programmes around them with an average percentage of 68% and only 31% of the students indicated that they do not have access to the educational television and radio programmes around them.

Table 2. Secondary School Students Access to Educational Radio and Television Programs in Ogbomoso

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Programme</th>
<th>Station</th>
<th>% Yes</th>
<th>% No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&quot;Abule Oloke Meje&quot;</td>
<td>Ajilete FM</td>
<td>92</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>When there is no doctor</td>
<td>BCOS, Ibadan</td>
<td>73</td>
<td>27</td>
</tr>
<tr>
<td>3</td>
<td>You and Environment</td>
<td>NTA, Ogbomoso</td>
<td>87</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>Sex Education</td>
<td>Learn TV (DSTV)</td>
<td>54</td>
<td>46</td>
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<tr>
<td>5</td>
<td>Technology and Energy around us</td>
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<tr>
<td>7</td>
<td>Basic Science and Technology</td>
<td>Ed television (DSTV)</td>
<td>54</td>
<td>46</td>
</tr>
</tbody>
</table>

Average %

68

31
Another finding of this study revealed that majority of the secondary school students in Ogbomoso can access educational television and radio programs around them. This shows that if proper sensitization is done and students are aware of the programs, there is no problem in accessing the programs with personal radio and television sets. This implies that secondary school students in Ogbomoso have access to functional radio and television sets that is connected to the radio and television stations that transmits educational programs. This is in line with the study of Familusi and Owoeye (2014), a research on use of radio and other means of information dissemination by the residents of Ado- Ekiti, Ekiti-State, Nigeria, which showed that the populace have good access to radio and television sets for receiving programmes.

Table 3 shows the analysis of respondents’ opinions about the possible problems that militate against students’ use of educational radio and television to learn in Ogbomoso, Oyo State.

Table 3. Problems Militating against Students’ Use of Educational Radio and Television for Learning

<table>
<thead>
<tr>
<th>S. N</th>
<th>Major Constraints</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inadequate power supply to use the television and radio to access educational</td>
<td>3.20</td>
</tr>
<tr>
<td></td>
<td>broadcast</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>High cost of subscriptions to the satellite television stations (Startimes and DSTV)</td>
<td>2.96</td>
</tr>
<tr>
<td>3</td>
<td>Inconvenient time of airing educational broadcasts on the television stations</td>
<td>3.09</td>
</tr>
<tr>
<td>4</td>
<td>Educational broadcasts are usually not interesting to listen-to or watch.</td>
<td>2.88</td>
</tr>
<tr>
<td>5</td>
<td>High cost of acquiring television and radio sets</td>
<td>2.41</td>
</tr>
</tbody>
</table>

Grand Mean 2.91

Table 3 shows the analysis of respondents’ opinions about the possible problems that militate against students’ use of educational radio and television to learn basic technology in Ogbomoso, Oyo State. The table shows that “Inadequate power supply to use the television and radio to access educational broadcast” is considered the most prominent mitigating factor with mean score of 3.20. This is closely followed by “Inconvenient time of airing educational broadcasts on the television stations” with a mean score of 3.09. The respondents also consider “High cost of subscriptions to the satellite television stations (Startimes and DSTV)” and “Educational broadcasts are usually not interesting to listen-to or watch” as strong mitigants towards the use of educational television and radio programs for learning with mean scores of 2.96 and 2.88. However, the respondents do not consider “high cost of acquiring television and radio sets” an issue that could mitigate the use of educational television and radio programs for learning basic technology with the item scoring a mean score of 2.41 which is lower than the benchmark score of 2.5 of 4 point Likert-scale used for data gathering. Overall, secondary school students in Ogbomoso town considered the items checked as real problems mitigating use of educational television and radio programs to learn basic technology with a grand mean score of 2.91.

The study further revealed that the cost of accessing learning on satellite television stations through DSTV and Startimes cable are expensive and this corroborates the findings of Familusi and Owoeye (2014) who revealed that the cost of accessing information on radio, television and use of mobile phone is not expensive while that of internet access and paying subscription to DSTV and other cable television is expensive. On the most affordable and
usable media in providing access to information for agricultural purposes, Kakade (2013) revealed radio is the most accessible and usable in accessing information by the farmers followed by mobile phone, television and newspaper. Kakade (2013) report showed that social network, DSTV, cable television and internet are expensive for the rural farmers to access agricultural information.

CONCLUSIONS AND RECOMMENDATION

This research examined effect of educational radio and television services on learning of basic technology in Ogbomoso, Oyo State and concluded through thorough data analysis that Secondary school students in Ogbomoso have ample access to educational radio and television broadcasts but they are uninformed about educational programs existence and timing. Also, the study concluded that secondary school students have several factors that bar them from utilizing educational broadcasts to learn, all of which could be surmounted if adequate publicity is given to the educational programs to increase students’ awareness of the programs.

Based on the findings and conclusions of this study, the following recommendations were made:

- Educational programs producers on both radio and television should create enough awareness about the programs to enable students follow the programs at appropriate time.
- Pricing of subscription charges for satellite channels that transmits educational broadcasts should be regulated or subsidized by the government to allow equal opportunities for all students irrespective of socio economic status of parents or guardians.
- Adequate planning and entertainment should be packaged into educational broadcasts to motivate learners to follow such programs.
- Teachers in secondary schools should include educational broadcasts as forms of stimulus variation that they could applied to their classes.
- Curriculum planners and professional associations like Teachers Registration Council of Nigeria (TRCN), Nigeria Union of Teachers (NUT), Parent Teachers Association (PTA), Social Studies Educationist Association of Nigeria (SOSAN) should encourage their members – the administrators of schools and the secondary school teachers to utilize radio and television channels at disseminating knowledge to the learners
- Students should be encouraged to tune in to educational programs on their radio and television sets notwithstanding various distractions of entertainment channels.

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BOOK REVIEW

MAKING ONLINE TEACHING ACCESSIBLE: INCLUSIVE COURSE DESIGN FOR STUDENTS WITH DISABILITIES
Written by Norman Coombs

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INTRODUCTION

Recent developments in information and communication technologies has led to the explosion of online learning. In addition, with the improvement in assistive technologies, people with disabilities have the chance to access to information and learning, which is incomparable to the former times. Assistive technologies are specialized software and hardware, which include screen readers, screen magnification, voice recognition and Braille keyboards. As a result, education has become much more egalitarian and inclusive. Norman Coombs provides a wonderful catalogue of means, tools, guidelines, decisions and legislations towards a more equitable as well as more inclusive design of courses in so far as online education is concerned. According to Coombs, accessibility means the online course contents can be used effectively by disabled learners. Coombs indicates that the book is intended for the teachers and instructional design staff.

REVIEW OF THE BOOK

In chapter 1, Coombs holds that the emergence of information technology has changed the education process for everyone, and, it has changed the personal lives of a lot of people. Coombs states that this is even truer when it comes to disabled people, namely, blind people and hearing disabled people. Digitized information has been major breakthrough for the disadvantaged. Coombs in this chapter also provides a detailed account of the assistive technologies, such as audio and video captions, voice recognition and screen reader; ways of inclusive design such as universal design principles for learning;
legislations such as section 504 and 508 of 1973, as well as ADA in 1990; and finally guidelines like web content accessibility guidelines.

Coombs, in chapter 2, goes over the three components of an accessible online learning system. These three components are learning systems such as LMSes, accessible course content such as in the form of HTML, and learner’s capability, which is student readiness.

In chapter 3, the author explains how to make accessible contents by virtue of Microsoft Word and Excel. Here Coombs suggests that using style sheets and word styling feature as well as universal design principles make the difference. Headings should be short and prominent. Lines should be short and coherent. Tables should be simple and intuitive.

Coombs discusses the properties of an accessible power point document in chapter 4. According to Coombs, the principles of universal design here apply also. Presentations should be structured thoughtfully. Contrasting foreground and background colors should be selected. Content should be kept easy to read. The use of text boxes should be avoided. A transcript of the narration should be provided for the hearing disabled people. Coombs in the following chapter, which is chapter 5, goes onto further details of how accessible contents can be distributed through various versions. Coombs offers power point formats, (ppt and pptx), plus daisy as well as hard copy Braille versions in addition to word, pdf and html versions.

In chapter 6, Coombs takes up the math and graphics in terms of accessibility. Coombs highlights that math and graphics have been the greatest challenge to visually-impaired people concerning accessibility. In spite of the revolutionary achievements, came with the discovery of nemeth code, mathml, math type, and math speak, we can say that even though it is much easier relative to the past now, the greatest challenge to the blind people, is still emanating from the graphical stem areas. Digital revolution still keeps us hopeful.

In chapter 7, Coombs delves into the use of multimedia in an accessible manner. Coombs offers two applications, which are Magpie and Camtasia for producing video captions. According to Coombs, even though it takes more time, the value, multimedia adds up to an online course is worthwhile. In using multimedia, Coombs determines the following steps as follows: It must be kept simple. It must be kept short. And lastly, it must be kept relevant.

Finally, Coombs in chapter 8 offers the formation of an accessibility team in an educational institution. He also describes the necessary qualities of the members of such team. The stakeholders’ representatives must be the members. Unlike many prejudices and discussions, Coombs argues that online learning is both a challenge and an exciting opportunity for the disabled learners. Given that the learner readiness and other kinds of digital divide are overcome; online teaching is a wonderful system of education. Accessibility of an online course depends on the accessibility of the learning management system, accessible course content, high quality adaptive technology and on the disabled
student’s readiness. The application of the universal design principles, Coombs states, creates reasonable accessibility.

All in all, despite some confusion of chapter titles and symbols used thereof, this book provides an excellent example of instructional design, whose main ideal is inclusiveness. Being blind and an educator, Professor Norman Coombs shares his priceless experience and knowledge with us. To finalize, as he puts it, teachers must focus on the ability of every disabled student instead of their disabilities.

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BOOK REVIEW

THE ONE WORLD SCHOOLHOUSE: EDUCATION REIMAGINED
Written by Salman Khan - The Founder of Khan Academy

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INTRODUCTION

Khan Academy is a global phenomenon with its revolutionary way of distributing courses. With its impressive database, Khan Academy has around 10,000 tutorial videos with short and to-the-point content mostly in Math and recently in many other subjects from science to art and humanities. The idea of offering free and world class education for anyone, anywhere started when the founder of Khan Academy- Sal Khan wanted to give video tutorials to one of his cousins upon request. As the tutorials were on demand by the other cousins in time, he decided to put the video content on YouTube and the demand started to raise. Over time his website became popular around the world with its quality and attention grabber videos on diverse subjects. In 2012 Khan wrote the book "The One World Schoolhouse" which is a kind of collection of Khan’s thoughts and experiences on education that he gained after the Khan Academy. In "The One World Schoolhouse," Salman Khan presents a simple thesis: We learn best when we learn actively and at our own pace, mastering each new skill before proceeding to the next. The book comes with the subtitle “Education Reimagined” as it aims to provide a new approach of learning in four parts respectively.

REVIEW OF THE BOOK

Part 1: Learning to Teach- This part has six chapters and the chapters are mainly about how Khan started teaching and how he came up with the idea of video tutoring. The focus point of the first part is to learn how to teach. According to Khan, teaching is an art and teachers are artists who can inspire others and during the lessons not only teachers teach and have their students learn but also they themselves learn while teaching. In the first
part, Khan tells the story of Nadia to his readers and via Nadia he reveals his approach to learning and teaching. Nadia is his cousin and upon her request he started to give video tutorials on Mathematics to Nadia. This attracted the attention of many others and he started to put his videos on YouTube. In the first part, he mentioned how he prepared the videos and how hard he tried to make them tailor made as he thinks that both learning and teaching are individual processes and uniqueness of the students shouldn’t be disregarded. He believes that a teacher shouldn’t be the one who spoon feeds the students but helps them learn how to learn. Being a facilitator of learning and empowering collaboration in the class are key points in Khan’s approach to teaching. Developing from there, he explains some basic concepts in teaching theory, including learning-by-association, self-pacing, consolidation, self-education, and, most importantly, the concept of “mastery learning”.

Part 2: The Broken Model- This part is mainly about the drawbacks of old fashioned teaching that he calls “the Prussian Model”. According to Khan this model has already been outdated but people got used to it so giving up to this model is just like leaving the safe zone for educational policy makers. He questions the duration of the lessons in this age because the attention span of the students is around 10 to 18 minutes according to many researches. Khan also compares the conventional education to “Swiss cheese with big holes in it. Also many courses are not related with each other and these gaps between the courses make learning not meaningful for students. The chapter focuses on lack of creativity, meaningless homework-just for the sake of homework, passive students and inefficient use of funds and emphasizes the importance of technology which he thinks will be the solution to these problems if used effectively.

Part 3: Into the Real World- This chapter gives the basics of Khan’s “One World Schoolhouse” via his famous words: “Education does not need to be hostage to any dogmatic theory” (pg.131). In this part, he puts emphasis of how important to differentiate learning for learners by using the means of the technology age and also he underlines the learner differences as he mentions andragogy- how adult learners learn which is quite different from the young learners. He says that enhancing learning with technology is not just putting whiteboards into the classroom, it should be done with careful and elaborate planning. Also he states that the quality time between the teacher and the students can be created and also increased if the technology use in learning is well planned and to the point. Through the end of the part, Khan gives a brief history of how his short videos turned into World-Renowned online courses and how his courses were multi-million dollars funded by Gates Foundation and Google.

Part 4: The One World Schoolhouse- The motto of this part is “Change is difficult but not impossible”. This part focuses on the future of education and how important it is for teachers to teach students how to learn. The flow of information is quite fast in the age of technology and process of learning is not stable. At this point flipping classes, or blending learning could be solutions to use time effectively for a better learning-mastery learning. According to Khan school reports should be portfolios of the creative works and the achievements of the students not just a paper showing the grades. Moreover, diplomas should be a collection of micro-credentials like the evidences of apprenticeship, or works of art, or what they learned. The tone of Khan in this part is quite futuristic but again he and his team do not see the technology as the only solution if it is not planned well. He suggests an enlightened use of technology. This means that for an equitable and affordable
educational future, technology should be used to enhance how we teach and learn and this can only be done by running a meaningful and imaginative integration of technology into learning environments.

In conclusion, like many innovators, Khan rethinks existing assumptions and imagines a learning environment without them. In the One World Schoolhouse, Khan presents his futuristic vision about education via his own teaching experiences with started with his cousin Nadia. His way of serving his video tutorials via Youtube and then on his website inspired many others in e-learning and helped them improve and enhance their courses. He believes that more than just an educational solution, this book is like a call for free, universal, global education that can be achieved via the correct use of technology and the Internet and he suggests that educational professionals in charge should take initiative to provide better learning environments to the learners of today and the future.

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