

Vision for the future
theoretical perspectives on
management (LCDB7006)

The influence of ICT on higher education

STUDENT ID: 1807312

UNIVERSITY OF WALES TRINITY SAINT DAVID Doctor of Business Administration

Table of content

I.	Introduction.....	1
II.	Literature review.....	2
1.	Higher education & ICT definitions.....	4
a.	Higher education.....	4
b.	ICT definition.....	5
III.	The role of ICT in higher education.....	7
1.	The impact of ICT on higher education.....	7
a.	Traditional learning vs e learning.....	8
b.	The impact of ICT on what we learn.....	8
c.	The impact of ICT on how students learn.....	9
d.	The impact of ICT on when and where students learn.....	10
e.	Emerg ed issues.....	10
f.	The influence of ICT on stakeholders.....	11
2.	ICT and students' performance: no clear direct effects.....	12
a.	ICT does not have a direct impact on students' performance.....	12
b.	ICT plays a role in students' achievements.....	13
IV.	ICT & higher education in the UK.....	15
1.	Higher education growth in the UK.....	15
2.	ICT use within higher education in the UK.....	16
V.	Impact of ICT Innovations on the Quality of Business Research Process in Higher Education Institutions.....	21
VI.	The future of digital learning in higher education.....	23
VII.	Conclusion and discussion.....	24
	References.....	25

The influence of Information and Communication Technology on higher education

I. Introduction

Since the past twenty years, technology has been developing at a rapid speed. It is undeniable that new technologies play a major role in all aspects of life. Technology has brought changes to business and industries' practices. Information and Communication Technology (ICT) has a significant influence on all fields and areas, especially in human resources and knowledge management (Pham, 2014). The ongoing technological change is transforming the teaching and learning process too, especially higher education. Most of traditional based programs have been converted to virtual ones, or what is commonly known as "e-learning", or blended learning, that gathers both face-to face and online learning. Advances in "Information and Communication Technology" are bringing new opportunities to higher education. Therefore, universities all over the world are deeply investing in ICT, to develop the teaching and learning methods. However, it remains unclear whether or not these technologies are effective in the university context. Many researches (theoretical and empirical) have been conducted, to explore if "Information and Communication Technology" has a positive or a negative impact on students' achievements, and the university's return on investment.

The purpose of this assignment is to provide a clear understanding of the role of "Information and Communication Technology" in higher education, demonstrating whether ICT has a positive or a negative impact on the learning and teaching process, and to analyze the link between ICT and students' performance as well as achievements.

II. Higher education & ICT definitions

1. Higher education

The development of a nation depends of its population. Therefore, higher education represents a key driver in the economic development and social progress of a country. According to the University of Warwick (2018), there is a huge difference between higher education and further education. Further education is continuing to study after the age of 16, usually after “GCSEs or BTECs”. Whereas higher education, abbreviated as HE, is continuing post learning after the age of 18. UNESCO (1997) defines higher education: “comprises all post-secondary education, training and research guidance at education institutions such as universities that are authorized as institutions of higher education by state authorities”. Higher education seems to be the most important and critical stage of the academic learning, as it plays a major role in the society development.

2. ICT definition

Information and communication of technologies appeared in the 20th century, and started progressing since then by unifying content, computing, telecommunications and broadcasting. The growth of Internet (global network of computer networks) has empowered the development of ICT. Information and communication technology is an expanded term from Information and technology IT, and abbreviated as ICT. There is no unique universal definition for ICT, because its concept evolves constantly. It includes all products that is based on digital information, such as laptops, smart TVs and even emails. The UNESCO uses the term ICTs “to describe the tools and the processes to access, retrieve, store, organize, manipulate, produce, present and exchange information by electronic and other automated means. These include hardware, software and telecommunications in the forms of personal computers, scanners, digital cameras, phones, faxes, modems, CD and DVD players and recorders, digitized video, radio and TV programs, database programs and multimedia programs” (UNESCO, Bangkok, 2003; Bairagi et. al., 2012). It is a “general term that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals), computers, middleware as well as necessary software, storage- and audio-visual systems, which enable users to create, access, store, transmit, and manipulate information” (UNESCO, Bangkok, 2003; Bairagi et al., 2012) .

ICT is referred to, technologies that give access to information through telecommunications, focusing mainly on communication technologies, such as internet, cell phones, wireless networks etc. In the 21st century, “information and communication technologies” have empowered society with a range of communication abilities. People from different destinations can communicate with each other in a real time, through prompt messages, face- calls, voice calls or social media websites, which is the most popular form of keeping people connected with each other across the world. It has transformed the world to a “global village”.

The first Human Development report that was published in 1990 states: “The real wealth of a nation is its people, and the purpose of development is to create an enabling environment for people to enjoy long, healthy and creative lives. This simple but powerful truth is too often forgotten in the pursuit of material and financial wealth.” (UNDP, Oxford). Since 1990 The Human Development report demonstrates that the economic growth and human development provide each other a mirror to reflect on current the global imbalance, and a telescope to predict the positive opportunities in the future. As a part of Human development, higher education is considered as a powerful instrument for the economic growth of a country (Baskaran, Muchie 2007). It is globally believed that ICT and higher education are some of the fields that contribute the most in the world’s development. Therefore, developed countries tend to get more advantage of ICT than developing countries (Pham, 2014). Even though ICT provides more opportunities for developing countries, to address issues in the field of health, poverty, employment and education (Baskaran, Muchie 2007). So, what is the relationship between ICT and higher education, how do they associate together?

III. The role of ICT in higher education

Use of ICT within academic institutions has been referred to as educational technologies (Mangin, 2011). Researchers have attempted to define Information Technology in education as an amalgamation of the tools and processes used in managing the educational requirements and challenges by applying computers and other related electronic technologies and resources (Kingsley, 2007, Cooper, 2014). This information Technologies in education denotes computers and other information and communication technologies whose application to the learning and teaching process, could change considerably the traditional education system. Information and communication technologies in education has been categorised into 3 namely: Administrative, Productivity, and Instructional (Ball & Levy, 2008).

Examples of these ICT in the education sector comprise computer technologies for creating programme materials such as social networking sites, database programmes, electronic mails, word processing, presentation programmes, websites, blogs (Mangin, 2011). ICT has been used by the education sector to manage numerous programmes such as Learning Management systems or Programme Management systems and have been used by university faculties for recording lectures, researching, recording presentations, electronic research purposes, simulations, recording classes, webinars, programme and module planning, providing tutorials, and other forms of instructions (Albirini, 2006; Mangin, 2011). Ball & Levy (2008) further suggested that the use of information technology in the academic higher education sector consists of retrieving course materials through artificial intelligence and internet resources, high speed communication infrastructures, emerging technologies for visual presentation, using online learning Management systems, merged technologies, wireless connectivity and internet technologies. The degree of integration of information technologies by academic institutions into their teaching methods may be influenced by several factors, including to improve the quality of education and teaching and learning process, to offer the best students experience, thereby meeting the quality requirements of the QAA and to foster collaborative learning among faculties and students.

The benefits and challenges of ICT is everywhere around us in today's world including Higher Education. ICT among others, facilitate personalised learning and digital infrastructure of devices being used in classrooms to explore different subjects, enhance teaching and learning and overall student experience. From accessing virtual textbooks and learning online, to watching recorded

lectures as revision, every aspect of education can be supported by IT. There is a huge growth in the Information and communication Technologies over the years particularly in the field of education (Albirini, 2006). While this growth has its own benefits, it also throws up many challenges to both academic institutions and their faculties. Academic institutions are investing substantial amount to build Information Technology Infrastructure and online learning opportunities. In return, university faculties are expected to achieve technological competence and implement better forms of teaching practices which improve the student learning experiences. In universities, faculties can prepare the students for a digital world by allowing them to do their projects and other works involving the use of Information Technology resources. These kinds of activities help the students to change the role from a passive receiver of content to an active participant and a partner of learning process (Roblyer, 2006).

Despite the many opportunities of contemporary Information and communication technologies bring to education, there have been some challenges to adopting them such as lack of institutional support, resistance to change from traditional methods to use new technologies, poor faculty expertise in technology and unpredictability (Annapurna, 2012; Cooper, 2014).

Information and communication technology have a relevant impact on students' learning process. Therefore, universities all over the world are intensively investing in ICT; the implementation of Information and Communication Technology in the university context has become unquestionable. The use of ICT in teaching and learning process includes e-communication, e marketing, e learning, e-registration, e training etc. In other words, it facilitates the access to information, for either students or teachers; it also enables communication between students, teachers and administrators through an array of digital web-based tools, it provides online training programs for teachers, employees and students. Furthermore, it empowers to promote the university at an international level, and allows students across the world to study online (Ali, Haoladar and Mahmud, 2013). However, the implementation of ICT in underdeveloped countries remains difficult and challenging due to many reasons, such as funding, technology infrastructure, lack of skills and knowledge, vision and planning issues etc. (Parvin, 2013)

However, the impact remains unclear. Many studies have been established to prove whether this has a positive or a negative impact on higher education, especially students' achievements and universities' return on investment. A research that has been conducted by Yusuf and Balogun

(2011) in a university in Nigeria showed that, a constructive impact of ICT on students' learning is not only related to a positive attitude towards the use of ICT, but rather depends on the integration of IT in the curriculum. On the other hand, another study demonstrated that ICT has a negligible impact on students' learning and did not improve their performance, when they are unaware of the potential of ICT in their studies. It was only a source of entertainment (Islam and Hasan, 2010).

In the same context, Bawaneh (2011) showed that employing ICT in Management & Accounting course had a positive impact on improving students' performance in their final examinations. With the increase of new technologies, both lecturers and students use ICT tools like e-mails, social web sites and online forums to communicate for academic purposes, and facilitate the learning process (Alarcia and Bravo, 2012). Students tend to adapt their studies habits based on the available ICT tools in their university (Mbah, 2010). Generally, the introduction of ICT tools in the higher education sector should not only be an innovative attempt in the educational process, but rather, to improve the effectiveness and quality of both teaching and learning, in order to void all the issues related to the classical educational methods. The use of ICT in higher education has converted the educational process, from teaching-oriented model, which is based on a passive participation, to self-learning oriented model, which is based on an active participation, where the student decides his learning process. The rapid development of ICT use in higher education has emerged the concept of "E-learning". According to Koohang & Harman (2005) E-learning is: "the process of training, teaching and learning that used and involves electronic media such as the internet and Intranet, using PC or other components hardware, various electronic components for playback, copying or storage media, various specialized software that provide faster educational Interaction between teacher and student". Researches have been divided to two categories, the ones that demonstrate that ICT has a positive impact of on improving the efficiency and quality of the educational process, (Gupta & Fish, 2012), and other studies that showed that there are many negative aspects about implementing ICT in higher education (Alkharang & Ghina, 2013).

1. The impact of ICT on higher education

a. Traditional learning vs e learning

It is undeniable that ICT improves the efficiency of the learning process, especially in higher education. However, studies showed that there are few disadvantages about e-learning (Sun et al., 2008). As mentioned in the above section, ICT requires training to use it the right way, any lack of ICT infrastructure, or knowledge and skills in using it, may lead to a low quality teaching and learning process. At the end, the only difference between traditional learning and e learning is the implementation of ICT. In the traditional learning model, the lecturer has control over the teaching structure and environment. Unlike modern learning, where the student participates in his learning process. Traditional learning requires a face-to-face interaction between the lecturer and the student, whereas e learning can take place even if the training provider are not in the same place, through a virtual a “virtual electronic cyberspace” (O'Connell, 2002).

Generally, traditional learning approach is more about teaching that is coming only from the lecturer's side. On the other hand, e learning empowers the student to be self-learner, it provides them flexibility and autonomy to learn according to their standards, in a highly interactive environment.

b. The impact of ICT on what we learn

Competency and performance-based curricula

“The moves to competency and performance-based curricula are well supported and encouraged by emerging instructional technologies” (Stephenson, 2001). These programs require:

- ✓ “Access to a variety of information sources;
- ✓ Access to a variety of information forms and types;
- ✓ Student-centered learning settings based on information access and inquiry;
- ✓ Learning environments centered on problem-centered and inquiry-based activities;
- ✓ Authentic settings and examples; and
- ✓ Teachers as coaches and mentors rather than content experts”.

ICT is the best tool that provides support to those programs (e.g. Oliver, 2000). In the past training providers had limited resources to implement such programs (competency and performance-

based), but, with the availability of ICT all those limitations and restrictions have been removed. Students and lecturers now have access to these quality-learning programs.

Information literacy

Another positive impact of involving ICT in higher education is that new technologies enable students not only to acquire skills and knowledge in their subject, but it also help them gain generic skills, such as soft skills and emotional intelligence skills. “The capacity to identify and issue and then to identify, locate and evaluate relevant information in order to engage with it or to solve a problem arising from it” (McCausland, Wache & Berk, 1999).

c. The impact of ICT on how students learn

ICT has transformed higher education, from content- learning to self-centered learning. In the past student were mainly depending on lecturers to present and deliver the information to. Whereas the contemporary learning encourages students to participate in the curriculum and be responsible on their learning process. Here are the two forms of learning enabled by ICT in higher education:

Student centered-learning

ICT was capable to transform higher education from lecturer directed-learning to student centered-learning. Therefore, most universities nowadays are encouraging capability and outcomes based programmes, problem-based programmes, and online-learning based programmes. Clearly, ICT is empowers students to be autonomous in creating their learning paths. The more students use web-based technologies as sources of information, the more the impact of ICT on how students learn will continue to improve (Reeves & Jonassen, 1996).

Supporting knowledge construction

The existence of ICT has emerged new learning and knowledge theories, the most popular ones are constructivist theories (Duffy & Cunningham, 1996). These theories are mainly based on constructive knowledge that is supported by social interactions in the learning process (Vygotsky, 1978). As mentioned in the above section, the learning process in higher education was based on conventional methods, where lecturers plan the content and lead students through a structured program to achieve the outcomes (Duffy & Cunningham, 1996). Today the contemporary learning supports constructive methods of knowledge that are based on interaction, rather than instructive

ones, which are based on transmission (Duffy & Cunningham, 1996). Constructivist approach empowers centered-learning and active interpretative understanding of the content (Berge, 1998; Barron, 1998).

d. The impact of ICT on when and where students learn

Earlier, students had limited choice in terms of the way programs were delivered, as universities were conventional in structuring and delivering curriculums. However, ICT has transformed this approach and made universities be more creative and innovative. Institutions now offer an array of options to students, from when to learn to where to learn.

Any place learning

Distance learning is not new; many research and development were established in order to improve distance learning effectiveness. Universities were offering learning off-campus in the past, but only for students who were not able to attend on-campus learning (Moore & Kearsley, 1996). Nevertheless, nowadays off-campus learning has become an option for all students with no exception, also, the quality of distance learning has significantly improved with the use of ICT, and technologies have facilitated this learning process. Here are some examples for how ICT has improved flexible learning:

- ✓ ICT has given distance-learning students the ability to access programs and courses from their location-based. This is not only convenient for those who are unable to attend on-campus learning, but it also plays a major role in saving travelling costs and time.
- ✓ ICT has given students the possibility to enroll in international and external universities, instead of only local ones, which provide students from different backgrounds and destinations opportunities to choose a Variety of courses and specialties.
- ✓ ICT has enabled students with a diversity and choice in completing their degrees. Students have now the option to study units of a single degree though different universities.

Any time learning

Unlike before, where students were constrained by temporal learning methods, nowadays ICT has released learners free this restriction, they are able to undertake education anytime, anywhere (Young, 2002)

- ✓ New technologies have allowed students constrained by commitments to participate in learning activities according to their schedules and slots, which has given students the opportunity to undertake formal courses online.
- ✓ ICT has offered the possibility of asynchronous supports, so that learners can still communicate and collaborate with other learners, without the need for real-time participation
- ✓ Mobile technologies and unified communication have made it opportunistic for lecturers as well, by empowering them with the flexibility to teach anytime as well, according to their schedule (Young, 2002)

ICT has overcome the temporal and geographical restrictions in higher education, by enabling students the opportunity to study anytime, anywhere. However, the question that arises under this section is about the quality of e-learning or, off-campus learning. Do students in higher education get the same outcomes and achievements by studying online? Do universities get the same return on investment by providing online course?

e. Emerged issues

There is a number of emerged issues from the use of ICT in learning and teaching process, including the expansion of teachers and students' pool and the cost of education.

Teachers' pool expansion

Whereas earlier the opportunity of teaching was given to only highly qualified teachers, today, ICT is offering the opportunity to include more educators and training providers in, also extend the pool of teachers. In order to be able to provide the necessary support for learners. As there an ongoing of high demand on learning, especially in higher education, also a constant development in ICT, the trend of expanding teachers' pool seems to continue growing in the future.

Students' pool expansion

While in the past, higher education was exclusive to only those who their situation fit the mainstream. Today it is available to all those who were unable take a part of it. "Information and Communication Technology" is significantly contributing in expanding the pool of students. For instance, all kind of people have the opportunity to continue their higher education, thanks to the

array of options and flexibilities. Information and Communication Technology has facilitated the learning process, by providing courses of a high variety of specialties, and adjusting learning and teaching methods with students' circumstances. Most of popular universities provide full time courses, part time courses, online courses and distance courses.

The cost of education

It has been expected that new technologies-facilitated learning, would significantly reduce the costs and provide a quality delivery of educational curriculums. Though, off-campus learning appeared to be more expensive on all levels, because the costs associated with the implementation of high quality technology-learning materials, infrastructure, courses development and delivery are reasonably high.

f. The influence of ICT on stakeholders

While Information and Communication Technology had a relevant influence on higher education and learning process in general, the impact will continue to grow in the future at all levels, with the development of new technologies. ICT influences all the stakeholders, students, employers, teachers, institutions and government. It has different impacts on each stakeholder. The table below demonstrates how the different issues discussed above may influence each:

Table 1: The influence of ICT higher education and stakeholders

	What is learned and how much	How it is learned	When it is learned	From whom it is learned	Who is learning	What it costs
Students	X	X	X	X	X	X
Employers	X		X	X		
Teachers	X	X	X	X		
Institutions	X		X	X		X
Government	X	X	X	X	X	X

2. ICT and students' performance: no clear direct effects

Since past decades, many studies and research have been conducted to explore the link between ICT and students' performance, and the benefit in the classroom. The first studies focused on the impact of computer use in the classroom, with the revolution of internet, the following studies examined the influence of digital activities on the educational learning. The researches show two opposite results. Some proved that ICT has a significant impact on students' performance and achievements (Banerjee et al., 2004). On the other hand, some results show that there is no direct influence on students' educational learning (Talley, 2005).

a. ICT does not have a direct impact on students' performance.

Coates et al. (2004) conducted a quantitative analysis of three matched pairs in economics course, at three different institutions. Face to face and online learning. At the end of the term, students' performance was measured based on their score in the test of "Understanding College Level Economics". The survey results reported that, face-to-face learning method scored 15% higher than online learning method.

Brown and Liedholm (2002) surveyed students of the same course and taught by the same teacher, but in different programs, one in online class and the other one in face to face program. It has been reported that, face-to-face program students scored 6% more than online program students. They explained that this was due to the efficiency of student-lecturer interaction, and the lack of self-management and discipline in the online learning environment. Anstine and Skidmore (2005) elaborated a survey of two matched pairs, in statistics and managerial economics, one on-campus and the other one off-campus. The results reported that, based on the final exam, online statistics class scored 14% less than on-campus class. Whereas, the survey showed almost the same score in the managerial economics course, for the both online and off-line class, there was not a significant difference between the two.

Another research conducted by Terry, Lewer and Macy (2003), in a course, which offers an on-campus program, online program and a hybrid program. The results that are based on their final exams, demonstrated that, online program students scored less compared with others. However, when they compared the final exam outcomes between on-campus and hybrid programs, there was no significant different between the two programs. It has been concluded by Leuven et al. (2002),

that there is no concrete evidence for the link between ICT and students' educational performance. In fact, ICT showed to have both, positive and negative impact on students' achievements, all depend on how technology is employed. Some students use ICT to enhance their research and knowledge resources. Whereas, some others miss-use it, in gaming or increasing communication channels on social media.

b. ICT plays a role in students' achievements.

A study conducted in 1994 by Kulik's revealed that students who used computers learned quicker and better than those who did not. ICT based-instructions made them enjoy their classes and score higher in their final exams. The relationship between ICT and students' performance is positive; however, this link goes down, when other students' environmental characteristics are taken into account. In other words, the implementation of technological innovations in higher education can have a significant positive effect on students' achievements, only if their attitude towards the contemporary learning process is appropriate. Meaning, it primarily depends on the use of these digital learning tools in higher education. An examination of 62,300 students in the united states, established by Atwelle & Battle 1999) showed that students who have computers at home have highly improved their scores in reading and maths. Which explains that there is a strong correlation between students' performance and computer's use.

“First, web-based instruction presents information in a non-linear style, allowing students to explore new information via browsing and cross-referencing activities. Second, web-based teaching supports active learning processes emphasized by constructivist theory. Third, web-based education is enhanced understanding through improved visualization and finally, the convenience, it could be used any time, at any place” (Li et al, 2003). Meaning that, ICT is supposed to be relevantly useful in students' learning process. It makes education independent from the conventional system that is mainly based on transmission. ICT learning-based enhances students' knowledge by enabling them to explore enormous sources of information, which can be available anytime, anywhere. However, it could restrict the creativity of students. As digital –based learning provides an array of available information, this may affect students' creative thinking and problem-solving abilities.

c. Students' performance indirect effect

Researchers affirm that students' performance in higher education is a complex question. In order to measure it, economics and science fields, suggest a methodology based on evaluating the effect of educational inputs (physical resources, infrastructure, teachers' characteristics and attitudes, programs quality etc.), and taking into consideration other external inputs (students characteristics and attitudes, socio-economic. meaning background etc. (Jaag, 2006). Studies showed that there is a strong link between ICT and students' performance. However, other factors interfere in this correlation, such as socio-economic factors, students' characteristics and educational environment.

Students' characteristics

The first body of economics literature objects to analyze the relationship between students' performance and their socio-economic characteristics, such as culture, background, geographical location, parents' educational level, age, gender etc.)

Pozo and Stull (2006) found out that students coming from an underprivileged socio-economic background tend to perform less than the ones coming from a privileged socio-economic background. In the same context Bratti et al. (2007) confirm that students' performance can be effected by the socio-economic characteristics of students. Age has a major effect on students' performance, as learners get older they tend to deliver higher results (Didia and Hasnat, 1998).

Educational environment

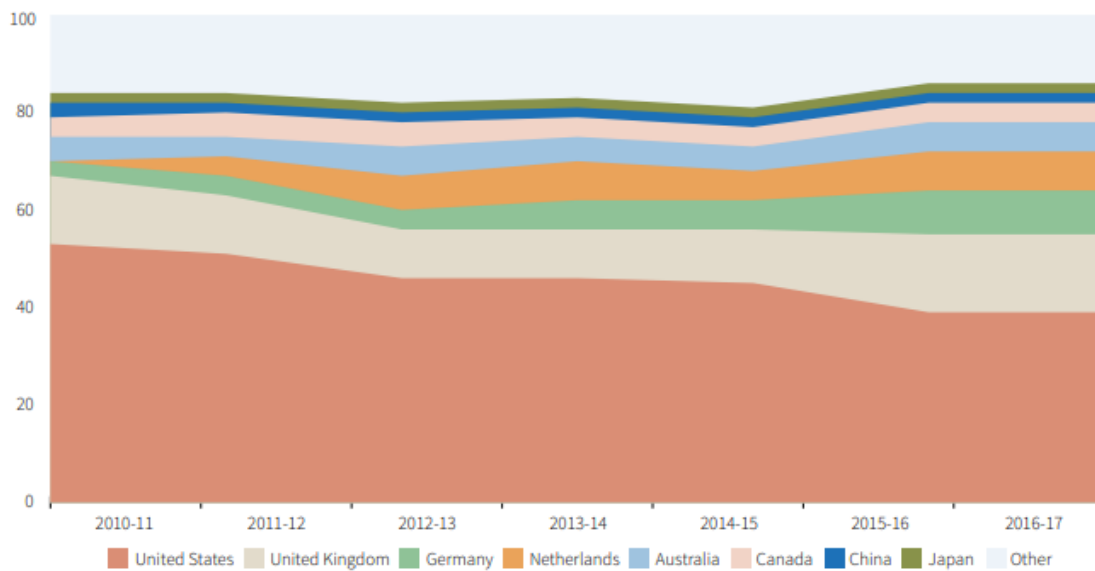
The second body of economics literature studies the relationship between the educational socio-economic characteristics and students' performance (Glen, 2006). It appeared that, the more universities invest in the educational environment the more students' achievements are higher. Especially in higher education, it has been showed that, when institutions invest in the classroom size it enhances students learning (Hanusek,2003). Another experiment conducted by Arias and Walker (2004) to evaluate the link between the class size and students' performance. They used the same program structure, teaching materials and instructors, but one class was larger than the other one. The statistic results showed that there was a significant positive effect, on students' performance in small class size.

IV. ICT & higher education in the UK

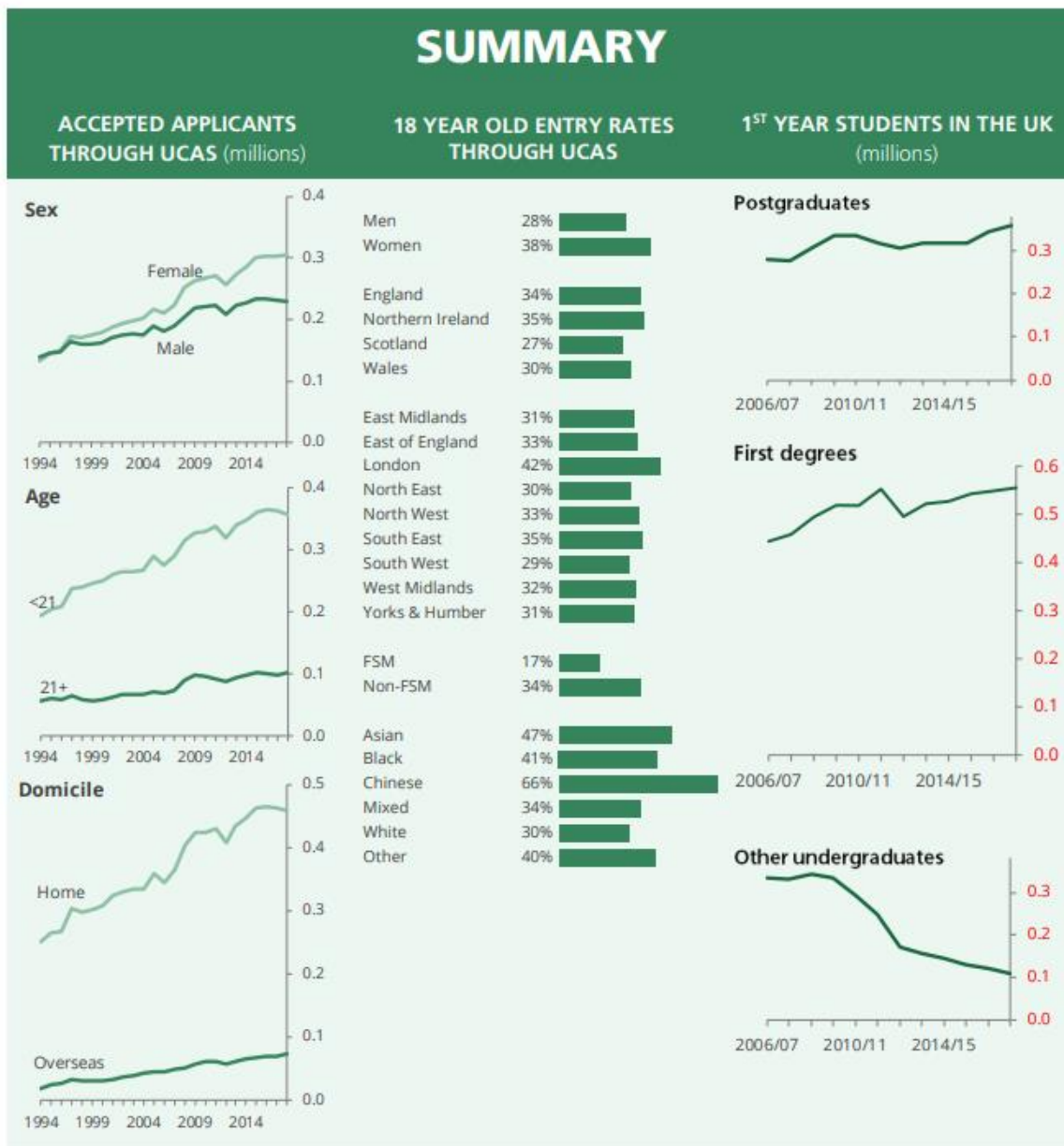
1. Higher education growth in the UK

” England benefits from a world-class higher education (HE) sector with growing student numbers” (the edge foundation, 2018). The UK is classified second in terms of the highest number of universities, after the US (figure1). Graduates in the UK represent stronger labour market as compared with ungraduated. However, opportunities depend on subjects, universities and the individual’s skills. At the same time, tuition fees and loans appear to grow rapidly as well.

Figure 1: Number of universities in the Times Higher Education World Rankings Top 100, 2010-2017



The UK has reached an important position being the second most popular destination, for international students in terms of higher education.



Student numbers have significantly increased over the past years, especially in first degrees and postgraduates. Moreover, the UK in general and England in particular seems to be attracting more international students from the past years. There has been a continued increase in home students and different groups of students, of different age, gender and nationality. Here are few statistics showing the ongoing development in higher education.

- “In 2017/18 there were 2.3 million students at UK higher education institutions.

- Most full-time students are studying first degrees. There are proportionately more overseas students studying postgraduate courses.
- Over the past decade the number of entrants to ‘other undergraduate’ courses has fallen by two-thirds. The large majority on these courses are part-time UK students.
- Total part-time entrants have fallen by 49% overall since 2008/10, 69% in ‘other undergraduate’ courses, 33% first degrees, 17% taught postgraduate and 15% postgraduate research courses.
- There were almost 700,000 applications for full-time undergraduate places through UCAS in 2018 and 533,000 were accepted.
- Applicant numbers fell in 2012 with larger falls among those who faced fees of up to £9,000. The total was 7.6% down.
- Applicant numbers bounced back in 2013. A record number were accepted in 2013 and new records were set for acceptances in each of the three following years.
- Applicants for 2019 at the ‘on time’ deadline of mid-January were up by 0.4% the first increase for three years. Applications of those outside the EU were up by 9%. There were falls in applicants from the UK particularly among older age groups” (Bolton, 2018).

2. ICT use within higher education in the UK

Computing skills and new technologies are very important for the UK, in every sector and industry, however, it is claimed by employers, that graduate students are lacking those skills and unable to progress in the labour market. According to higher education statistics agency survey, in 2014-2015, students who graduated from computing sciences are the ones with the highest number of unemployment, among other degrees. 13% of computing sciences graduates remain unemployed six months after they finish their degree, compared with only 8% across other specialties.

IT employers believe that “there is a serious mismatch between what is taught in schools and universities and what businesses require” (Flavel, 2015). Universities are focusing on theory-based teaching programs, instead of an-in-depth practical and technical understanding for the professional needed skills in a career.

The UK is getting ready for a digital future. Fujitsu (2017) the Japanese IT company, has conducted a research report about developing digital learning in the UK. In their report, Fujitsu is trying to

explore the different challenges and opportunities involved in higher education. They spoke to “over 600 IT leaders in a mix of schools, colleges and universities from seven different countries. They revealed where their digital ambitions lie, and how far away their dreams are from their reality” (Fujitsu, 2017). The research showed that:

- ✓ “Entirely embracing digital learning and innovative technology in higher education is highly sought and indispensable.
- ✓ In terms of IT budgets, the majority are either staying the same or increasing, and teams are mainly investing at a foundation, practical level.
- ✓ In terms of IT departments, it is relied more and more on business cases and provable ROI when it comes to investing in IT.
- ✓ In terms of digital literacy, it is quite low among teachers, and educational establishments face challenges with supporting teachers.
- ✓ In terms of Poor connectivity, and unsuitable and flimsy devices challenge IT departments, as does trying to find the right mix of devices, infrastructure and apps.
- ✓ The main priorities for schools, colleges and universities around the world are balancing levels of access and security and improving staff digital skills and the reliability of devices” (Fujitsu, 2017).

The research has also revealed that, there is a noticeable increase in the digital learning among universities in the UK, due to the development of technology infrastructure.

Higher education system in the UK is focusing more on ICT use in the learning process, to encourage self-learning and explore different subjects. Young generation in the UK is digital. 97% of individuals from 15 to 24-year olds are familiar with the basic digital skills, and 0% have none Basic (Digital Skills UK, 2017).

Here are the top three areas that schools, colleges and universities have invested in over the last 12 months, or plan to over the next 12

	US	84% Wireless network/Wi-Fi	82% Laptops	75% Cloud-based networks
	UK	81% Wireless network/Wi-Fi	78% Laptops	70% Tablets and desktop computers
	Germany	85% Wireless network/Wi-Fi	82% Laptops	73% Projectors
	Australia	90% Wireless network/Wi-Fi	84% Laptops	73% Desktop computers
	Hong Kong	90% Wireless network/Wi-Fi	82% 2-in-1 devices/ notebooks	79% Tablet devices
	Thailand	90% 2-in-1 devices/ notebooks	90% Projectors	88% Desktop computers
	Indonesia	96% Wireless network/Wi-Fi	82% Desktop computers	88% Laptops

Investments in Wi-Fi or a wireless network over the last 12 months, or planned in the next 12, globally



of universities
and colleges



of secondary
schools



of primary
schools

According to the first table, the UK is investing less in Wireless network/Wi-Fi, laptops, tablets and computers. Compared with other top 6 countries in the digital learning. However, the UK tend to invest more in higher education other than primary and secondary schools.

The emerged challenges of digital learning within higher education in the UK

- ✓ “59% Keeping up with technological advances
- ✓ 54% Limited IT resources
- ✓ 42% Government funding and investment
- ✓ 45% Easily broken/damaged through student use
- ✓ 34% Cost of replacement parts
- ✓ 33% Poor battery life
- ✓ 60% of students are excellent or good
- ✓ 46% of teachers are excellent or good
- ✓ 23% of students are poor
- ✓ 12% of teachers are poor” (Fujitsu, 2017).

V. Impact of ICT Innovations on the Quality of Business Research Process in Higher Education Institutions

ICT has influenced all the research sectors with no exception. However, it has a significant impact on business research process, because it is considered as a strategic tool that contributes in the development of business models. Business research within higher education participates in the society economic development (the UNESCO Forum on Higher Education, 2007). As mentioned previously, ICT helps provide a quality education across the world, helps translating data and numbers to useful information and practical knowledge (Blurton, 2012). However, it must be properly structured and oriented to be efficient. Therefore, the question is, what is the role of ICT in business research?

1. ICT facilitates business research

Information and Communication technology has provided researchers the opportunity to work on their research off and on-campus. University Grants Commission states (2016) “In 2005, the number of doctorates awarded in the field of business studies was 1096 which has seen a growth of 45 percent to 1585”. During the past years, there has been a relevant increase in the number of business research within higher education. ICT use empowers the researcher to collect secondary data in a form of soft copy to help in the analysis afterwards. The existence of ICT in higher education has a relevant positive impact on business research process.

2. Accessibility

High quality business research requires high quality resources. Information and Communication Technology provides the accessibility to an array of articles, journals, books, and multidisciplinary research papers. Which contributes in making the research relevant and efficient (Kumari, 2008).

3. Data process and reliability

Earlier, data collection and analysis were done manually, which make them susceptible to error. “In the past two decades particularly in business research data collection and dissemination has been technology majorly supported and its non-adoption could lead to competitive disadvantage for business research” (Cooper, 2014). Primary or secondary data collection is critical for most business researches (Bryman, 2012). ICT plays a major positive role in that, for either qualitative or quantitative analysis, through online surveys or questionnaires, online or phone interviews etc.

Furthermore, ICT enables business researchers to reach a large volume of participants in different destinations

4. ICT and ethical dimension

Ethical issues should be taken into consideration in every research. In business research they tend to emerge in data collection, analysis and the representation of information. In business research there are two different views: the deontological view and teleological view. The deontological view confirms that researcher should not use unethical means to justify getting the relevant information. While the teleological view contends that end results justify any means of obtaining of data” (Saunders, Lewis and Thornhill, 2011). It is usually required by most universities, to provide a formal approval from “Research Ethics Department”, showing their data collection methods. ICT has come up with new dimensions of investigations, to control plagiarism and protect author’s rights (Cooper, 2014).

5. Emerged issues associated with ICT use in business research

To achieve the desired efficiency in business research, within higher education, there are few challenges that diminish the effectiveness of ICT in business research, within higher education. Such as, the lack of infrastructure, digital learning funding, research and development investment and the lack of proper training of stakeholders (Annapurna, 2012). Overcoming these challenges in the future, is related to improving ICT infrastructure and adapting it to the new technology’s rapid growth. Moreover, provide researchers in particular and stakeholders in general, with all the necessary trainings, to enhance their digital skills.

Clearly, ICT has a positive impact on business research, within higher education. It facilitates their search process, by giving researchers the possibility to work on their research on or off-campus. Furthermore, ICT provides researchers the accessibility to a high variety of resources, which boosts the effectiveness and reliability of the research. It has also a positive impact on data collection and analysis, through different methods, such as online questionnaires or online interviews. ICT plays a major role in protecting author’s rights and controlling plagiarism as well. However, there are still few challenges related to the use of ICT in business research, to overcome in the future.

VI. The future of digital learning in higher education

As the world is turning digital, it is mandatory to focus on developing ICT in the learning and teaching process in the coming years. Because the economic development of a country, mainly depends on the population development. Therefore, here are few areas that should be focused on in the future, in order to enhance digital learning in higher education.,As ICT improves in a rapid speed, it is recommended to provide lecturers as well as employers with all the necessary up to date trainings, to ensure they are comfortable with using ICT tools. This will bring a significant change to institutions within higher education.

New technologies is changing and developing on a daily basis. Thus, it is necessary to keep on track and adapt learning methods with technological advancements. To do so, it is recommended to invest in research and development. Furthermore, collaborate with digital colleges, to be able to choose the right system and deliver the most innovative technologies.

It is expected that in the next few years;

- ✓ Every institution will have access to ICT, and high tech infrastructure.
- ✓ The number of students will continue increasing worldwide and so the number of lecturers.
- ✓ All age groups and genders will be able to participate in higher education.
- ✓ E learning will continue to improve and become probably more efficient that on-campus learning.
- ✓ All stakeholders will have access to up-to date digital training etc.

Institutions, lecturers and students, will all speak one language: digital language.

VII. Conclusion and discussion

The world is manifesting a rapid growth in “Information and Communication Technology”. It is influencing every sector and every aspect of human life. It has changed practices and procedures in all fields, including higher education. ICT plays a major role in the learning and teaching process. Researches revealed that, there is a direct and indirect correlation between ICT and students’ performance. The implementation of technology in learning systems can have either a positive or a negative impact on students’ achievements. It has been shown in some investigations that the use of ICT had a significant impact on improving students’ performance. On the other hand, few researches demonstrated that, students who study on-campus and do face-to-face learning, had higher scores in their final exams, and compared with those studying online. In fact, some other studies proved that, there are other factors that may interfere between ICT and education. Such as, socio-economic factors, students characteristics, lecturers characteristics, etc. due to the ongoing development of Technology as well as education demand, it has become unquestionable that universities all over the world, should intensively investing in ICT within higher education.

In my opinion, Information and Communication Technology can have a relevant positive impact on students’ performance and achievements within higher education, if used appropriately. All stakeholders within educational system have control over the nature of influence they want to get from ICT. From students’ angle, digital learning can significantly increase their knowledge and enhance their skills. From lecturer’s angle, ICT can help them deliver a better content, in better methods, for a better teaching. From researches angle, the use of Technologies give them the opportunity to conduct a more diverse, relevant and reliable researches. From administrators’ angle, technology can increase and speed up their productivity. From universities’ angle, Information and Communication Technology enable them to get a higher return on investments.

Therefore, it is mandatory that all institutions worldwide should focus on ICT use within higher education, through investing in research development and collaborate with digital organizations, to help implement the most innovative technologies. Furthermore, it is necessary to keep providing digital trainings to all stakeholders, to be able to get the best advantage of technologies in teaching and learning process.

References

- Akareem, H. S., & Hossain, S. S. (2012). Perception of education quality in private universities of Bangladesh: a study from students' perspective. *Journal of Marketing for Higher Education*, 22(1), 11-33.
- Alarcia, O. F., & Bravo, I. A. (2012). The impact of ICTs on lecturer and student interaction in university education processes. *Universities and Knowledge Society Journal*, 9(2), 213-228.
- Albirini, 2006 A. Albirini. Teachers' attitudes toward information and communication technologies: the case of Syrian EFL teachers. *Computers & Education*. 2006; 47:373p.
- Alkharang, Mubarak, Ghinea, G. (2013), E-learning in Higher Rducational Institutions in Kuwait: Experiences and Challenges, *International Journal of Advanced Computer Science and Applications*, 4(4), 1-6.
- Ali, G., Haoladar, F. A., & Mahmud, K. (2013). The Role of ICT to Make TeachingLearning Effective in Higher Institutions of Learning in Uganda. *International Journal of Innovative Research in Science, Engineering and Technology*, 2 (8), 4061-4073.
- Arif, S. (2012). Impact of determinants on student performance towards information communication technology in higher education. *International Journal of Learning & Development*, 2(2), 18-30.
- Bahr, D. L, Shaha, S. H., Briant, J., Lewis, V.L., Benson, L.F. (2004), Preparation Tomorrow`s Teachers to Use Technology: Attitudinal Impacts of Technology- supported Field Experience On Pre-service Teacher Candidates, *Journal of Instructional Psychology*, 31(2), 88-97.
- Ball and Levy, 2008 D. Ball, Y. Levy. Emerging Educational Technology: Assessing the Factors that Influence Instructors' Acceptance in Information Systems and Other Classrooms. *Journal of Information Systems Education*. 2008; 19:431p.
- Barron, A. (1998). Designing Web-based training. *British Journal of Educational Technology*, 29(4), 355-371.
- Bawaneh, S. S. (2011). Does using computer technology improve students' performance? Evidence from a management accounting course. *International Journal of Business and Social Science*, 2(10), 266-274.

Bernarrdez, M. (2003), From E-Training to E- Performance: Putting Online Learning To Work, *Educational Technology*, 43(1), 6-11.

Berge, Z. (1998). Guiding principles in Web-based instructional design. *Education Media International*, 35(2), 72-76.

Bielaczyc, K. (2006), Designing social infrastructure: Critical issues in creating learning environments with technology, *Journal of Learning Sciences*, 15(3), 301-329.

Chao, R.-J. & Chen, Y.-H. (2009), Evaluation of the criteria and effectiveness of distance e-learning with consistent fuzzy preference relations, *Expert Systems with Applications*, 36, 10657-10662.

Collis, B. (2002). Information technologies for education and training. In Adelsberger, H., Collis, B., & Pawlowski, J. (Eds.) *Handbook on Technologies for Information and Training*. Berlin: Springer Verlag.

Duffy, T., & Cunningham, D. (1996). Constructivism: Implications for the design and delivery of instruction, *Handbook of research for educational telecommunications and technology* (pp. 170-198). New York: MacMillan.

Forman, D., Nyatanga, L., Rich, T. (2002), E-learning and educational diversity, *Nurse Educational Today*, 22, 76-82.

Freeman, M. (1997). Flexibility in access, interactions and assessment: The case for web-based teaching programs. *Australian Journal of Educational Technology*, 13(1), 23-39.

Gupta, A. & Fish, D. (2012), Technology-supported learning environments in science classrooms in India, *Learning Environment Research*, 15, 195-216.

Hogarth, K. & Dawson, D. (2008), Implementing e- Learning in Organizations: What E-Learning Research Can Learn From Instructional Technology (IT) and Organizational Studies (OS) Innovation Studies, *International Journal on E-Learning*; 7 (1), 87-105.

Islam, N., Ahmed, S., & Afrin, S. (2015, March). The Impact of Use of IT in Teaching Learning Process on the Behavior of Private University Students in Bangladesh. Paper presented at the 13th South Asian Management Forum 2015, Colombo, Sri Lanka.

Jonassen, D. & Reeves, T. (1996). Learning with technology: Using computers as cognitive tools. In D. Jonassen (Ed.), *Handbook of Research Educational on Educational Communications and Technology* (pp 693-719). NewYork: Macmillan.

Kennedy, D. & McNaught, C.(1997). Design elements for interactive multimedia. *Australian Journal of Educational Technology*, 13(1), 1-22.

Khudri, M. M. & Sultana, S. (2015). Determinants of service quality and impact of service quality and consumer characteristics on channel selection. *British Food Journal*, 117(8), 2078-2097. <http://dx.doi.org/10.1108/BFJ-12-2014-0431>

Kingsley, 2007 K.V. Kingsley. Empower Diverse Learners With Educational Technology and Digital Media. *Intervention in School and Clinic*. 2007; 43:52p.

Koohang, A. & Harman, K. (2005), Open Source; A Metaphor for E-Learning, *Informing Science Journal*, 8, 75- 86.

Laffey J., Tupper, T. & Musser, D. (1998) A computer-mediated support system for project-based learning. *Educational Technology Research and Development*, 46(1), 73-86.

Lebow, D. (1993). Constructivist values for instructional systems design: Five principles toward a new mindset. *Educational Technology, Research and Development*, 41(3), 4-16.

Liaw, S.-S. & Huang, H.-M. (2011), A study of investigating learners attitudes toward e-learning, *International Proceedings of Computer Science and Information Technology*, 12, 28-32;

Littlejohn, A., Suckling, C., Campbell, L. & McNicol, D. (2002). The amazingly patient tutor: students' interactions with an online carbohydrate chemistry course. *British Journal of Educational Technology*, 33(3), 313-321.

Macpherson, A., Homan, G., Wilkinson, K. (2005), The Implementation and use of e-learning in the corporate university, *Journal of Workplace Learning*, 17 (1/2), pp. 33- 48;

McCausland, H.,Wache, D. & Berk, M. (1999). Computer literacy; its implications and outcomes. A case study from the Flexible Learning Centre. University of South Australia.

Mangin, 2011 J.-P.L. Mangin. Modeling Perceived Usefulness On Adopting On Line Banking Through The Tam Model In A Canadian Banking Environment. *Journal of Internet Banking and Commerce*. 2011; 16:13p.

Moore, M. & Kearsley, G. (1996). *Distance Education: A Systems View*. Belmont, CA: Wadsworth.

Oliver, R. & Short, G. (1996). The Western Australian Telecentres Network: A model for enhancing access to education and training in rural areas. *International Journal of Educational Telecommunications*, 2(4), 311-328.

Oliver, R. (2000). Creating Meaningful Contexts for Learning in Web-based Settings. *Proceedings of Open Learning 2000*. (pp 53-62). Brisbane: Learning Network, Queensland.

Oliver, R. & Towers, S. (2000). Benchmarking ICT literacy in tertiary learning settings. In R. Sims, M. O'Reilly & S. Sawkins (Eds). *Learning to choose: Choosing to learn*. Proceedings of the 17th Annual ASCILITE Conference (pp 381-390). Lismore, NSW: Southern Cross University Press.

Oye, N. D., Noorminshah, A. I., Madar, M. J., & Norzairah, A. R. (2012). The Impact of E-learning on Student Performance in Tertiary Institutions. *International Journal of Computer Networks and Wireless Communications*, 2(2), 121-130.

Parvin, M. S. (2013). Integrations of ICT in Education Sector for the Advancement of Developing Country: Some Challenges and Recommendations - Bangladesh Perspective. *International Journal of Computer Science & Information Technology (IJCSIT)*, 5(4), 81-92.

Pio, Albina, A. (2013), A Shift from P-Content to E- Content- A Need of the Hour, *Papirex-Indian Journal of Research*, 3(5), 53-54.

Roblyer, 2006 Roblyer, M.D. (2006). *Integrating educational technology into teaching* (4th Ed.). Prentice Hall. USA.

Roy, R., Potter, S., Yarrow, K. (2008), Designing low carbon higher education systems: Environment impacts of campus and distance learning systems, *International Journal of sustainability in higher education*, 9(2), 116-130.

Soloway, E. & Pryor, A. (1996). The next generation in human-computer interaction. *Communications of the ACM*, 39(4), 16-18.

Starr, L. (2001). Same time this year. [On-line]. Available at http://www.education-world.com/a_tech/tech075.shtml [Accessed July 2002].

Stephenson, J., Ed. (2001). *Learner-managed learning- an emerging pedagogy for online learning*. Teaching and Learning Online: Pedagogies for New Technologies. London, Kogan Page.

Young, J. (2002). The 24-hour professor. *The Chronicle of Higher Education*, 48(38), 31-33.

Yusuf, M. O., & Balogun, M. R. (2011). Student-Teachers' Competence and Attitude towards Information and Communication Technology: A Case Study in a Nigerian University. *Contemporary Educational Technology*, 2(1), 18-36.