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ICT Use and E-learning Integration in Higher Education: Opportunities and Challenges

Case Study of Students and Teachers of the Department of Computer science at Laghouat University

A Dissertation Presented to the Department of English Language as Partial Fulfillment of the Master's Degree in Civilization, Literature and Language Teaching

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DEDICATION

I dedicate this work to:

- *My dear parents who showed me the right way, I am grateful to them for everything they did for my success.*
- *My dear family members for their help, encouragement and support.*
- *All my friends and colleges.*
- *Every teacher who taught me in life.*

BENDAOUD CHERIFA

DEDICATION

This work would not have been possible without the loving support of so many people.

To my Dear Parents,

To my Brothers,

To all my Family,

For your endless love, sacrifices, prayers, supports and advices

Lastly, I offer my regards and blessing to all those who supported me during the completion of this dissertation.

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ABSTRACT

Over the last two decades, several advancements in the field of technology have occurred and new ways of learning have emerged. ICT and E-learning are forms of education to which attention has increased. This research present a historical background of higher education in Algerian and a fundamental definition of ICT and E-learning, in addition to the general background about the use, and the integration of ICT and e-learning in higher education. The main purpose of this study is to investigate the use and the integration of ICT and E-learning in higher education. To achieve this purpose, a questionnaire directed to the sample of the research that included the students and the teachers of Computer Science Department at Laghouat University. Their levels vary between Licence, Master for students, and Magister, Doctorate for teachers. The findings of the research reveal that ICT and E-learning are beneficial tools for the learning process. The findings also reveal the opportunities and the challenges that face the use and the integration of technology. This study is an attempt to make teachers and learners more aware of using ICT and E-learning in education and receive their welcome and readiness for the adoption of this new technology in the future.

Keywords: ICT, E-learning, technology, higher education, use, integration

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ACRONYMS

CAI	Computer-Assisted Instruction
CAL	Computer Assisted Learning
CBT	Computer Based Training
E-learning	Electronic Learning
E-mail	Electronic Mail
HE	Higher Education
ICT	Information And Communication Technology
LMD	Licence-Master-Doctorate.
LMS	Learning Management System
MOOCs	Massive Open Online Courses
PC	Personal Computer
UATL	University Of Amar Telidji Laghouat
UFC	University of Continuing Education
USTHB	University of Science and Technology
VLE	Virtual Learning Environment
WWW	World Wide Web

GENERAL INTRODUCTION

General Introduction

Over the last two decades, several advancements in the field of technology have occurred , making several aspects of our lives more easily managed and completed through computers and online based technologies, even education is benefiting from this advancement. The education landscape worldwide is experiencing a major change in the ways higher education is taught and the ways the students learn due to the advent of modern technologies. Nowadays, new ways of learning and teaching have emerged globally. ICT and E-learning are forms of education to which attention has increased. Actually educational technology is integrated as a supporting didactic tool in the majority of Algerian Universities.

Educational technology improves learning, which support the need to expand the use of these technologies for today's students and provide them efficient tools for learning. In developing countries, education is gaining more importance due to its benefits for a given country's economic and social position. Many governments around the world spend billions every year to improve all aspects of their education systems.

In this vein, Algeria has turned more attention to the sector of modern technologies of information and communication, and raised the budgets of the various sectors associated with the field of technology to the highest levels.

Believing in the role of the university, and its importance in achieving development and prosperity, Algeria has been keen to modernize the higher education sector, which has benefited significantly, from various tools and modern technologies(Djoudi,2010). After having witnessed the institutions expansion, and the development of all levels and disciplines, Algeria attempts to interact with the international environment, and continuously benefits from all types of developments. In fact, the Algerian higher education cannot afford to remain on the margins of technological innovations. It has become important for Algeria to strive to use new trends of technology to develop and strengthen higher education. Nevertheless, the use and the integration of technology is still in its early stages. Many difficulties and challenges need to be addressed, in order to be widely adopted.

The present research studies the current situation of the use of ICT and E-learning integration and adoption at Laghouat University. The study aims at analyzing the prospects of benefiting from these technologies in Algeria, to minimize the problem facing the higher education system at Laghouat University. The study further points out the challenges that hinder the rise of e-learning and highlights the degree of readiness to integrate e-learning in higher education for the students of computer science.

Statement of the problem

Algerian government has investigated a great amount of money devoted to the scientific research to provide universities with new technologies. The integration of e-learning and ICT may be considered as an essential factor when attempting to enhance the learning process of the future educators. Attitude and perception toward the integration of technology influence the level of technology use.

This study attempted to explore how education in Algeria is improved with the presence of ICT and e-learning as perceived by teachers and students. We will also try to find out the perceptions of students on what can be added to the educational technology system in Algeria in an afford to identifying the possible benefits of using ICT and e-learning.

The purpose of the study is to learn about the status of e-learning and ICT in the Algerian higher education and capture the opportunities of these technologies and the barriers of using of ICT in higher education. In addition to investigate the different views expressed by teachers and learners of Computer Science Department at the University of Laghouat.

Objectives

The purpose of this study is to learn about the status of ICT and e-learning use in the Algerian Higher Education and to capture the opportunities and the constraints of the use and the integration of these technologies.

This research is intended to investigate the following:

- Examine the use of ICT and e-learning in higher education
- Explore the benefits and the barriers of the integration of ICT and e-learning

- Investigate the different views expressed by teachers and learners of Computer Science Department at the University of Laghouat about integrating technology.
- Making teachers and learners aware of the importance of including ICT and e-learning in their teaching learning process.

Significance of the study

This study is seen significant in terms of expanding the probability of developing ICT and e-learning in Algeria.

The problem is significant since there is a lack in using technology in the Algerian Universities, which prohibits students from receiving the benefits. Technology is essential to provide today's learners optimal opportunities. Thus, the findings of this study will provide information on overcoming the problems by revealing the reasons behind the non-use of technology. Study results are needed for the design and the integration of e-learning in higher education. Findings will also help guiding future research.

The focus of integrating new technologies within the process of teaching and learning is to facilitate and make the process more productive. However, the traditional learning needs these new instruments to cope with globalization and the world of technology. The role of ICT and e-learning in higher education is important.

Research questions

The main research question of this study is how ICT and e-learning are used and integrated in higher education.

In order to answer this question, the study tackles the following investigated questions.

1. What is the current status of using ICT and e-learning in higher education system at the University of Laghouat?

2. What are the benefits of integration of e-learning and the constraints that face the integration of e-learning in higher education?

3. Do teachers and students accept the new ICT and e-learning platforms?

Hypotheses

To answer the questions above, the following hypotheses were put forward:

1. The status of using ICT and e-learning in higher education system at the University of Laghouat department of computer science might be high.
2. The Opportunities and the challenges of integrating e-learning in higher education might be found in the department.
3. Whether Teachers and students accept the new ICT/ E-learning platforms or not.

Means of Research and Methodology

In attempt to tackle the research problematic, a case study is implemented along with one research instrument, namely, questionnaire with Computer Science students and teachers at the University of Laghouat in Algeria. Who are selected on the basis of their experience with technology in teaching and learning so as to elicit a quantitative data that might result satisfactory answers for the research problematic.

Structure of the Thesis

The current study embodies three chapters. The first part is theoretical, in which it provides a historical background of higher education in Algerian and a fundamental definition of ICT and E-learning. Furthermore, the second chapter discloses a general background about the use, integration of ICT and e-learning in higher education, and the main challenges and opportunities of educational technology. Accordingly, the third chapter provides a brief description about the research design and method used, in addition to the sampling procedures as well as instrumentation. Whereas, the second part of the third chapter deals with the practical part of the research, in which the collected data analyzed and interpreted by means of quantitative approach. Hence, it discusses the obtained results of both questionnaires.

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CHAPTER ONE

Background and Current Technologies

Chapter

I

Background and Current Technologies

I.0. Introduction

In developing countries, education is gaining more importance due to its benefits for a given country's economic and social position. Many governments around the world spend billions every year to improve all aspects of their education systems.

In this vein, Algeria has turned more attention to the sector of modern technologies of information and communication, established for this purpose an independent institution such as the Ministry of Posts, Information Technology and Communications (MPTIC), and raised the budgets of the various sectors associated with the field of technology to the highest levels (Djoudi, 2010:4).

In the twenty first century, the environment surrounding higher education has been dramatically changing due to globalization, as well as to rapid technological advancements, as Gupta points out that "We have moved from the industrial age to the networked age. We have moved from the agricultural and industrial revolutions to the information revolution" (qtd. in Bhatia,2011:2). In particular, progress in Information and Communications Technology (ICT) has released space and temporal constraints from the traditional higher education system, providing the foundation for bringing a new kind of higher education. Universities are forced to respond to the emerging developments in information and communication technology (ICT). The introduction of E-learning systems is the new trend observed, to provide students with online access to learning contents (Qureshi et al. 2012:311).

The present chapter will focus on the theoretical background about the Higher Education in Algeria and the new trends of technology, namely, ICT and E-learning. It will highlight the notions related to the teaching and learning in higher education. This chapter is divided into two sections: section one is devoted to the concept and the nature of higher education in Algeria, and the other section is devoted to ICT as new tool for education, the broad categories of E-learning, and their importance in the educational field.

I.1. Part One: State of Algerian Higher Education (HE) and the New Trends of Technology

I.1.1. History of Algerian Higher Education

There is no doubt that the basis of development in any country is now dependent on the issue of university formation, and the relationship between university institutions and society.

Algeria today is living in a transitional phase that embodies vital challenges in all political, economic, cultural, scientific and technological fields, the university represents the major breakstone of this transition.

Gheraf points out that, since independence, the university went through five stages (2010:60-62):

- ***From 1962 to 1971***: The number of students from 1962 to1971 was very small, and the only university at the national level was the University of Algiers. With the introduction of the reform of higher education in 1971, things have changed by introducing the Arabization process.
- ***From 1971 to 1984***: After the establishment of the University of Science and Technology (USTHB), and the university of Oran, the number of students multiplied day after day, until the situation worsened in the early eighties. The universities were complaining about the lack of infrastructure, equipment, classrooms and laboratories, because of the economic crisis at that time.
- ***From 1984 to 1999*** : This period was characterized by an increasing number of students males and females, causing widespread overcrowding in Algerian universities, which led to the establishment of a network of university centers throughout the country, and the establishment of the University of Continuing Education (UFC).
- ***From 1999 to 2002***: The increasing number of students in all disciplines, even if it is a positive criterion in the equation of growth, remains the central dilemma of supervising. Moreover, a large proportion of professors had left the country since the

early 1990s. For example, the University of Algiers alone has lost 108 professors enrolled in foreign universities in the West and the Arab world.

- ***From 2002 to this day*:** the involvement of a uniform structure of study known in French as LMD (licence-master-doctorate). This came into effect from 2004-2005 and it is designed to align Algerian higher education with international systems and standards, with a bachelor degree of three years, a two-year master and a three-year doctorate.

What is noticeable in this last period is the persistent attempts to introduce the technological element in all administrative work, from the announcement of the results of the baccalaureate and the orientation process, to the development of robust technical infrastructure.

In addition, the ministry tried to be involved in the world developments, by linking the different universities, institutions, and scientific research laboratories to the international network (Hamouche, 2007:35).

I.1.2. Algerian Higher Education

The Ministry of Higher Education and Scientific Research approves the curriculum, which is standardized for each field of study. According to the European Commission, Universities in Algeria have gone through a reform of bringing the composition of degrees into accordance with international standard called LMD, applicable to all disciplines except medicine. It is hoped that the new system will make program offerings from Algerian universities more compatible with those around the world. Moreover, the reforms are aimed at increasing student flexibility in choosing and transferring courses, making the system more efficient (2012). Educational reform has focused on curricula that have been revised, notably for teaching content and the criteria used for choosing between the different disciplines. Science has been emphasized and Information and Communication Technologies (ICT) is being introduced as a teaching tool and a mean of access to knowledge (2012:4).

Major Characteristics

The network of higher education institutions comprises (European Commission, 2012:5):

Institution	Number
Universities	39
University of continuing education	1
University campuses	17
University annexes	2
Preparatory schools	10
Integrated preparatory classes	2

Table 1.1: Algerian HE Network

The number of students attending institutions of higher education is approximately 1 210 000, where 60% of graduating students are female (European Commission, 2012:5).

Number of students in Higher Education	
1 210 000	
Male	Female
40%	60%

Table 1.2: Number of Students in the Algerian HE

Research Activities

Algeria aims to launch a national system with effective links between industry, universities and research establishments. Scientific research and technological developments had come to the fore as national priorities, in the extended Act of 23 February 2008. In view of the Algerian challenges, technological development is a strategic aim, which affects the national economy (European Commission, 2012:6).

The European Commission points out that the objective is to place universities at the heart of the country's economic development by ensuring the production and dissemination of knowledge, the mastery of technology, and the promotion of research and development (2012:6).

I.1.3. Educational Imbalances in the Algerian University

Despite the positive results achieved by the Algerian Higher Education over the past decades, it remains far from the desired level in terms of quality. Today, it suffers from a set of imbalances and deficiencies at various levels, such as the increasing number of students, the supervising dilemma, lack of pedagogical facilities, the brain drain and the phenomenon of leaving professors towards other prospects more attractive. In addition, to the weak integration of the university into its social and economic environment (Gheraf, 2010:64). As a result, Algeria is facing the growing gap that separates us from the developed world.

It is in this context, the Algerian University is looking for the most effective ways to the use of modern technologies in the research development, education, and the improvement of the administrative management in educational institutions. Furthermore, it becomes a key element in the globalization of thought and knowledge.

Despite the problems that we have pointed out, the Algerian University remains a source of pride for its achievements since independence. It started from the ground up, introduced a culture of learning and training for all Algerians through the free education.

I.1.4. Future of Higher Education in Algeria

The 21st century society emerged with new features, culminated in globalization and knowledge, because of the spread of the information and communication revolution, which led to transcend traditional geographical boundaries. Therefore, the world became a global village with no Isolation. This situation is characterized by the opportunities and the

challenges that must be contributed by higher education in all its physical and human components to achieve bets at the local and the international levels (Gheraf, 2010:64).

The Higher education system is the main concern of Mr. Abdelaziz Bouteflika, President of Algeria, and the initiator of the Information and Communication Technology (ICT) development in Algeria, who clarifies the point of providing the universities with the latest technologies by saying,

> "This does not mean providing university institutions with computers and linking them to the Internet and intranets only, but also achieving a fundamental development aimed at investing the pedagogies, in a different and effective way" (qtd.in Hamouch, 2007:42) .

The Ministry of Higher Education and Scientific Research established an education strategy, to develop the educational system in Algeria to be parallel with the latest international standards, focusing particularly in introducing the most recent Information and Communication Technology (ICT) resources for the educational sector.

Preparing students for the 21st century education and work, has a strong focus on computer literacy, and on English language teaching in higher education as a separate module in all brunches. English is the third official language for learning and communication in the country, after Arabic and French languages. However, teaching in English is becoming the language for learning in most universities in the early 2000, which is characterized by the transition to globalized pedagogy or the free market economy (Mami, 2013:911).

Information and Communication Technologies (ICT) are considered important to be integrated in higher education system, to support learning by the new trends of technologies, known as the E-learning, and making the teaching learning process more developed.

I.2.Part Two: ICT and E-Learning Technologies

I.2.1.ICT: Information and Communication Technology

This section will focus on ICT in terms of tools of education, exploring its types, and then, its importance in learning.

I.2.1.1 Defining Information and Communication Technology (ICT)

Several definitions have been given to explain and interpret the acronym ICT. It stands for "*Information and Communication Technologies*". All technologies that provide access to information through telecommunications is mentioned as ICT. In general, it is used to represent a broader list of all components related to computer and digital technologies (Christensson, 2010).

Rouse goes further to explain ICT, in her web site, as “the infrastructure and components that enable modern computing”. This term is widely accepted, despite the fact that there is no consensus on the definition of ICT (2017). However, Lindsey states that ICT is the extended form of IT, which covers “any device or system that allows the storage, retrieval, manipulation, transmission and receipt of digital data” (qtd. in Khatkar, 2011: 2). They also assert that, such data must be digital or electronic, involving collaboration and communication.

Whereas an ICT system is defined as, set of hardware, software, data and the people using them. It usually includes communications technology, such as the Internet. ICT systems take inputs, process these inputs, and then produce outputs, which are stored or communicated in a digital way (“what is an ICT system” 1).

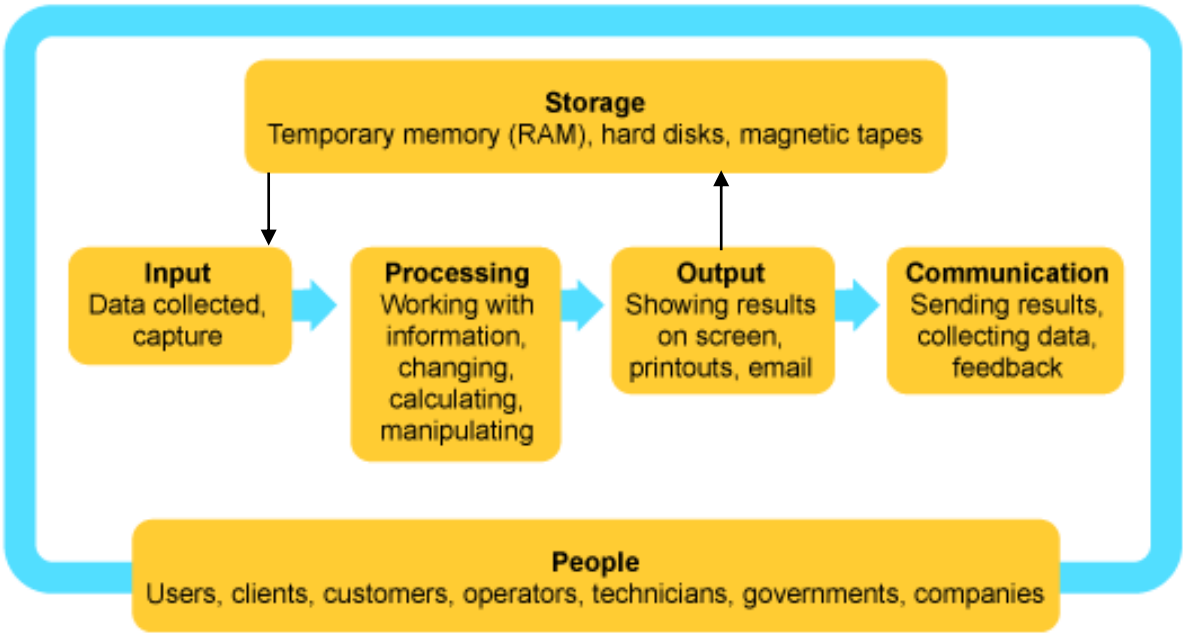


Figure 1.1: An ICT System Diagram ("what is an ICT system" 1)

The systems of ICT contain some or all the parts shown in the above diagram. Different devices are used for input, processing, output, and then communication.

Several countries, developed and developing, now consider ICT as part of the core of their development, to prepare people to the modern age, and to contribute to the knowledge nation, by having access to the best educational facilities (UNESCO, 2002:3).

I.2.2.2. ICT as New Tool for Education

All governments aim to provide the best education possible for their students within the constraints of available finance. The introduction of ICT into education became an obligation, because of the pivotal position of ICT in this modern digital age.

According to Amin(2013:2), the field of education, and then teaching, learning and research were greatly influenced by the integration of ICT. Yucef describes ICT in very effective way, from an economic and a pedagogical point of view as, "having the potential to accelerate, enrich, and deepen skills, to motivate and engage students, create economic viability for tomorrow's workers, as well as strengthening teaching and helping schools change" (qtd. in Amin 2013: 2). Thus, the economic development of the country depends on teaching in schools, the students of the today are the workers of tomorrow. Further explanations on the effects of ICT in education have been well documented (Dave and Tearle 2010; Lemke and Coughlin, 2009).

In a rapidly changing world, technology for education is essential in our global village. Indeed, we are moving from personal, face-to-face interactions to ones in the digital space, using computers, Internet, videos, and other technologies in education. Technology oriented education have been considered as a key factor in enhancing the performance of learners, and improving the quality of education (Al-Ammary, 2012:54). Today, improving the quality of education is the main objective of the educational technology.

According to Sachdev et al., the different techniques of presentation, arrangement of learning activities, and the pedagogical organization, change the educational environment (1984:35). Through ICT, educators can easily explain complex concepts and ensure the understanding of their learners, by creating an interactive education, which could improve student concentration, and thus, improve the quality of learning.

However, integrating ICT effectively into the educational field is a complex procedure that implicates not just technology, but also readiness, pedagogy, educator competencies and long term financing, among others (Tinio).

Conclusively , ICT describes the process of creating, modifying, storing, transmitting of digital information, using different electronic technologies, to develop learner's skills for communication, cooperation, problem solving and the acquisition of knowledge. ICT, as tool of education, have provided education with a vast array of new tools for communication and cooperation, to achieve to goal of improving the educational field.

I.2.2.3Types of ICT

The queue of ICT types is exhaustive; however, it continues to grow. Some types, have existed for a long time (as telephones and computers), while others are recent (as smartphones, digital TVs and robots) (Rouse).

Figure 1.2:Types of ICT (Rouse, 2017)

According to Turner the main kinds of ICT are three hardware, software and communications technology:

- **ICT hardware** includes computers, scanners, digital cameras, etc.
- **ICT software** includes Standard Office Applications, Database software, Graphics, web design software, programming languages software, etc.
- **'C'** in ICT stands for **communications technology**, and covers all the communications technologies such as: digital TV , digital radio , e-mail , Internet , networks (wired and wireless) , mobile phones , GPS (global positioning systems) , videoconferencing , instant messaging, etc.

There is a wide range of technologies existing in education, such as:

1. Computers

According to the English definition dictionary, a computer is "an electronic device that processes data according to a set of instructions…at very high speed". Computer is a helpful device that is used to facilitate communication between learners and teachers by providing, storing and processing data, which can be words or numbers or programs. There are several types of computers: mainframe, desktop, workstation, laptop, notebook, PDA, tablets, and smartphones (Johnson). Computer-assisted instruction (CAI) has a great importance in schools today and is crucial in the teaching and learning of subjects, with high-level thinking skills (Muraina, Adeleke and Rahman, 2011:16).

2. Internet

Internet, net or **web**, was originally developed to aid in the progress of computing technology, by linking all the best academic computer centers. The Internet experienced one of its largest growths to date and today is accessible by people all over the world. The Internet contains billions of web pages created by people and companies from around the world, making it a limitless place to locate information. Internet is used for search engines, downloading, uploading, which make it possible for teachers and students to retrieve historical materials from the Internet. Thus, it is used for communicating with others through social networks, forums, chat, e-mails, blogs, IM and VoIP ("Computer Hope").

3. **Email and Chatting**

Electronic mail and chat technologies are two of the oldest and most used internet technologies, means for transmitting messages electronically (as between computers on a network) they allow one-to-one conversations and file sharing between students, teachers, or between teacher and his students. Moreover, the educator can hold revision meetings, or group debates using chatting tools (Iran, 2011:5). Some use internet-based applications and some use programs on their computer to access and store emails and data.

4. Video Conferencing

Also called video teleconferencing, this technology provides real time interaction with two real-time transmission of audio and video communication between specialized devices or computers (participant) at two or more locations via satellite (wireless) over a network such as

a LAN or internet. Each participant has a video camera, microphone, and speakers mounted on his or her computer. Video conferencing can be used for educational purposes in many ways, such as conducting distance lessons and lectures, or inviting guest speakers to the class, who is living in different country, etc (Alhlaka et al. 2011:104).

5. Web 2.0

Web 2.0 refers to the second generation of the World Wide Web (WWW) (Guevara, 2016). It does not refer to a specific version of the Web, but rather a series of technological improvements. Web 2.0 is characterized mainly by the ability of users to share information quickly with others, which has been developed into the phenomenon that we call social media including a wide range of technologies (Christenson, 2008). Some features, which can be used effectively to enhance education, and considered part of Web 2.0 are listed below:

5.1.**Blogs** : is an abbreviation for the words Web Logs, these allow users to post thoughts and updates about their life on the Web as a personal webpage, but with the ability to publish topics, get ideas and comments from visitors (Guevara 2016; Galindo 2016). It can be used to form a discussion group between students and teachers. Furthermore, it can be used to submit work and assignments.

5.2. Wikis : sites like Wikipedia and others enable users from around the world to add and update online content. It is a collaborative publishing tool using Open Editing (Guevara 2016; Galindo 2016). Moreover, it can encourage knowledge creation and sharing among students (Parker and Chao, 2007:61).

5.3. Social networking : sites like Facebook, MySpace and Twitter allow users to build their own profile, share information, and communicate with friends (Guevara 2016; Galindo 2016). In terms of education, social media offer easier communication and more interaction between students and teachers, by sharing educational news, work, and publishing quizzes or questions for students and teachers (Richards, 2010).

5.4. Podcasts: the word podcast is combination of the two words broadcast and iPod (one of the most popular portable MP3 players), which is a device to play media files. In fact, students can access the class at anytime and anywhere, by recording lectures as a video or audio file, and sharing it over media devices or laptops (Parker and Chao, 2007:57).

5.5. Web applications: a wide range of new applications make it possible for users to run programs directly in a Web browser, without installing programs (Guevara 2016; Galindo 2016). Students can run and execute **online** their programs easily.

Web 2.0 technologies provide a level user interaction that was not available before. The present Web 3.0 technologies, refers to the third generation of the Semantic Web, is defined by Spivack as connective intelligence; connecting data, concepts, applications and ultimately people (2017).

I.2.2.4. Importance of ICT

While ICT is the term that covers a wide range of communication devices or applications, the computer usage is essential to undertake ICT (Williams, 2016). The Nigerian scholar Ozeiwo Ali points out that the importance of ICT lies less in technology itself, than in its capacity to create more access to information and communication (2015:868). Therefore, there is a need, especially in developing nations, to examine the application of ICT.

The discrepancy in access to ICT has created the digital divide, which is the gap between technological "have" and "have not" geographic zones. Numerous countries have established organizations for the promotion of ICT, to advocate policies and programs in order to bridge the digital divide, and this, by providing greater access to ICT among those people struggling to afford it (Ozeiwo Ali, 2015:868). By 2020, the United Nations (UN) considers one of its sustainable development goals, in the least developed countries, to increasing and providing access to ICT and Internet (UN, 2016).

As we approach the third millennium, there is a focus on the education and the use of ICT, which seems to be a necessity for both, the developed and developing countries (Leguault).

1.2.2. E-learning

In fact, everyone who uses a computer has some knowledge on e-learning. It was called web-based learning, or online learning, or computer-based learning, but it is all under the same e-learning umbrella.

This section will focus on e-learning in terms of development, exploring its categories and platforms, and then, the difference between traditional learning and e-learning.

I.2.2.1. Defining E-learning

E-learning is one of the most popular and commonly used educational systems, due to its flexibility, benefits, and support to the mental development of learners.

E-learning, or electronic learning, has been defined in many ways in the literature. It is important to note that there is no single agreed definition of e-learning. The Oxford Dictionary defines e-learning as: *"the learning conducted via electronic media".* In this context, Ali et al. clarifies the various electronic media, including the Internet, Intranets, extranets, satellite broadcast, audio/videotapes, interactive TV and CD-ROM, which are designed to support learning by delivering instructions (2006). In other words, e-learning is the expression describing "instructional learning experience enabled by electronic technologies" (Ong, Lai and Wang, 2004:4), which means education powered by technology.

In learning and education, e-learning refers to the use of new technologies, for instance, computers, digital technology, networked digital devices and associated software (Jaggi, 2015:43). In this context, e-learning is learning with the aid of ICT-technology. It is a generic term for all learning based on *information and communication technologies (ICT)*. Similarly, Challis, Lidgey and Robertson consider e-learning, as the simple use of Information and Communication Technology (ICT) in teaching and learning environment (2003).

Accordingly, e-learning is a term that is used to refer to all forms of electronic media and ICT, that can be used to transfer knowledge and skills, and enhance teaching and learning (Olutola and Olatoye, 2015:302). Inclusively, e-learning describes educational technology to support learning and teaching electronically. According to Parks, the e- in e-learning should denote everything, everyone, engaging and easy, as well as electronic (2013).

In essence, developments in internet and recent technologies are the basic enablers of e-learning, that allow learners to learn anywhere and at any time.

I.2.2.2. E-Learning Historical Foundation

In history, e-learning can be traced back to the 19th century. The following timeline provides the key events about the historical foundation of e-learning (Gogos, 2013):

In the 1840′s, Sir Isaac Pitman taught his learners shorthand via correspondence. At that period, distance courses were being offered to provide students with education on particular subjects or skills. The course materials were delivered by post and correspondence.

In 1924, the first testing machine was invented. This device allowed students to tests themselves.

In 1954, BF Skinner, a Harvard Professor, invented the teaching machine, which enabled schools to control programmed instruction of their students.

In 1960’s, the first Computer Based Training program (CBT) was introduced to the world (Manjon et al. 2007). At that time, the British Open University was also founded, and the use of printed materials was joined by multimedia such as, audiotapes, videotapes, radio, TV broadcasts, telephone, etc (Aretio , 2001).

In 1970’s, the Open University in Britain was keen to take advantage of e-learning. Their system of education has always been focused on learning at a distance. With the Internet, the Open University began to offer a wider range of interactive educational experiences, as well as faster correspondence with students via email etc.

In 1980's, the first MAC enabled individuals to have computers in their homes, making it easier for them to learn about particular subjects. With the introduction of the computer and internet in the late 20th century, e-learning tools and delivery methods expanded, marking the arrival of modern telecommunications in the education scene. Then, in the following decade, virtual learning environments began truly to flourish, with the age of online information.

By the early 1990's, online courses were delivered, bringing education to a wider audience. At the end of the 1990s, the Learning Management System (LMS) concept was used. Some universities started to design and develop their own educational systems. The word "e-learning" was coined in 1999, at a CBT systems seminar.

In the 2000′s, ICT supported education, became a subject undergoing intense study, due to the spreading use of the WWW and Web 2.0 , and their rapid developing applications.

I.2.2.3. E-Learning Categorization and Platforms

The field of e-learning has developed over the years in a fact pace. These technological developments resulted in the classification of e-learning . There are diverse ways of classifying the types of e-learning. According to Algahtani, there have been some classifications based on the use in education; others are based on technology (2011:150).

In this vein, Zeitoun classified e-learning by the extent of the use in education, blended/hybrid mode, assistant mode, and completely online mode. The blended/hybrid mode offers a short-term degree for a partially traditional method .The assistant mode supplements the traditional method when necessary. The completely online mode, involves the exclusive use of the network for the learning process (2008).

Gülch et al. classified the generations of e-learning according to technology (2012). Accordingly, three main generations emerged, the distance learning, online learning and networked learning, that ranged from the use of new technologies (Holley, 2002).

At this point, Kwofie insisted on the fact that e-learning is not distant learning, where teacher and student are not physically present in the same place, as many writers believe. The technology, which enable the unreached to be reached, should not substitute e-learning for distance learning. Similarly, e-learning is not only term to online-learning, learning via the Internet, although many authors limit their use of the term to that context, because the learning process include also means such as, radio, TV, computers, etc. (2015) For that reason, the term e-learning cannot be only restricted to internet-based learning.

Accordingly, e-learning can be categorized into three categories (Kwofi, 2015:61):

- ❖ Category 1 : Internet and web-enabled: e-learning is used to offer online learning services, which can be offered using different approaches:
- Blended/hybrid, where the physical presence of student and teachers on campus is combined with content and instruction via digital and online media. (wikipedia)
- Fully online, the content and instruction are delivered via digital and online media, used by learners at any time, place and pace, as well as the availability or absence of teachers.

For each of these two approaches, the learning process could be either 'real-time' mode (synchronous) or 'non real-time' mode (asynchronous).

- ❖ Category 2 radio, Tv, CD/DVD: is used to deliver one-way learning services involving the listening to or watching of instructional materials, on a CD/DVD using a computer, and there is no means of communication.

- ❖ Category 3 satellite is used to deliver instructions via a videoconference, which enables participants to communicate using the satellite media.

The below diagram shows this categorization.

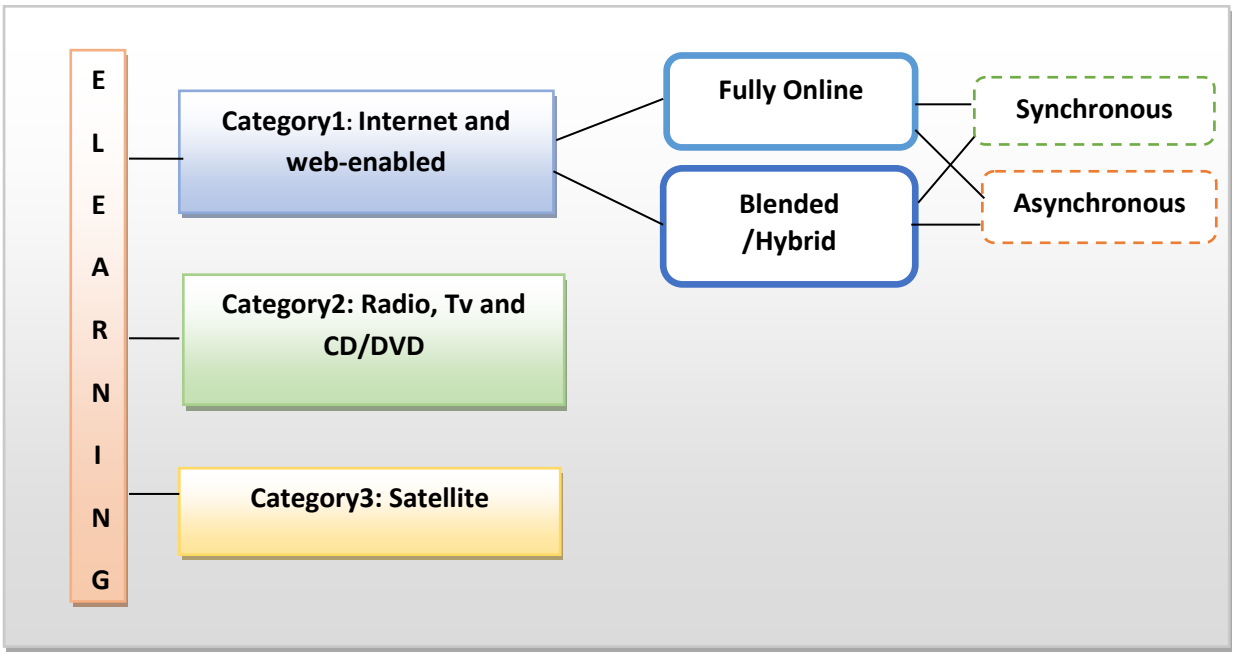


Figure1.3: E-learning Categories (Kwofi, 2015:61)

Internet and web-enabled category is the most largely used all over the world. E-learning delivery via the internet started from static web pages, displaying information about courses and their contents, and gradually developed into web-enabled applications or software, called platforms, that manage the development and improve learning content.

E-learning platforms, called Learning Management Systems (LMS), are applications or software used for delivery of learning content and facilitation of learning process. By the use of LMS, e-learning is made simpler creating portals on the Internet, through which students can easily find and access learning materials, and teachers can organize and deliver educational courses.

In the beginning, learning management systems were dominated by content, but over the last five years, Web 2.0 features (collaborative learning tools as forums, chats, wikis and blogs, etc.) were added to facilitate communication and collaborative learning.

Many e-learning platforms currently available are based on either proprietary software (WebCT, Blackboard, etc.) or open source software (Moodle, Claroline, etc.). (Kanninen Essi,

2009). The latter is more emphasized in developing world due to the challenges faced when implementing the proprietary software.

Moreover, MOOC platforms are another new type of platforms emerged from 2013. MOOCs, stands for Massive Open Online Courses, used to describe courses that are open, free to many, delivered online, and taken by potentially thousands of people from all over the globe (Herman, 2012). EdX is the example of such MOOC platforms, which has a fast, modern feel, with the ability to accommodate big enrollments.

On the other hand, LMS are Learning Management Systems; it can be implemented for an institute, an organization or any other group of students. Moodle is the example of such LMS platforms, which is an open-source that allows users to build and offer online courses. Hence, they are not by default open for all people.

I.2.2.4. Traditional Learning vs E-learning

The debate to compare the differences and similarities between e-learning and traditional learning environment is as old as 1999, when starting to include the Internet as an educational medium. E-learning includes many elements that are familiar from traditional learning, such as, presentation of ideas by the students, group discussions, and many other forms of conveying and accumulating knowledge. However, how do traditional learning and e-learning actually differ?

Certainly, there are many differences between the traditional and the e-learning environment. First, the e-learning can be synchronous and asynchronous, whereas the traditional learning is simply synchronous. Then, e-learning requires digital literacy, and a technology savviness, but the traditional learning requires physical presence and communication skills. Finally, the instructor becomes a mentor in e-learning, where the old authority of the instructor, who leads the learning process in the traditional learning, shifts towards a mentor, who guides on the side.

The most important point is to combine the traditional learning with e-learning, by encouraging both educators and learners to use new technologies, to enhance the learning process, and make the learning environment more exchangeable.

I.3. Conclusion

Because of the population explosion and the policy of democratization of education, learning requirements are increasing in Algerian Higher education. Regardless the annual opening of new universities, overload students remains a problem. Add to this the lack of teachers in some specialties, where demand is high and spread over the territory of Algeria. E-learning presents an alternative bringing benefits in terms of educational and economic consequences, with the integration of modern ICT technology, which indicates a paradigm shift in the learning process. In fact, as we approach the third millennium, implementing technology may be a catalyst, because remaining on the margins of technological innovations, is not the solution strategy for Algeria.

In this chapter, we presented some background notions about the Algerian Higher Education, and the current technologies, ICT as new tool for education, and E-learning as learning platforms, their types and their importance in the educational field.

The next chapter will be devoted to the use of ICT and E-learning in Higher Education, and the different opportunities and challenges that face the adoption of these technologies in education.

2

CHAPTER TWO

ICT and E-learning in Higher Education

Chapter

II

ICT and E-learning in Higher Education

II.0. Introduction

The integration of Information and Communication Technologies ICTs into the education field is in constant progression. E-Learning is believed to be one of the main elements expected to support the formation of modernisation in the developing countries. Researchers consider that one of the goals of introducing e-learning was to revolutionize the learning process, as it is seen as an important tool for enabling learners to gain access to higher education quality. The adoption of new technologies in education is considered as an important turning point from the point of view of different higher education Institutions (Mourad, 2010:604).

Some research projects in e-learning are introduced in several universities in Algeria to overcome the problems of the overload students and the insufficiency of teachers, which became the main issue of the managers of these establishments. Accordingly, e-learning presents an alternative, as it brings benefits in terms of educational and economic consequences. It is assumed that introducing e-Learning in Algeria could eliminate problems such as overcrowded classrooms and limited resources. In order to meet the needs of the increasing numbers of students, and fulfil the requirements of the job market in a period of communication and knowledge revolution; the Algerian government considered introducing e-learning, especially in higher education (Djoudi, 2010:28). Although e-learning seems to be a promising opportunity for educational systems, its integration still facing a number of challenges.

This chapter aims to better understanding the relationship between ICT and E-learning in higher education, we point out the adoption and the integration of such technologies in higher education, taking into consideration the context of the Algerian Universities. After that, we move to the crucial role of the readiness model for e-learning. Finally, we have depicted the eventual opportunities and challenges of using ICT and e-learning in higher education, identified by many researchers.

II.1. Relationship between ICT and E-Learning

Information Communication Technology (ICT) represents the whole of techniques and tools that are used in gathering, storing, processing and communicating data. When ICT is used in education or to reinforce the learning process, it is called E-learning Technology or Educational Technology (Olutola, 2015:302). Sife et al. assert that, "E-learning refers to the use of ICTs to enhance and support teaching and learning process" (2007:58). It is the instructional content provided by electronic technologies and it integrates a wide range of learning strategies and technologies. E-learning ranges from the way students use e-mail and accessing online materials while following a course on campus to fully online programs. It is therefore an alternative solution, which enlarges accessibility and becomes essential to supplement the traditional way of teaching (2007).

E-learning encompasses a variety of integrated educational technologies. At one-end applications that has little impact on learning and teaching process, as PowerPoint. At the other end applications that can have significant impact upon learning and teaching processes, as the Virtual Learning Environments (VLEs) or Learning Management System (LMSs). The supplemental use of technology in the classroom, through blended or hybrid uses a mix of face-to-face, fully online instruction, and fully online synchronous and asynchronous distance learning provided to remote learners (Sife et al. 2007:58).

Advancements in ICT, particularly Learning Management Systems (LMS), such as Moodle, have created notable opportunities for higher education to expand the learning beyond the traditional classroom to include geographically dispersed students. Brito noted that the term e-learning is an umbrella term for the use of technology in several ways to enhance education. She presents the ICT involvement in learning: (2014:588)

- ✓ ICT support for e-learning communication, like chat or threaded discussions
- ✓ ICT offers media sources, like audio, video, spreadsheets and text
- ✓ Learning Management Systems (LMS), a software framework for learning

II.2. Adoption and Integration of ICTs in the University Environment

It has widely been recognized that in higher education ICTs hold the potential of transforming learning in new and powerful ways. This is the case as it allows for a wide range of learners to access the content needed to improve their knowledge and professional skills without having to travel distances to the source of knowledge. According to Watson "ICT is perceived as a catalyst for change; change in teaching styles, learning approaches and in access to information" (2005:5). For instance, the Internet and World Wide Web have shaped the learning process and brought about dramatic changes to various aspects of education including distance and online learning, collaboration, virtual classrooms etc. (Wang and Thang 2010:3)

The "Technology in Schools Taskforce" defines educational technology integration as:

> Technology [education] integration is the incorporation of technology resources and technology based practices into the daily routines, work, and management of schools . . . . This definition is not itself sufficient to describe successful integration: it is important that integration be routine, seamless, and both efficient and effective in supporting school goals and purposes. (qtd. in Mayes ,Natividad and Spector, 2015:223)

The authors argue that technologies can play a role in education when is integrated in the daily routine and the management but the successful integration depends on supporting the purpose of education.

II.2.1. ICTs in Algerian Higher Education

ICTs are an influential and attractive means of involvement in any filed and thus, they became part from the Algerian Universities. In Algeria, there are very few studies on the uses of ICT in higher education and the attitude of Algerian teachers' and students' vis-à-vis the huge existence of these new technologies.

Hence, the Algerian universities found it necessary to cope with technology by adapting new policies in the field of education. As it is mentioned in the first chapter, after the independence, Algeria had just one university, which delivered 63 degree in 1963. This number was multiplied by thousand in four years. In 2003, more than 70.000 students had theirs degrees, supervised by 21.500 teachers (Ziani, Cherroun and Ouinten, 2007:10).

A prediction of two million students is expected in the future. The ministry of higher education had a policy of ICT integration in all the pedagogical practices. According to the authors, this policy was brought into practice through different levels.

- **Structural Plan**

The sector has a central direction called the Direction of Systems and Networks, which adapt the higher education system to the transformation, development and use of ICT, in the different sector activities. The Ministry of Higher Education has also played an important role in the ICT field, especially through the Scientific and Technical Information Research Centre (CERIST), which functioned as the only internet service provider (ISP) before market liberalization (UNESCO, 2004). This center has national missions of research, development, expertise and assistance in the field of ICT, scientific and technical information. The CERIST is in charge of the design and implementation of the Academic and Research Network ARN[1] project, the training in the domain of ICT, the development of the scientific production of the sector, and the development of the university libraries. These two structures are relayed at the local level by a common service called "*the center of information and communication systems and networks for distance training and e-learning"*. This department is responsible for managing the Intranet and the development of ICT resources (2007:10)

- **Communication Infrastructural Plan**

The sector of Higher Education and Scientific Research is the first sector in Algeria, which have a private research in the academic and research network. It connects the local networks of the different academic and research establishments to the Internet network. The implementation of the local network infrastructure is financed in part by the institutions themselves and in the majority of cases by the ministry via special funding. The ARN project,

[1] http://www.arn.dz

which connects all the established universities and research centers, is set up within the framework of the CERIST missions. It is designed to be more than just a communication infrastructure. The objective of the network is to offer, in addition to communication services, panoply of products and services for access to information and documentation, exchanges and collaboration between the actors of the sector. The connection to similar foreign networks, like the French network RENATER[2] and the European GIANT[3] network, reinforces this trend. However, the services and products currently available on the network are very limited and do not reflect the initial objectives (2007:11)

❖ Equipment Plan

The Ministry regularly provides equipment. Several sources of funding are mobilized for this purpose. The funds of the institutions, the special funds such as the national research fund, the economic support plans, the cooperation, etc. (2007:11)

❖ ICT Training Plan

Several actions have been done, with a view to integrating ICT into education and training. It is mainly a form of training within the framework of cooperation. Table 1 provides a snapshot of the most important actions (2007:12).

Action	Partners
Master UTICEF	AUF[4], ULP[5],TECFA[6], UMH[7]
Workshops TRANSFER	AUF+ Universities
Master COSELEARN	S.A.Qualilearning MESRS[8]
Project AVICENNE	UNESCO and Mediterranian Universities
Master FORTIF	UFC, CNAM[9] ، CNED[10], UNESCO
SERPOLET	UFC
FPD-CARO	Bejaia University

Table 2.1: The Most Important Actions of ICT (Gueraf, 2010:68-69)

[2] http://www.renater.fr
[3] http://www.geant.net
[4] AUF : Agence Universitaire de la Francophonie
[5] ULP : Université Louis Pasteur de Strasbourg (France)
[6] TECFA : Technologies de Formation et Apprentissage, université de Genève (Suisse)
[7] UMH : Université de Mons Hainot (Belgique)
[8] MESRS : Ministère de l'Enseignement Supérieur et de la Recherche Scientifique
[9] CNAM : Conservatoire National des Arts et Métiers : http://www.cnam.fr/
[10] CNED : Centre National d'enseignement à Distance : http://www.cned.fr/

In conclusion, the integration of ICT at the level of university is relatively recent, still ongoing and at an early stage. Therefore, the use of ICT in the teaching and learning process at the Algerian Universities is the subject matter of the managers, but no study has been made to find out the reasons for this lack of ICT integration (Guemide, Benachaiba and Bouzar 2011:85).

II.3. E-learning in Higher education

E-learning can also be seen as a promising mode for improving the quality of higher education and effectiveness of the learning process (Kalaivani, 2014:16). It can give increased flexibility of learning experience to student, enhances access to information resources for more students. E-learning could also lead to the improvement of quality in higher education by leading to innovative pedagogical tools, new ways of learning and interacting by the easy sharing of the new practices among learners and teachers communities (2014).

E-learning is to the use of ICTs in the diverse processes of education to support and improve learning in higher education. This comprises the use of ICT technology as a supplement to traditional learning, online learning or mixing the both modes. E-learning offers higher education and their learners the flexibility of place and time of providing or learning information (Al-adwan, 2012:121).

The term ‘e-learning’ has been applied in different settings, such as distributed learning, hybrid learning and online-distance teaching. In an e-learning environment, a diversity of tools and technologies are used, such as, internet mediated teaching, web-based education, TV and radio broadcast, virtual classrooms and distributed learning. Online learning can be more flexible and often encompasses more technologies, for instance, audio chatting, video conferencing and online discussion. All these new trends of technology give learners the chance to interact with teachers and other learners in effective way (Al-adwan, 2012:122).

II.3.1. Students centered learning

Both teachers and students, encounter e-learning technologies frequently. The traditional is teacher-centered learning, while the blended learning is mentioned as student-centered learning. The term student-centered learning has now caught the attention of higher education, and the effective learning has predominantly become the main objective of learning. In the light of this, student centered learning must be studied to extract the different roles of teachers and learners in the new age of e-learning to reinforce at the end the student knowledge (Aguti, 2014:391).

II.3.2. E-learning Attempts in Algerian Higher Education

The integration of information and communication technologies into the education field is in constant progression. Some research projects in e-learning are introduced in several universities in Algeria to overcome the problems of the overloaded students and the insufficiency of teachers, which became the main issue of the managers of these establishments. Accordingly, e-learning presents an alternative as it brings benefits in terms of educational and economic consequences (Djoudi, 2010:28).

The E-learning in Algeria is a national initiative, which is part of a larger national ICT sector, where it offers great potential to shape the future of education systems in the country. The vision of e-learning in Algeria is enhancing the quality of education and inspiring lifelong learning through e-learning. The Algerian Universities translated this vision by introducing an environment, where the use of ICT becomes an integral part of the universities (Hamouch, 2007).

The Algerian Universities have managed to implement the e-learning platform. They possess the basic ICT infrastructure such as Local Area Network (LAN), Internet, computers, CDs and DVDs facilities that form the basis for the establishment of e-learning platform using Moodle software. Moodle is a learning management system (LMS) a free, open source

software package designed to help teachers in creating effective online learning communities and courses (Sife, 2007).

E-learning has been applied in Algeria in a number of projects that took advantages mainly from the foreign cooperation, as it is shown in the table1.

Although the described context of higher education in Algeria create a significant potential for the adoption of e-learning, the technological readiness could be main constraint for the acceptance and use of the new technology in higher education. Consequently, limiting the developments that e-learning could contribute towards enhancing the higher education experience in Algeria. Attitudes towards

e-learning usefulness, ease of use, pressure to use, are all predictors in modelling students' adoption intentions (El Gamal, 2012).

From the e-learning attempts listed above, it could be concluded that the Algerian teachers and learners might have various perceptions towards introducing e-learning in education.

II.4. Model on readiness for E-learning

Literature demonstrated a wide range of factors that causes of the low awareness levels about a new technology given. Determining the factors that influence perceptions should consequently help in raising the awareness level among the learners and, as a result, increase acceptance, adoption and use of e-learning in higher education. So, to what extent are learners ready and able to adopt new learning strategies involving the use of computer and internet?

According to the conceptual model of Akaslan and Law, on teachers' and students' readiness for e-learning in Higher Education (Fig. 1), the notion of "readiness for e-learning" can be defined as the ability of an individual or organization to benefit from e-learning (qtd in. 2012: 366)

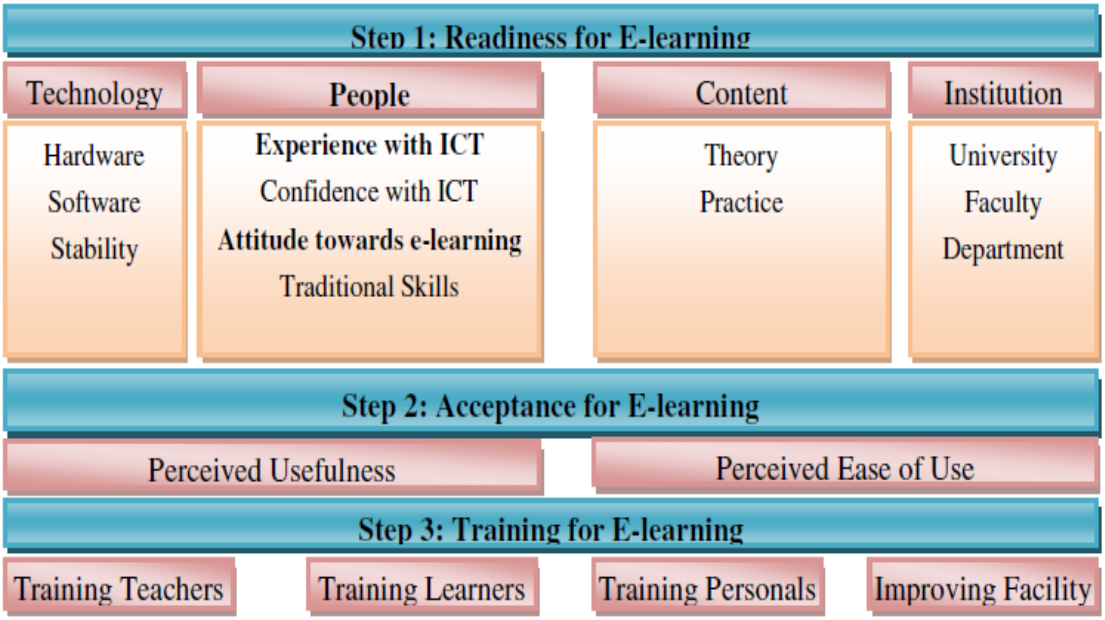


Figure 2.1: Readiness Model for E-learning

As shown in Figure. 2.1, there are many factors affecting the ability of teachers or students to take the advantage of e-learning in their own working or studying context. Akaslan and Law aim to find out whether individuals tend to embrace or ostracize e-learning, when they have more or less experiences of using ICT, focusing on two attributes of the factor People, that is Experience with ICT and Attitude towards e-learning.

- **Experience with ICT.** Earlier research studies indicate that the usage of a system is influenced by previous experiences of other systems. Based on the related literature, the authors identify three sub-factors: **First, readiness for e-learning, second, acceptance for e-learning and finally, training for e-learning.**
- **Attitudes towards E-learning.** Attitudes of individuals towards e-learning are highlighted as an important aspect of predicting and improving e-learning usage. Hence, different researchers measure people's attitudes with different approaches such as, Technology Acceptance Model (TAM). TAM is used to measure two constructs: perceived usefulness and ease of use, which signify the degree to which people believe using a system would be useful and free of effort, respectively. They adopted TAM to measure teachers' and students' attitudes (Akaslan and Law 2012: 366).

Therefore, the conceptual model of Akaslan and Law measures the readiness level of ICT resources in higher education in terms of ICT readiness, teacher readiness, and learner readiness.

II.5.Opportunities, Challenges of ICT and E-learning Use in Higher Education

II.5.1. Benefits, Advantages of Using ICT and E-learning in Higher Education

ICTs have the potential for increasing access to information and improving the significance and quality of learning. It, thus, represents a potential objective for developing countries. Moore and Tait, emphasize on that, as they said "…ICT created wealth of information that was never possible in the classical model" (qtd. in Nyadara, 2012:135). They even went further and added that technology simplifies communication between students and teachers and helps teachers to be creative by designing very interesting course through electronic media. Moreover, this innovation refers to the use of learner-centered approach with electronic resources. In this context, ICT expands the learning opportunities, as individuals will be able to learn anytime and everywhere, which led to reduce the knowledge gap between people (Nyadara, 2012:135).

The adoption of e-learning higher educational has several benefits, consequently, e-learning is considered among the best methods of education. Based on the literature review, we made a comparative study between the different previous works about the benefits and the advantages of e-learning. According to Holmes and Gardner, the advantages of the adoption of e-learning include the following (2006):

- ✓ It is flexible when issues of time and place are taken into consideration)Almarabeh, 2014; Uys, 2003; Unwin, 2008; Qureshi, 2012; Bhatia, 2011; Bhuasiri et al. ,2011).
- ✓ E-learning enhances the efficacy of knowledge and qualifications via ease of access to a huge amount of data (Unwin, 2008; Qureshi, 2012; Bhuasiri et al., 2011).
- ✓ Provide relations between learners by means of discussion forums, for the sake of interaction and collaboration (Unwin 2008; Qureshi 2012; Bhatia 2011; Bhuasiri et al., 2011).

- ✓ E-learning is cost effective in the sense that there is no need for the students or learners to travel (Almarabeh, 2014; Uys 2003; Unwin, 2008; Qureshi, 2012).
- ✓ E-learning takes into consideration the individual learners differences. Some learners, for instance prefer to concentrate on certain parts of the course, while others are prepared to review the entire course.
- ✓ The use of e-learning allows self-pacing. For instance, the asynchronous way permits each student to study at his or her own pace and speed)Almarabeh, 2014; Unwin, 2008; Bhuasiri et al., 2011)

In addition, Bhuasiri et al. describes other advantages, such as, personalized instruction, content standardization, accountability, on-demand availability, and confidence (2011).

Other benefits of e-learning as shortened from Unwin (2008) include:

- ✓ The potential for interactivity amongst and between learners and teachers
- ✓ Content is more timely, consistent and dependable with potential for re-use
- ✓ Supports student centered e-learning paradigm
- ✓ Increases access to learning and training opportunity
- ✓ Scalability: e-learning solutions are highly scalable
- ✓ Facilitates the management of student records and tracking students' progress

Moreover, the Freedom of speech is noted by Qureshi, 2012. Besides, the Virtual Learning Environment (VLE) or the Learning Management System (LMS), which allows access to different types of learning, is mentioned by Bhatia (2011).

Works / Advantages	Holmes and Gardner (2006)	Almarabeh)2014)	Uys (2003)	Unwin (2008)	Qureshi (2012)	Bhatia)2011)	Bhuasiri et al. (2011)
Flexibility	*	*	*	*	*	*	*
Efficacy	*			*	*		*
Scalability				*			
Interactivity	*			*	*	*	*
Connectivity						*	
Cost Efficiency	*	*	*	*	*		
Individual Differences	*						

Self-pacing	*	*		*			*
Availability				*			*
Student centered e-learning				*			
Learning/training opportunities				*			
Freedom of speech				*			
Virtual Learning Environment						*	
Personalized instruction							*
Content standardization							*
Accountability							*
Confidence							*
Management of students				*			

Table 2.2: Comparative Study about E-learning Advantages and Benefits

Although the new trends of technology in education present various opportunities, it has not been effectively integrated into the learning process. Bhuasiri, et al, (2011) noted that, in developing countries, e-learning is still in its early adoption stage. The practice of teaching still relies on the single pathway without multiple methods to build up ICT use culture in education.

II.5.2. Barriers in the Integration of E-learning in Higher Education

Using ICT in higher education environments has a great degree of importance. Therefore, universities must find means to enhance ICT and integrate it in every part of their systems regarding learning and development. The rapid growth of e-learning courses at academic institutions has brought about a big change for students and teachers with various levels of academic experience. Teachers and students must possess specific skills to use the various e-learning tools. Students may establish their learning efforts via different types of technology such as text, video or audio devices. It is important to identify the barriers in order to build a successful e-learning system.

Literature highlighted some challenges concerning the adoption of e-learning in higher education context. In this vein, we made a comparative study between the different previous works about the challenges facing the integration of e-learning in higher education. According

to Aung and Khaing, the barriers of e-learning integration in developing countries' universities includes the following: (2015:407-409)

- ICT Infrastructure

  The cost of acquiring, managing and maintaining ICT Infrastructure has been noted as the main obstacle in deployment and adoption of e-learning in education. (Al-adwan and Smedley, 2012; Nyandara, 2012; Sife, et al 2007; Alturise and Alojaiman, 2013)

- Contextual Factors

  The context of e-learning includes the society, culture, traditions, instructions and regulations (Sife, et al., 2007)

- Teachers' Competencies

  The integration of ICT would require significant pre-service and in-service teacher training in basic computer literacy, as well as how to teach effectively with e-learning technologies (Sife, et al., 2007; Alturise and Alojaiman, 2013).

- Technical Difficulties

  Technical skills are a significant aspect of implementation and integration of e-learning technologies in education system. They include installation, availability of latest technology, fast internet connection, uninterrupted supply of electricity, maintenance, administration, security and absence of technical support. The lack of quality experts for implementations and maintenance of (ICT) is considered as the major problem for the most of the developing countries (Al-adwan and Smedley, 2012; Orr and Heaton, 2007; Nyandara, 2012; Sife, et al, 2007; Alturise and Alojaiman, 2013).

- IT Literacy

  The degree of proficiency in computer technology is an important factor in successful adoption of technology. The confidence in skills and ability to use e-learning will contribute significantly towards the usage of technology (Al-adwan and Smedley, 2012; Nyandara, 2012; Alturise and Alojaiman, 2013; Kenan, Pislaru, and Elzawi, 2012)

- Language Competency

  English language was a barrier to e-learning students in most of developing countries (Alturise and Alojaiman, 2013; Kenan, Pislaru, and Elzawi, 2012). Students may also find it very difficult to comprehend their contents if they are expressed in complex language (Al-adwan and Smedley, 2012).

- Awareness

  Students unaware of the benefits of e-learning are likely to get frustrated easily as they may take it as a time wasting activity. Without realizing the importance of a particular technology and its contribution to the achievement of goals, successful integration of technology is difficult (Sife, et al., 2007)

- e-Readiness

  To achieve a higher level of readiness, universities need to provide preparatory training to both teachers and students to improve their skills in handling the technology involved in higher education.

There are still many challenges to state on e-learning integration. As Kenan, Pislaru, and Elzawi (2012) mention, the barriers of integration are:

- Lack of Training

  A significant percentage of teachers and students are still computer illiterate (Al-adwan and Smedley, 2012; Alturise and Alojaiman, 2013)

- Lack of Interests

  The fear of the stuff that e-learning would abruptly shift traditional education into a new pedagogical venture, make the lecturers and policymakers not interested in the change. (Al-adwan and Smedley, 2012)

- Rigid Learner-Lecturer Relation

  Learner may feel subservient to the lecturer and this could prove a problem when the learner is asked to discuss his/her views freely with the teacher. Moreover, Al-adwan and Smedley (2012) point out the lack of face-to-face contact in e-learning procedure

- Highest Load on the Academic Staff

  The learning load in universities is typically large, for thus, even teachers find it difficult to find the time for research activity and educational development (Al-adwan and Smedley, 2012; Alturise and Alojaiman, 2013)

- Lack of Official Recognition by the Qualifications of Online Studies

  There is no official recognition in developing countries for distance or online learning as a valid mode of education.

In addition to the above challenges in developing countries, (Sife, et al, 2007; Al-adwan and Smedley, 2012; Alturise and Alojaiman, 2013) point out the challenge of insufficient of qualified staffs, which hardly affects the e-learning process.

Many researchers have argued that resistance to change is an important barrier to teachers' use of new technology in education because it may not improve their knowledge of how to use ICT and thus affects their motivation to change (Kenan, Pislaru, and Elzawi, 2012; Alturise and Alojaiman, 2013). Moreover, the lack of access to resources such as computers and Internet and even the home access to courses is a complex problem that discourages students and teachers from integrating new technologies into university courses (Sife, et al., (2007); Alturise and Alojaiman, 2013) . Finally, Alturise and Alojaiman, (2013) notes that students usually do not have enough income to purchase or hire rapidly changing hardware and software technology especially in the developing countries.

Works / Challenges	Aung and Khaing (2015)	Al-adwan and Smedley (2012)	Orr and Heaton (2007)	Kenan, Pislaru, and Elzawi (2012)	Nyandara (2012)	Sife, et al (2007)	Alturise and Alojaiman (2013)
ICT Infrastructure	*	*			*	*	*
Contextual Factors	*					*	
Teachers' Competencies	*					*	*
Technical Difficulties	*	*	*		*	*	*
IT Literacy	*	*		*	*		*
Language Competency	*	*		*			*
Awareness	*					*	
E-Readiness	*						
Lack of Training	*	*		*			*
Lack of Interests		*		*			

Rigid Learner-Teacher Relation				*			
Load on the Academic Staff		*		*			*
Lack of Official Recognition				*			
Insufficient of Qualified Staffs		*				*	*
Lack of Access to Resources						*	*
Resistance to Change				*			*
Lack of Income							*
Lack of Face-to-Face Contact		*					

Table 2.3: Comparative Study about Challenges of Integrating E-learning

II.6. Conclusion

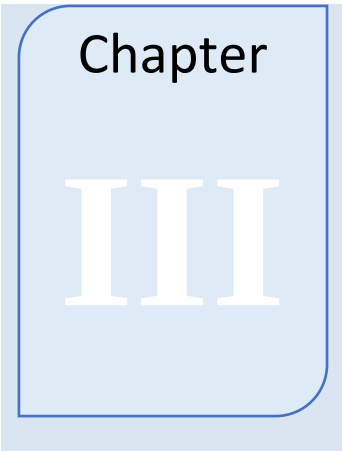
E-learning involves the use of digital tools (ICTs) for teaching and learning to enable learners study anytime and anywhere. It involves the teaching, the delivery of electronic data and motivates students to interact, collaborate, as well as exchange and share different ideas. It facilitate communication and improves the relationships that sustain learning. Despite some challenges discussed, the literature has sought to explain the role of e-learning in particular, and how it has made a strong impact in teaching and learning. Its adoption in higher education has increased the access to information and has provided a rich environment for collaboration among students and teachers. The overall literature, which explains the benefits of e-learning suggests the need for its implementation in higher education to enjoy the full opportunities that come with its adoption and integration.

In this chapter, we presented the relationship between ICTs and e-learning in terms of use in higher education, and then in the Algerian Universities. After that, we focused on the readiness model for e-learning, to explore the ICT experience and the attitude toward e-leaning. Finally, we described the opportunities and challenges of using such technologies for the sake of integrating e-learning in higher education. The next chapter will be devoted to the methodology and the data analyses.

3

CHAPTER THREE

Data Analyses and Discussion



Data Analyses and Discussion

III.0. Introduction

This chapter is devoted to the exhibition and the analyses of the statistics and data collection using questionnaires .Therefore; questionnaire is probably the most widely used instrument for eliciting information. According to Kumar, the utilization of questionnaires is the most common means of data collecting in quantitative research (2011:155). Our investigation starts by presenting the setting in which the study was conducted and introducing the population of the study, then defining, analyzing and interpreting the questionnaire results. In addition, we use tables and graphs in order to organize our results and make them easy to be understood. Finally, our research presents findings about the important and the wide use of ICT and e-learning in higher education.

III.1 Context of the study

Founded in 1986, the University of Amar Thelidji is a non-profit public higher education university. The Ministry of Higher Education and Scientific Research recognize Laghouat University officially. Amar Thelidji University offers courses and programs leading to officially recognized higher education degrees such as bachelor degree, master degrees and doctorate degrees in several areas of study. UATL provides several academic and non-academic facilities such as library, sport activities, study abroad and exchange programs as well as administrative services. The study was conducted at the Department of Computer Science, which was established in 1999 for the classical system. Whereas, the LMD system formation was launched during the academic year 2006/2007 .This department is the third branch of the Faculty of Sciences. It provides its students with 36 computers, which are distributed between two laboratories. The number of teachers is 35 divided between the different levels. The total number of computer science students is 340. We conduct our research in the computer science department.

III.2. Research Design and Methodology

To conduct any research we need to choose the exact methodology in order to achieve the wanted goals. The two concepts *research design* and *research methodology* need to be explained firstly. The *research design is* defined as a plan for selecting subjects, research sites, and data collection procedures to answer the research question(s), whereas the *research methodology* involves analysis of the assumptions, principles and procedures in a particular approach to inquiry.

III.2.1. Research Questions

Throughout the present work we have formulate a set of questions. Through which we tried to clarify the use of ICT and e-learning in higher education and the main challenges and opportunities of educational technology in the Algerian university.

1. What is the current status of using ICT and e-learning in higher education system at the University of Laghouat?

2. What are the opportunities and challenges of educational technology?

3. Do teachers and students accept the new ICT and e-learning platforms?

III.2.2. Research Hypotheses

To help find answers to the previous set research questions we formulated three hypotheses.

1. The current status of using ICT and e-learning in higher education system in the department of computer science at Laghouat University might be high.
2. The Opportunities and the challenges of educational technology that might be found in the department.
3. Whether Teachers and students accept the new ICT/ E-learning platforms or not.

III.2.3. Research Objectives

Any research has a set of objectives; in the current research we have designed three objectives which are the following:

1. To shade the light on the use of technology in higher education.
2. To investigate the opportunities and challenges of educational technology in higher education.
3. To examine the acceptance of ICT in the department of computer science.

III.2.4. Target Population

A sampling is selecting a group of subjects that meet a designated set of criteria. Our study opted for LMD students and teachers of Computer Science; at the University of Amar Thelidji Laghouat. We have randomly selected the sample which is consisted of 34 students (19 females and 15 males). Our rationale for selecting this category of population is attributed to the fact that the number of LMD computer science students is huge to conduct a research on as a population. The latter consists of 340 students. On the other hand, we have contacted 35 teachers which is the whole number of computer science teachers.

Our questionnaires were distributed with the help of a teacher who was responsible of the target class. He helped us to explain the items that were used in the questionnaire. kumar in 2011stated that "*As you have personal contact with the study population, you can explain the purpose, relevance and importance of the study and can clarify questions that respondents may have."* (140).We used the mother tongue in some cases when needed. While other students responded using the online questionnaire. At the start of the research, we collected the names of the teachers and their email addresses. The teachers' questionnaires were sent via emails and other teachers were given the paper form. In this stage we did not find a problem in the language (English) of the questionnaires because most teachers are familiar with it.

III.2.5. Research instruments

Data was collected using two means, for the present work which lends itself to a descriptive nature. The descriptive approach is the most preferred because of the quality of the subject. We used it to accurately describe the population who took part in this study. According to Glass and Hopkins, "descriptive research includes collecting data that describe procedures and then organizes, tabulates, represents and describes the data collection.*"* (qtd .in knupfer .2) . While collecting data we used two methods. The secondary resources played a great role in the first part of this work. Moreover, primary resources were based on two types of questionnaires (electronic and paper forms). They are considered to be a supportive instrument to the present research.

This study makes use of quantitative information to explore the use of ICT in higher education. We make use of quantitative study design because it is more specific and structured. Kumar argued that *quantitative research ,the measurement and classification requirements of the information that is demand that study designs are more structured ,rigid, fixed and predetermined in their use to ensure accuracy in measurement and classification* "(2011:103).

III.2.6. Questionnaires

The most frequent instrument used is the questionnaire. This instrument carried information that is relatively easy to tabulate and analyze. The questionnaire is defined as a series of questions combined with the corresponding answers. The answers to which are recorded by participants .They are asked to read the questions, interpret what is predictable and then write down the answers. (Geoffrey, Damatteo and Festinger , 2005:152)

We introduce the questionnaire with a paragraph explaining the purpose behind this study. By virtue of ethical issues, the participants were informed that the data they provided on the questionnaire would be confidential and used for the purpose of this research only.

The questionnaire for this study is composed of three sections. The first section formed to find out background information of the participants. Participants were asked to provide their gender to know whether males were more engaged than females in the field of technology or females, age, profession and degree. In the other section, participants were

asked about the use of ICT in the field of work. The final section is designed to obtain the probable obstacles that they face while using ICT.

For the present study, two questionnaires were formed for both students and teachers of Computer Science Department. Students' questionnaire contains 31 questions, whereas Teachers' questionnaire contains 35 questions distributed into three sections (table 1). Both questionnaires contain various types of questions. Multiple choice types where teachers and students to tick the corresponding option after reading the questions thoroughly (table 2). Most questions were close-ended questions. According to (Belson .Et al) close ending questions are better because simple formats let users simply to check the answers on the questionnaire work the best." (qtd. in knupfer . 1201) . Plus the free answering style. The questions were ordered from general to specific respecting the order of the research goals. Kumar argued that "*questions should follow a logical progression based upon the objectives of the study*."(2011:150).The returned student's questionnaires totaled 34 out of 34 (100%). However, from the total examined population only 15 teachers have responded (42%).

Sections	**Type of questions**	**Number of questions**
Section one	Background information	3Q (students)
		4 Q (teachers)
Section two	The use of ICT in education	15Q (students)
		17Q (teachers)
Section three	The probable obstacles while using ICT	16Q (students 18Q(teachers)

Table3.1: The Distribution of Questions in the Questionnaire.

Have you participated in an E-learning program?
YES ☐ **NO** ☐
Will you accept the new E-learning platforms at your department in the future?
YES ☐ **NO** ☐

Table3.2: Sample of Multiple Choice Types.

III.3. Questionnaires Analyses and Interpretation

III.3.1. Computer Science Students' questionnaire

The aim of this questionnaire is to collect the needed data to answer our research questions. We have nominated the most important questions. The analyses of the questionnaire were undertaken by means of quantitative tools. The objective is to quantify the students' answers and represent it in statistical data, which are also summarized in figures (bar charts and pie charts) and tables.

A. Section one: Personal information

This section indicates in general information concerning the demographic data of the participants in this study. The results are shown as follow:

a. Gender

The number of males is, apparently, larger than that of the females.

GENDER	Males	Females
%	58.8%	41.2%

Table 3.3: Participants' Gender

B. Section two: The use of ICT Information and Communication Technology in education.

Question 1: Do you have the internet at home?

This question is given in order to discover whether students have internet at home or not.

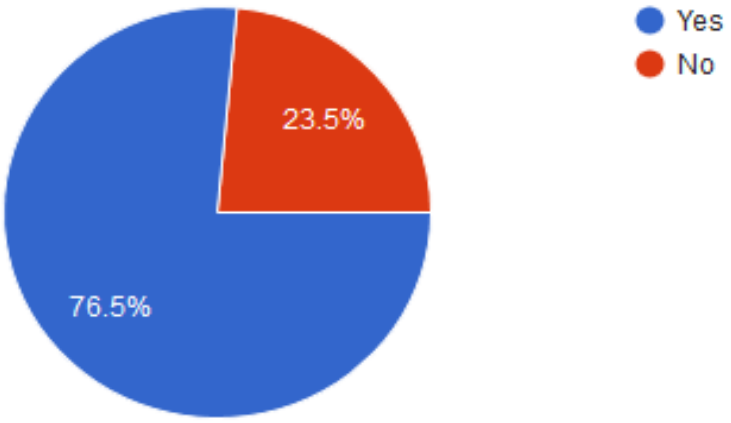


Figure3.1: The Owning of Internet at Students' Home.

The results showed that 76.5% of the students could access the net from their home. However, 23.5% of the students responded that they do not have internet at home.

Question 2: How many hours do you spend online?

This question is composed to obtain the time that the students of computer science spend online.

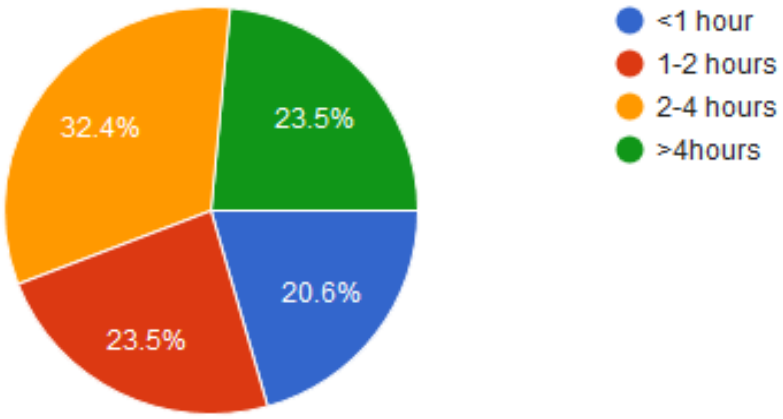


Figure 3.2: The Time Students Spend Online.

From this question, we discover that 23.5% spend more than 4 hours online. Hence, 32.4% assumed that they spend from 2 hours to 4 hours. On the other hand, 20.6% say that they spend less than one hour online. However, 23.5 % claimed that they spend from 1 hour to 2 hours. The majority affirmed that they took the time between 2 to 4 hours.

Question 3: What do you usually visit?

The current question is indicated to come across the most used websites.

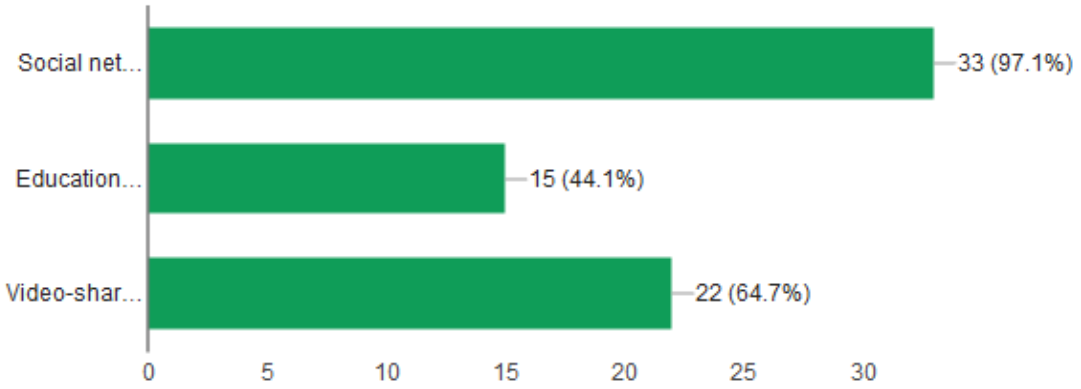


Figure 3.3: The Websites that the Students Visit while Connecting.

The outcomes of this question showed that the majority of the student visit social networks such as Facebook and twitter by 97.1%. The second percentage referred to video sharing websites. Whereas, the educational websites took only 44.1%.

Question 4: Have you been taught a computing course before entering the University of Laghouat?

The rational of this question is to elicit whether students are familiar with using computers before entering the university of Laghouat or not.

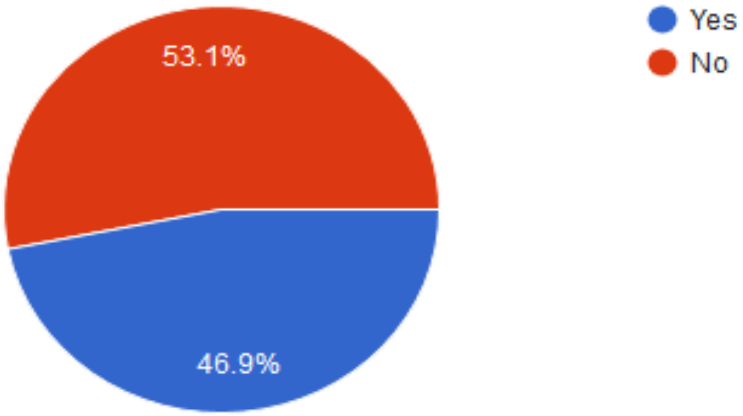


Figure 3.4: Students' Previous Experience of Computing.

The findings of this question reveal that more than the half of computer science students have experienced to use computers before entering university in which 53.1% of the students responded that they are familiar with using computers .Whereas ,49.9% of the students responded that they do not taught to use computer.

Question 5: Have you conducted an academic research or an expose with aid of computer or /and internet?

This question aims to investigate whether computer science students have used computers or/ and internet to conduct an academic research or expose or not.

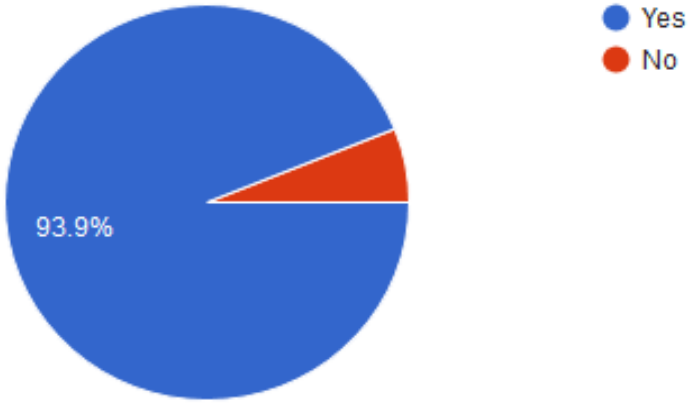


Figure 3.5: Students Usage of Internet and Computer Technology to Conduct a Research.

The majority of the students responded that they used computer or /and internet to conduct an academic research or expose by 93.9%. Whereas, only 5.1% responded that they did not.

Question 6: How do you find yourself towards handling computer technology?

This question aims to find out the students' command of computer technology.

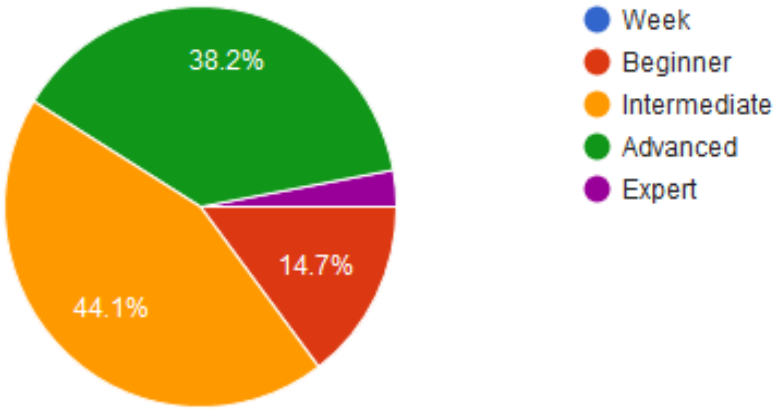


Figure3.6: Computer Sciences Students' Mastery of Computer Technology.

The findings of this question reveal that 3% of the students admit that they are expert at using computer technology. Hence, others claimed that they are advanced users by 38.2%. On the other hand, 14.7% of them consider themselves to be beginners. However, 44.1% of computer science students consider themselves as intermediate users.

Question 7: How often do you access internet from your department?

This question is designed to find out the frequency of accessing internet from department of computer science.

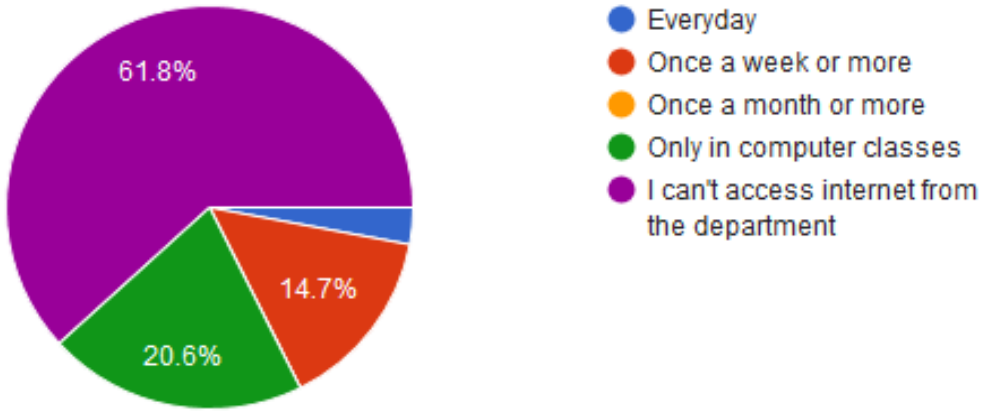


Figure 3.7: The Frequency of Accessing Internet from the Department.

The findings of this question reveal that the majority of the students cannot access internet from the department by 61.8% .while 20.6% responded that they could access internet only from the computer found in the classes. However, 14.7% of the student showed that they could access internet once a week or more. The rest claimed that they could access the internet everyday by 2.1%.

Question 7 : Will you accept the new e-learning platforms at your department in the future?

This question is designed to find out students acceptence of e-learning platforms at the department of computer science in the future.

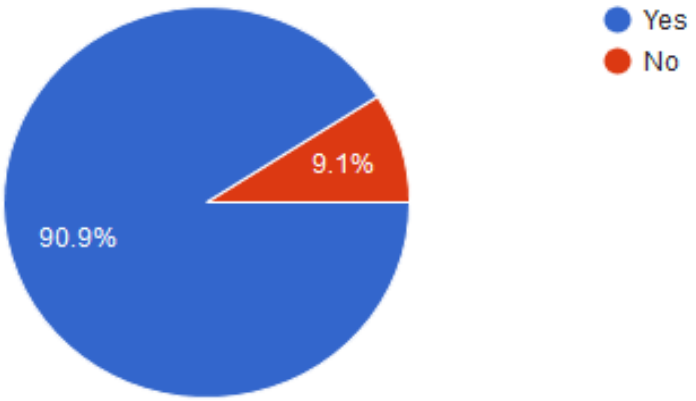


Figure 3.8: Students' Acceptance of the New E-learning Platforms.

Through the presented results, we can denote that 90.9% of the students accept the new e-learning platforms. However, only 9.1% of them rejected it.

Question 9: In terms of method preference what do you like?

This question seeks to reveal the preferred method of teaching for computer science students.

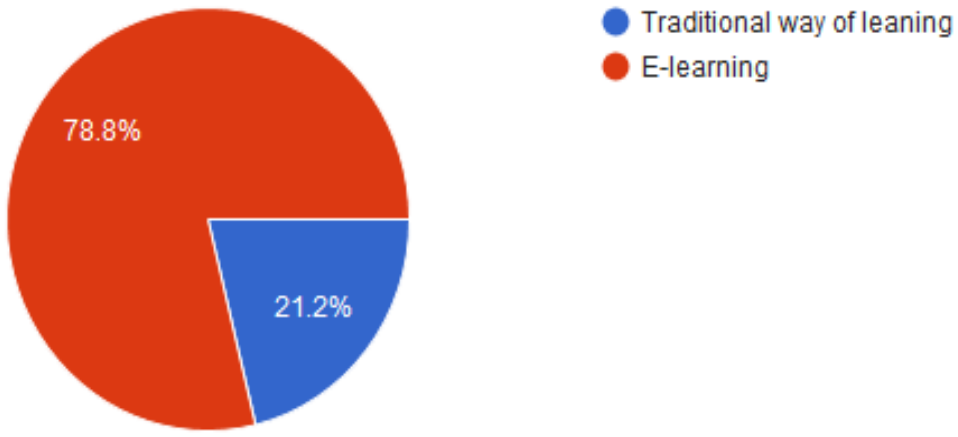


Figure 3.9: Traditional Learning vs. E-learning.

Accordingly, 78.8% approved that the preferred method is e-learning. On the other hand, the other students favored the traditional one by percentage of 21.2%.

C. Section Three: Obstacles of using ICT in teaching and learning.

Question 1: Obstacles of using ICT in teaching and learning: Is your university affected by a shortage or inadequacy in the following areas?

This question is composed to obtain the main obstacles students face while using ICT in teaching and learning.

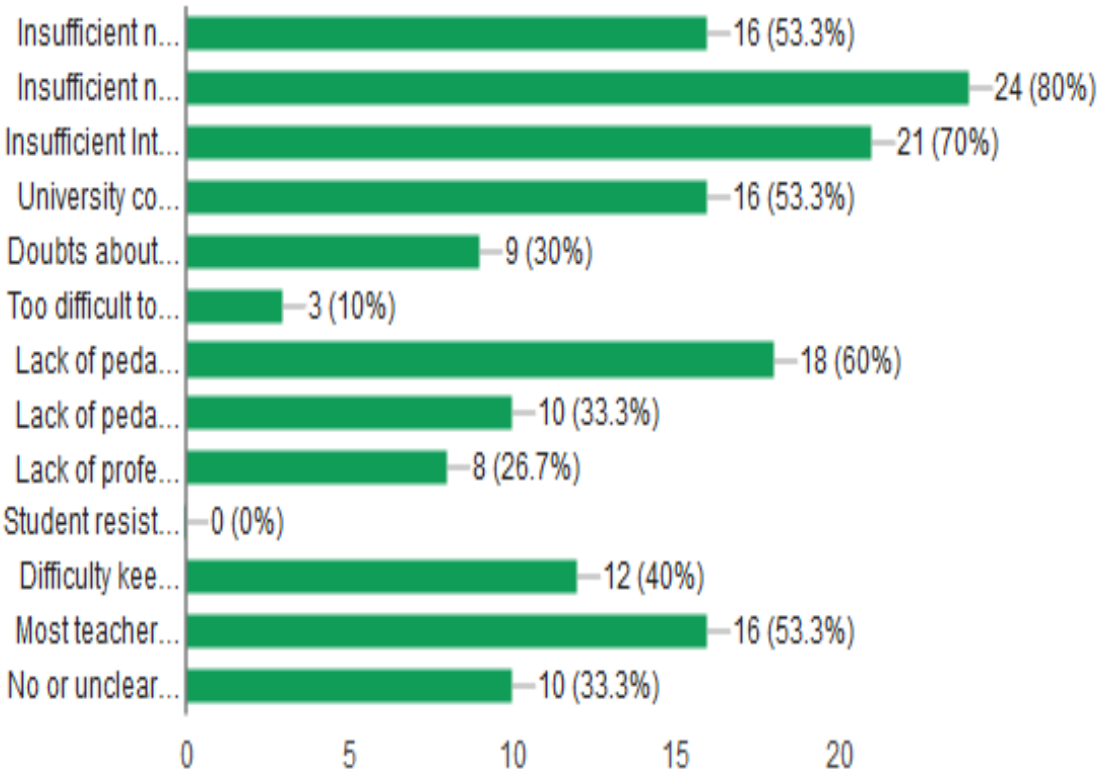


Figure 3.10: Obstacles of Using ICT in Teaching and Learning.

obstacles	Insufficient number of computers	Insufficient number of Internet-connected computers	Insufficient Internet band width or speed	University computers out of date and/or needing repair	Doubts about technology's usefulness in teaching your courses	Too difficult to integrate ICT use into the curriculum
%	53.3%	80%	70%	53.3%	30%	10%
obstacles	Lack of pedagogical models on how to use E-learning platforms	Student resistance to technology	Difficulty keeping up with changes in technology	Most teachers not in favor of the use of ICT at university	No or unclear benefit to use ICT and E-learning in teaching	
%	60%	0%	40%	53%	33.3%	

Table 3.4: Obstacles of Using ICT in Teaching and Learning.

As the results in the table above indicates that 80% of students declared that they have insufficient number of Internet- connected computers and 70% of them affirmed that they suffer from insufficient Internet speed. Moreover, 53% of the students said that the numbers of computers are not enough and there is a Lack of the pedagogical models on how to use e-learning platforms. Throughout this table, students show no resistance to technology.

III.3.2. Computer Science Teachers' Questionnaire

The aim of this questionnaire is to gather the desirable data to answer our research questions. We have selected the most important questions. The analyses of the questionnaire were undertaken by means of quantitative tools. The objective is to quantify the teachers' answers and represent it in statistical data, which are also summarized in figures and tables.

A. Section One: Background Information

This section indicates personal information of the participants of the study. The results are shown as follows:

a. Gender

The number of males is, apparently, near to that of females. We have to notice that 53.3% represents male participants. While, 46.7 considered to be the female participants.

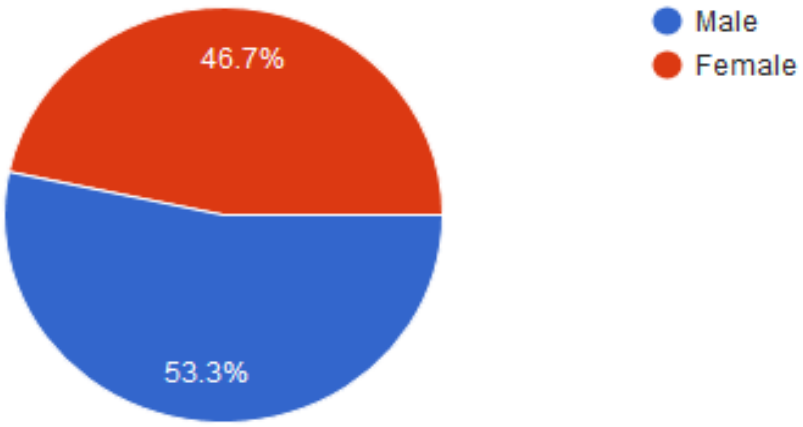


Figure3.11.Teachers gender

b. Degree

This question is designed for the sake of knowing the educational background of computer science technology.

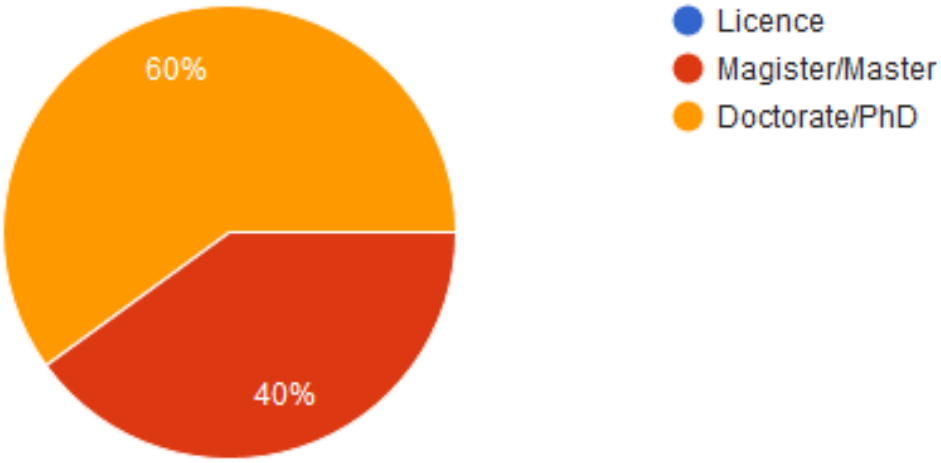


Figure3.12: Teachers Degree

Level	Licence	Magister / Master	Doctorate /PHD
%	O%	40%	60%

Table 3.5: Teachers' Degree

The results tabulated above summarizes the participants' educational background .the teachers participating in the study almost hold doctorate degree by 60%. On the other hand 40% has the Magister degree.

B. **Section Two:** The use ICT Information and Communication Technology in education

The questions of this section sought to investigate teachers' beliefs, attitudes, willingness and concerns with respect to computers in general and the usage of technology in teaching specifically.

Question1: Do you have internet at home?

This question is designed to know whether teachers have the internet at home or not.

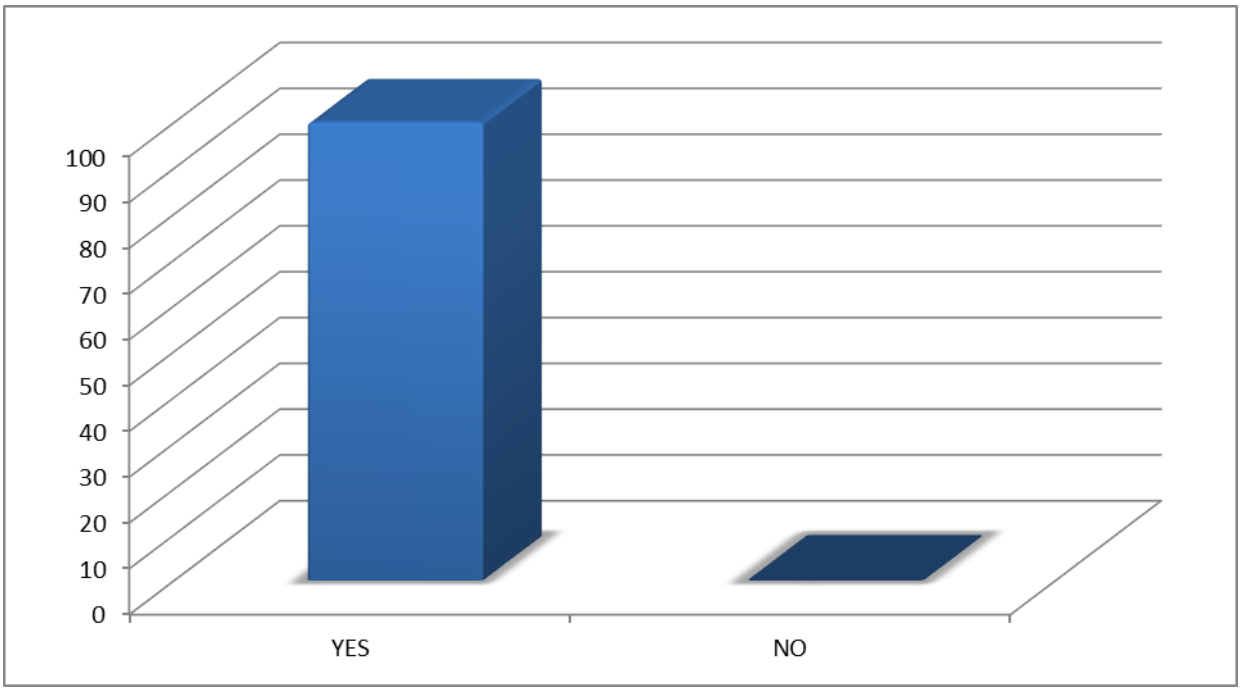


Figure3.13: The Owning of Internet at Teachers Home.

All teachers stated that they have the internet at home. This question has devised to examine the importance of the internet for the teachers. Thus, we can conclude that teachers are aware of the importance of the internet.

Question2: What do you usually visit?

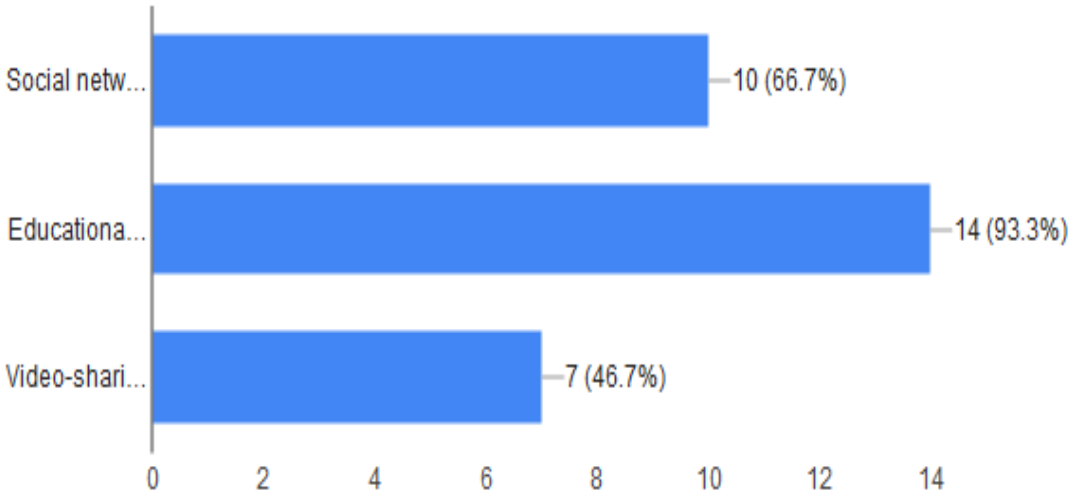


Figure 3.14: The Websites that the Teachers Visit While Connecting.

This question is designed to obtain the most visited websites to teachers. 93.3% of the teachers stated that they visit educational websites. On the other hand, the social media networks come in the second stage by 66.7%. However, video sharing websites took on 46.7% of the responses. In this vein, teachers are more interested in using internet for educational purposes than other purposes.

Question3: How often do you use a Laptop /PC with internet?

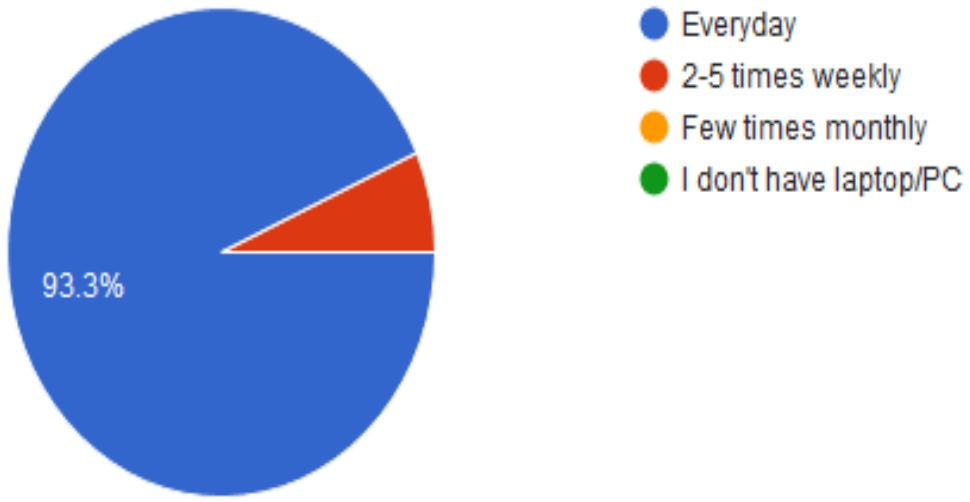


Figure3.15: The Amount of Time Teachers Spends on the Internet.

This question has focused on teachers' utilization of internet related to periods. In fact, teachers use the internet everyday by 93.3%, while others responded that they access the internet from 2 to 5 times a week. The amount of time allocated to the use of internet is important to teachers.

Question4: How often do you access internet from your department?

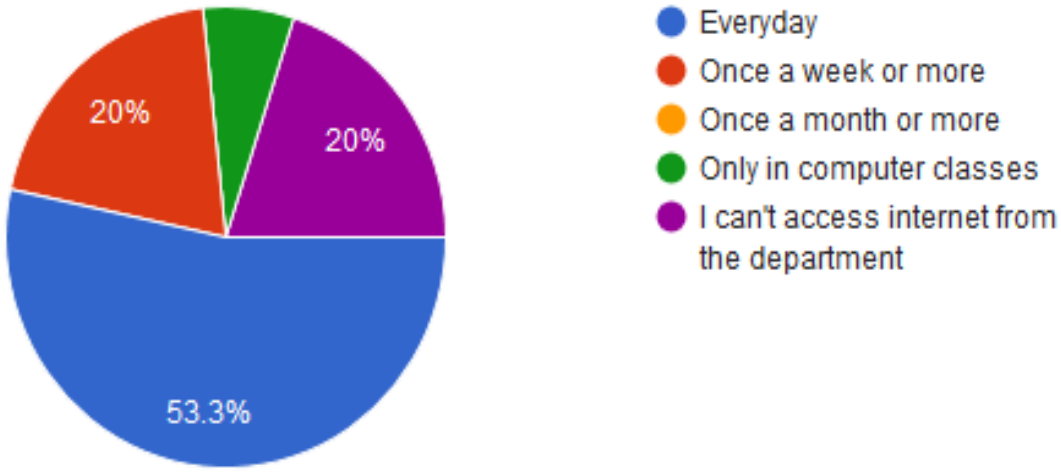


Figure3.16: Teachers' Frequency of Internet Use from the Department.

The question aimed at investigating the frequency of accessing internet from their department. The results showed that 53.3% of the teacher responded that they access the internet every day. While 20% mentioned that they could access internet once a week or more, equally, 20% teachers showed that they access once a month or more. On the other hand, only 6.7% claimed that they could access only in computer classes.

Question5: How do you describe your learners at the level of ICT mastery?

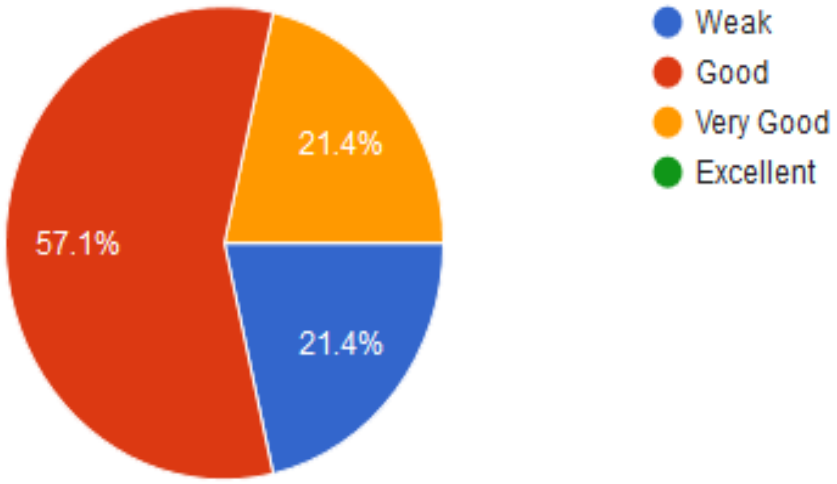


Figure3.17: Learners Mastery of ICT

Teachers here were asked to describe students at the level of the ICT mastery. Hence, 57.1% revealed that the level of their students is good. Yet, 21.4% claimed that the mastery of ICT considered to be very good. Moreover, 21.4% considered week at using ICT. We can conclude that the level of the students according to the evaluation of their teachers is intermediate.

Question6: Have you ever asked your students to prepare an expose or a research with computer technology?

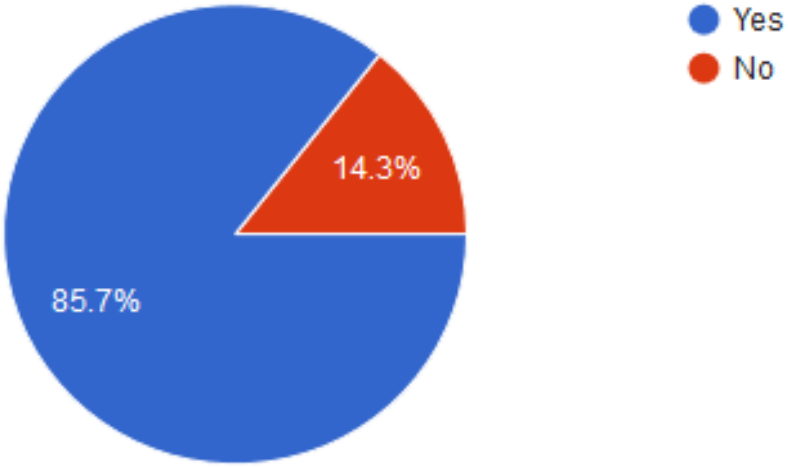


Figure3.18: Student Assignments Using Computer Technology.

This question is planned to know whether the assignments given by the teachers need computer technology or not. The majority of the teachers agreed upon the idea that they ask their students to prepare exposes and researches using computer technology by 85.7%. However, 14.3% stated that they did not.

Question7: Do you think computer technology would help you teaching efficiently?

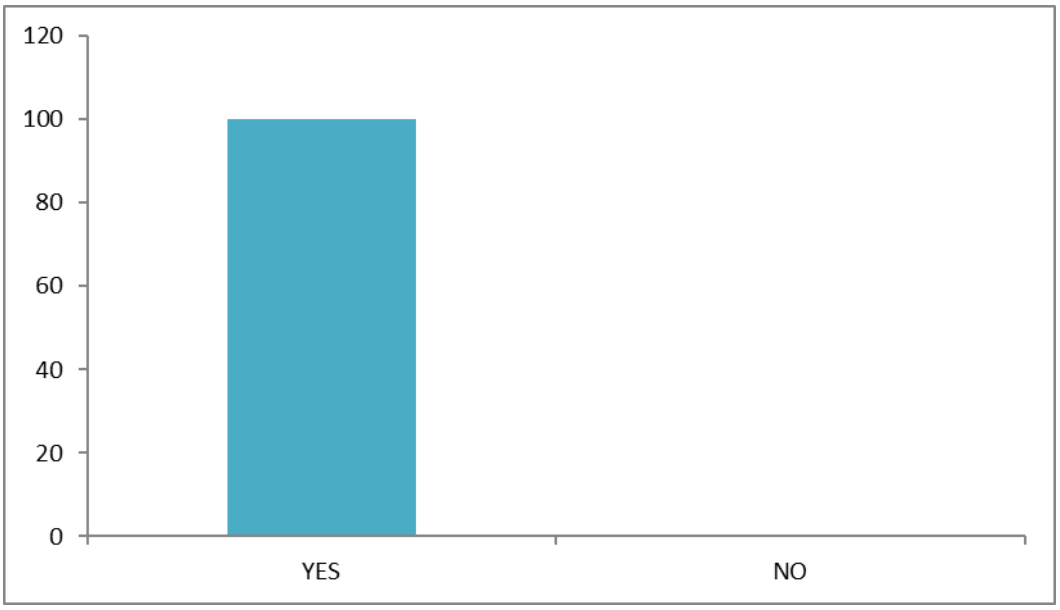


Figure3.19: The Role of Computer Technology in Making Teaching Efficient.

Teachers were asked about the role of computer technology whether it helps in making teaching efficient or not. 100% of the responses stated that they have benefited from computer technology in teaching .This revealed the idea that ICTs are basic means and have helped teachers to teach efficiently.

This question formed to examine whether teachers participated in an e-learning program or not. 53.3% of responses approved that they have participated in an e-learning program. The other teachers requested that they did not participated yet.

Question8: Does your department use e-learning?

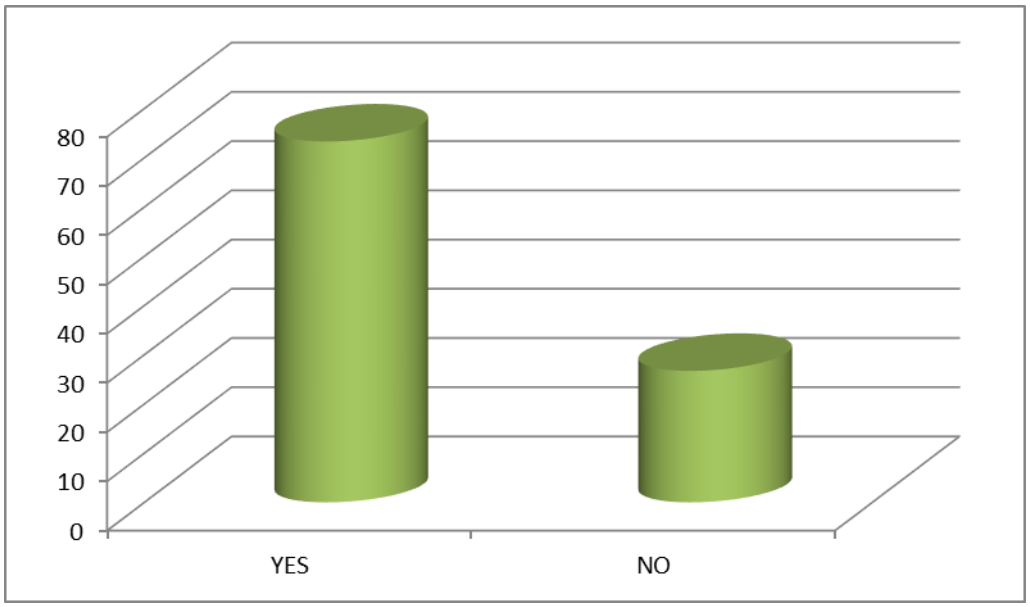


Figure3.20: The Use of E-learning at the Department of Computer Science.

Computer science teachers claimed that their department use e-learning by 73.3%. The others replied that it did not use e-learning by 26.7%. The results showed above affirmed that the department of computer science provides its teachers and students with e-learning system.

Question9: Will you accept the new e-learning platforms at your department in the future?

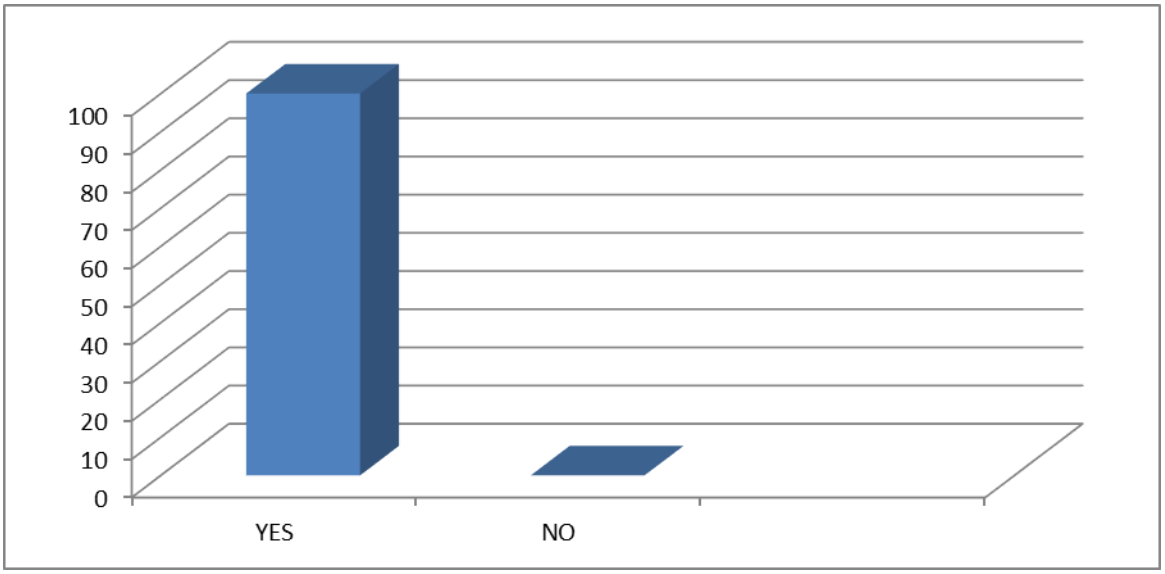


Figure3.21: The Acceptance of the New E-learning.

c. Section three: Obstacles of Using ICT in Teaching and Learning.

This question is designed to examine teachers acceptance of the new e-learning platforms the latter indicates that all the participants accept the new e-learning platforms.100% of the responses accept the new e-learning platforms.

Question10: Obstacles to use ICT in teaching and learning: is your university affected by a shortage or inadequacy in the following areas?

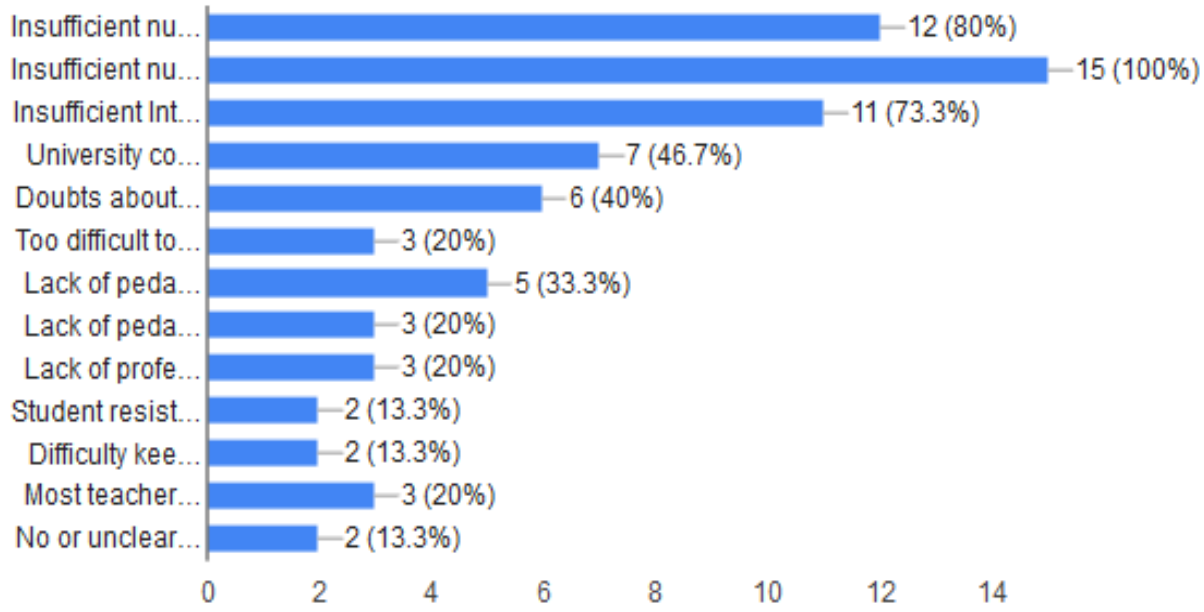


Figure.3.22: Obstacles of Using ICT in Teaching and Learning.

The outcomes in the bar-chart above designates that 100% of the teachers confirmed that they have insufficient number of Internet- connected computers and 80% of them affirmed that they suffer from insufficient Internet speed and insufficient member of computers. Moreover, around 40% of the teachers said that the university computers need repair and that there are set of doubts about technology's usefulness in teaching courses. The minimum percentages 13% represent students' opposition to technology, difficulty to keep up with changes in technology and unclear benefits to use e-learning in teaching.

III.4. Discussion of the Data

The present questionnaires are devoted to computer science students and teachers. The questionnaire aimed at investigating and answering the research questions and confirming or denying the research hypotheses.

III.4.1. Discussion of the Questionnaire Results

This part is devoted to the discussion of the findings of this research.

A. Discussion of the students' Questionnaire Results

The purpose of the questionnaire was to measure students' opinions and perceptions concerning the use, role and importance of ICT and e-learning. The data gathered from this questionnaire reveals that the majority of computer science students use ICT and e-learning. The results of the first question showed that the internet become an important tool in which most of them have the Internet at home.

Moreover, the data collected from the second and the fifth question displays the wide use of the internet among students. Students spend more than three hours in front of their technological devices doing different works. Relating the use of internet in their academic research and exposes more than 93% confirmed that they refer to the aid of internet and computers to do their academic works. In this vein, students seem more conscious about the importance of using internet and computers. According to the results of the third question the most used website is the social networks such as Facebook. Then, the educational websites comes in the second stage by 44.1%. Video-sharing websites comes in the third stage.

We come to the point that half of the students have experienced to use computers before entering university. In question five, the majority of the students responded that they used computers and internet in conducting an academic research or exposes this reveals the importance and the wide use of ICT in higher education. The level of the students considered to be intermediate according to their responses. Throughout the observation of the results of the seventh question, the majority of the students cannot access internet from the department of computer science. While, others can access only from the computers found in the classes. There is a wide acceptance among students of the new e-learning platforms. Computer science students prefer e-learning over traditional learning.

It is clear that even students face problems in using ICT in the process of teaching and learning. The question revealed that the students of computer science technology have technical problems and insufficient number of Internet- connected computers. Nearly half of the students relate the difficulty to the lack of pedagogical models on how to use ICT for learning and that most teachers are not in favor of the use of ICT at university. The most attractive point is that those students show no resistance towards technology.

B. **Discussion of the teachers' Questionnaire Results**

The present questionnaire aimed at examining and answering the research questions and approving or denying the research hypotheses. In this section, we are going to state down the main findings that found in the questionnaire .The questions of this section sought to investigate teachers' beliefs, attitudes, willingness and concerns with respect to computers in general and the usage of technology in teaching specifically.

a. **Section One:** Personal Information:

Q1: The stuff of conducting a research should be composed of both males and females. The number of males participants was near to the number of females.

Q2: In conducting a research, it is significant to involve the degree of the participants in the sense that the work becomes weightier and more reliable. Most teachers hold a Doctorate degree and the others Magister degree.

b. **Section Two:** The use ICT Information and Communication Technology in education.

Q1: Among all technological devices around the world, internet is the most useful one in all domains. This fact made it necessary to find the internet in all teachers' home.

Q2: Technology plays a great role in the field of education. Teachers are aware of this point in which they visit the educational websites more than the other websites.

Q3: The utilization the internet is becoming a major tool of communication. Teacher access the internet every day by 90%. This reveals the idea that internet is a significant tool for teachers and it took a huge amount of time.

Q4: In the department of Computer Science half of the teachers can use the internet from the department. However, the others showed that they can access only once a week or more.

Throughout this question we conclude that the department provides its teachers with the internet.

Q5: Teachers evaluation help in enhancing the learners level in all stages. This question exposes the evaluation of students in terms of ICT mastery. Through the observation of the results we can conclude that the level of students is intermediate.

Q6 and **Q7**: The majority of the teachers ask their students to conduct researches and exposes using internet and computer technology. As it is found the 7th question there is a total agreement upon the idea that the internet makes teaching more efficient.

Q8 and **Q9**: The eight question's results denote the complete acceptance of the new e-learning platforms. The other question indicates teachers' use of the new e-learning platforms among teachers of computer science. In which 73.3% of the responses affirmed there is an e-learning platforms.

This section represent the real status of using ICT and e-learning at the University of Laghouat. There is a high use of ICT and a low use of e-learning among students and teachers, as we mention in the first hypothesis the use might be high for ICT.

Concerning the third hypothesis, students and teachers accept new e-learning platforms in the department of computer science.

c. Section Three: Obstacles of Using ICT in Teaching and Learning.

Q10: As it is mentioned, the aim of this question is to list the common obstacles of using ICT among teachers. The bar-chart indicates that most teachers suffer from insufficient number of computers, insufficient number of Internet- connected computers and insufficient Internet speed. Moreover, the second three bars took from 46.7% to 33.3%, teachers relates the difficulties to another technical problem, which is university computers need, repair. In addition to personal barriers, which are doubts about technology's usefulness in teaching, their courses and most teachers not in favor of the use of ICT at university. Furthermore, other problems appeared in the pedagogical and in the curriculum sides in which it took 20% for each. The least percentages 13% represent students' resistance to technology, difficulty to keep up with changes in technology and unclear benefits to use e-learning in teaching. Thus,

we conclude that there are a set of barriers to use ICT in teaching and learning. Those difficulties arranged in three categories: technical, pedagogical and personal barriers.

As we mention in the second hypothesis, the challenges of integrating ICT and e-learning at the University of Laghouat are the insufficient number of computers, insufficient number of Internet- connected computers, technical problem, doubts about technology's usefulness, resistance to technology, and unclear benefits to use e-learning in teaching.

III.5.Conclusion

This chapter represents the core of study as it provides information about the participants of the study, tools of the study, and data analysis. It also reveals data analysis procedures and the findings of the study. Through the analysis of the questionnaire, we come to the following conclusions, the wide use of ICT among teachers and students. Indeed, teachers proved the efficiency of using technology in teaching. It is an essential part of the academic and educational processes. Despite the opportunities of educational technology there are set of obstacles that come along the process of teaching and learning. The results of the questionnaire show that teachers and students are aware of the importance of ICT in higher education.

GENERAL CONCLUSION

General conclusion

This study was conducted in order to provide a brief literature to teachers and learners about the significance of ICT and e-learning in relation to the field of learning process. The main purpose of this study is to investigate the use and the integration of ICT and e-learning in higher education.

This research work is divided into two main parts. The first part concentrated on providing enough information about the two variables: ICT, E-learning and Higher Education. The second one is mainly devoted to the fieldwork in order to approve or disprove the hypothesis. The theoretical part of this research includes two chapters. The first one is mainly directed to the theoretical study of the Algerian Higher Education, in addition to the new trends of technology; ICT and E-learning; under this title we identify the key concepts concerning ICT and E-learning. The second chapter concentrated mainly on the use and the integration of the two technologies in higher education, thus, the main opportunities and challenges that face the integration of educational technologies in higher education. The last one is devoted to prove or reject the general hypothesis: ICT and E-learning are very beneficial tools for the learning process in higher education. This part itself is divided into two sections: the first one is about the research methodology followed in this research study, which includes two questionnaires. The second section exposed the discussion and interpretations of the results obtained.

The research was conducted in the Computer Science Department at Laghouat University. We have chosen students and teachers from different levels as our population. A questionnaire directed to the sample of the research that included the students and the teachers. It is designed for the sake of obtaining insights about their attitudes using ICT and E-learning especially in the computer science department. Thus, we have decided to distribute online questionnaires through the net.

The findings revealed that the computer science learners and teachers have the tendency of integrating e-learning in their learning process. The vast majority of learners and teachers strongly agree with the idea of the importance of using ICTs as tools for learning.

The analysis of data provides us with the following findings:

- We have found that the use of technology in teaching and learning is widespread.
- The importance of ICT and E-learning is growing up.
- Traditional learning goes hand in hand with E-learning.
- To use ICT and to integrate E-learning, there must be a support from the pedagogical models.
- To successfully integrate new technologies, there must be a cooperation between teachers, learners and pedagogy.

To conclude, this research has lead us to assert that the implementation of ICT and e-learning has a significant effect in improving students and teachers' level. Therefore, these findings go hand in hand with the main hypotheses that were put forward to the study. The findings of the research expose that ICT and E-learning are beneficial tools for the learning process, in addition to the opportunities and the challenges that face the use and the integration of technology. This research helps the teachers and learners to be more aware of using ICT and E-learning in learning, and to be ready for the adoption of new technologies in education. Each individual teacher and learner needs to understand how we can take advantage of these wonderful opportunities for learning.

Recommendations

- Encourage teachers to be mentors, tutors, and guides of the students' learning process to promote cooperative and collaborative learning guide on the side.
- Establish partnerships and collaboration between Laghouat University and the other universities of the developed world, to bridge the gap of the digital divide.
- Training for teachers of Laghouat University to develop their knowledge and skills in learning environement.
- Put the link of the virtuel university space of e-learning in the interface of the Laghouat University website.
- Providing the university with much more computers connected to the internet with large bandwidth.
- Finally, it is high time to integrate MooC courses in learning as a supplement to Moodle in order to benefit from its wonderful opportunities.

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APPENDIX