BARRIERS TO INTEGRATING INFORMATION TECHNOLOGY IN LIBYAN HIGHER EDUCATION

BY

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ABSTRACT

This study investigated the perspectives of Libyan faculty use of information technology and possible barriers that might influence the adoption of educational technology at Benghazi University. Analyses of self-report survey data from 183 Benghazi faculty showed that the overall level of faculty knowledge of information technology was moderate (M=2.55) using a 4-point technology experience scale (4=high experience). The faculty's use of information technology was low (M=1.19) on a 5-point usage scale (5=high use). Ratings of the policy barriers indicated that Benghazi faculty would benefit from additional university access to information technology and more professional development in integration strategies (M=2.26) on a 5-point support scale (5=strong support). Benghazi faculty members had positive attitudes and highly value the integration of technology (M=4.00) on a 5-point attitude scale (5= highly positive attitude). Males (M=2.02) reported a higher use information technology than Females (M=1.84), t(181)=2.00, p=.047. Females (M=2.16) also reported that there were more barriers to the use of educational technology than males (M=2.41) t(181)=2.75, p=.007. The difference between male and females opinions regarding infrastructure resources was not significant.

Results indicate that while Benghazi faculty feel that they are moderately prepared in the use of information technology they will appreciate greater access to information technology and more professional opportunities in integrating technology into their teaching. The study also indicated that female faculty have less experience and saw more usage barriers than male faculty. Additional university access to information technology and professional development, targeting both males and females, should significantly benefit Benghazi faculty and may positively impact their students who will be competing in a global information economy.

DEDICATION

I would like to dedicate this work:

To my beloved Beautiful homeland Libya with all my wishes to be successful and developed country.

To my gorgeous family: father, mother, brothers, sisters, nephews, nieces, and especially to my genuine husband Mohamed and my wonderful children Fatima and Libya, to my truthful friend Ebtisam Alqahtani with all my love and my wishes for all of them to be happy and healthy.

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In the name of Allah, the Most Gracious and the Most Merciful Alhamdulillah, all praises to Allah for the strengths and His blessing in completing this work.

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Special thanks to the distinguished faculty members who served on my committee: Professors Ronald Aust (chair), Branham Richard, Bruce Frey, Suzanne Rice, Robert Isaacson and Young-Jin Lee. As my advisor Dr. Aust, his sage advice, insightful criticisms, and patient encouragement aided the writing of this work in innumerable ways.

I must express my very profound gratitude to my husband who supported me throughout my journey– patiently assisting with words of assurance.

To all my friends, thank you for your understanding and encouragement in my many, many moments of crisis. Your friendship makes my life a wonderful experience. I cannot list all the names here, but you are always on my mind.

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CHAPTER 1: INTRODUCTION

In almost every contemporary educational setting, there is some degree of integration between the classroom curriculum and technology. Studies showing the positive benefits of technology, including computers, smart tablets, projectors, and so forth, on student learning are overwhelming in number. In addition to the benefits technology has for student learning and classroom experience, it enables students to access a wide variety of resources they would otherwise not be able to access. Technology can be used as a powerful educational tool that can facilitate learning in students by providing great visuals and enhancing their imaginations.

Technology integration is defined as using technology seamlessly to support and extend curriculum objectives and to increase students' engagement in the learning process. Therefore, technology is used to enrich activities and provide students with new ways to demonstrate their understanding (Dias, 1999).

One very tangible benefit to students, resulting from the application of information technology within schools, is student independence. The ability to work independently, at one's own rate, allows students often to exceed expectations; specifically in their level of learning in mathematics and writing (Boysen, 1994).

When technology integration is done effectively, technology has a positive impact on student learning. It can: (a) increase student motivation for learning, (b) improve communication of learning goals, (c) facilitate higher-order thinking skills, (d) build valuable skills that students will use in college and in the workplace, and (e) expand students' understanding from novice to mastery (Melville, n.d.)

Teachers also benefit from the application of information technology in education. Those who are knowledgeable about information technology can communicate and collaborate with

their peers in real time; enabling each other by sharing instructional units across computer networks. Technically knowledgeable teachers simplify record keeping and recall of diagnostic information, streamlining their jobs with reference to student attendance, grades, and other data on the computer. These benefits enable teachers knowledgeable in information technology to focus more on in-class instruction (Boysen, 1994). The development of the computer and the emergence of the Internet created a revolution in education, which has resulted in an extensive use of this technology by both learners and instructors (Ess, 2009). With the importance of technology in education, technology integration has been greatly emphasized in teacher training and professional development. (Lawless & Pellegrino, 2007)

Integrating information technology is very important in the field of education, specifically in higher education. The use of information technology may lead to the accomplishment of many educational goals within a short period of time by enabling qualitative improvements in teaching and learning. "The importance of information technology in today's world cannot be denied, and educators are aware that information technology is already an important force in modem education. Technology is found in schools everywhere, represented by different tools and instruments" (Al-Alwani, 2005,2).

Interactive games develop skills and stimulate the intensity to learn because they provide immediate feedback through participation, giving students control of their learning ability, repeated practice challenges, motivation, communication and teamwork (Barnett et al., 2005; Lyons & Milton, 2002; Lyons, 2012). "Almost all the possibilities of face-to-face teaching can be replicated by technology" (Lyons, 2012, p. 1).

In fact, the use of technology tools, such as word processors and multimedia presentation managers, help students improve communication skills and assume responsibility for the quality

of their products of learning. True, all of this could be done without technology, but if the tools are there and are undeniably used in the world outside of school, why wouldn't teachers and students want to use them? The answer to that question is fairly simple.

For the most part, it is the fact that, at the present time, many educators are themselves not properly trained and instructed in the integration of technology information, which is essential for a classroom format. This is a valuable tool for an educator/teacher to accept, adapt, and facilitate the integration process for themselves in order to expand the level of learning, comprehension, and productivity. (Sun et al, 2000)

If the educators are not equipped with proper information, how can anyone expect the information being transferred to the students to be administered successfully to the learner? It is of foremost importance that the educators doing the teaching be taught properly and efficiently for a productive learning experience for those being taught. (Sun et al, 2000)

Twenty years ago it was said that computers were the key to the future; the future is now and in active motion. If the Libyan educational system does not remain active and in motion, Libya's future as a people will become stagnant.

Wright (2014) in his article "5 Key Barriers to Educational Technology Adoption in the Developing World" stated that:

> Educational technology will continue to be implemented incrementally in many parts of the developing world. More rapid uptake and success are unlikely to occur unless five items are addressed – power, Internet connectivity and bandwidth, quality teacher training, respect and better pay for teachers, and the sustainability of implementations. (para,1)

Libya Overview

Libya has the fastest growing rate of literacy in the Arab world; as shown in the United Nation's Human Development Index. This is how the standard of living is ranked, including social security, health care management, and other important factors for development.

Regarding educational progress, the Libyan Government has plans to put a reform into action for developing an information technology infrastructure in Libya and expanding information technology into education as the main components in its overall development plans. Libya intended to take leadership on the African continent by sponsoring major initiatives and projects, which include the countries surrounding Libya, such as Chad, Niger, and Rwanda. Problems face a society that does not have the necessary skilled teachers of information technology. This is a challenge for the current reform process in Libya (Hamdy, 2007; Rhema & Miliszewska, 2010).

Libya's Profile

Libya is located in North Africa, and it is one of the largest countries by area in Africa. Libya has long borders on the Mediterranean Sea where the majority of the population live. The Sahara Desert covers a large portion of the country. Until the Libyan revolution that took place in 2011, the Libyan state was drawing revenues from 100 million USD dollars a day from the oil and gas industries. Although it was investing large sums in the economy and in the sectors of education and health, unfortunately it was not productive. The new generation was not being properly prepared for the demands of the labor market in a globalized world. In Libya's training institutions, skills that were in high demand in the private sector were being developed and transferred on a rudimentary basis only (Braun & Jones, 2013).Table 1 shows Libyan socioeconomic information.

Table 1

Socioeconomic Information about Libya

Population	6.647 million
Languages	Arabic
Religions	Muslim 97%; others 3%
Population growth rate	2.064% (2011 est.)
Literacy	Male: 92.4%, Female: 72% Total population: 82.6% (2003 est.)
Labor force	1.729 million (2010 est.)
Unemployment rate	30%(2004 est.)
GDP* per capita (US dollars for Libya)	$ 15,161.44(2014 est.)
GDP (US dollars for Libya)	$ 106.112 Billion (2014 est.)

* The Gross Domestic Product (GDP)
Source: http://www.economywatch.com/economic-statistics/year/2014/

Educational System in Libya

Education in Libya is free for everyone from the elementary school level to the university and post-graduate studies level. The first (basic) nine years of education are compulsory and include six years primary school and three years intermediate school (Clark, 2004; Hamdy, 2007). Students then proceed to one of two secondary education choices:

1. *Specialized high schools*, which take three years and are the preparation for entering a university or higher learning educational institution/higher vocational training center. The specializations cover life science, engineering, economics, basic science, social science and languages.
2. *Intermediate vocational centers*, which average three years training. Those who graduate from this type of program are skilled laborers and can enter the mainstream market. Universities and higher vocational centers give tertiary education in Libya. The labors

are mainly dropout students during all educational levels and from the students that graduate basic, secondary education and specialty education. (Braun & Jones, 2013). Figure 1 shows an overview of Libyan education.

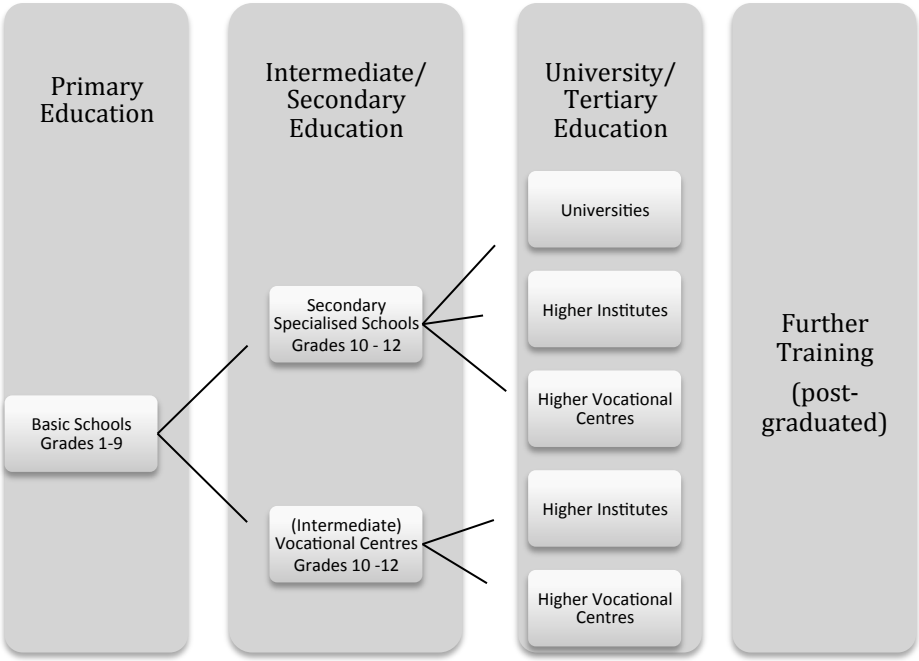

Figure 1: Overview of the Libyan Education System. **Source: (**Braun & Jones,2013, p. 76).

A Brief History of the Libyan Educational System

The Libyan government has emphasized the significance of education. In the beginning, during the 1970s, specialty-training programs that developed an individual's progress were expanded. However, by the 1980s, there still was a shortage of teachers who were qualified to educate the growing population of students in Libya. Furthermore, there was low enrolment in specialized training. Recently, these ongoing problems are beginning to be readdressed. Since 1980, the New Educational Structure has guided the format in Libyan education. Putting the importance on early specialization, this format allows students, under certain expectations, to

enroll in technical or vocational programs that develop skills that are efficient for them and the labor market. This has helped encourage a continual expansion in the number of vocational and technical centers. The number is seemingly lower than the expected growth in enrolment in vocational programs as of the present time. A higher degree of importance is placed by society on traditional theoretical and academic learning. The most detrimental decision was made when the English language was removed from the Libyan code of curriculum in the 1980s. This has recently been reintroduced, but when it was removed it left an entire generation of Libyans without the very much-needed international communication skills (The Report, 2008; Braun & Jones, 2013).

Higher Education in Libya

Libya became independent in 1951, and the first university, the Libyan University, was established in Benghazi, which has recently become known as Benghazi University. The School of Arts and Education was the name given to the first School in the university. In 1957, the School of Science was established in Tripoli. The School of Economics and Commerce was also founded in 1957, and a few years later, in 1962, the School of Agriculture followed it by the School of Law and, in 1966. In 1967, the Libyan University saw the opportunity for expanding, including both the Facility of Higher Technical Studies and the Higher Teachers Training College.

In 1970, the School of Medicine was founded. The Islamic University in Albayda was also founded in 1970 and then incorporated by the Libyan University under the name of the School of Arabic Language and Islamic Studies. In 1972, the facility for Oil and Mining Engineering was founded and then relocated in the late 1970s to the Brega Oil Terminal Complex.

In 1973, the Libyan University was split into two independent universities, the Universities of Tripoli and Benghazi. These were later renamed as the University of El-Fateh in Tripoli and the Garyunis University in Benghazi respectively (Libya–Education, 2009).

Due to the growing number of students who have enrolled in higher education since 1981, the university system was revised and numerous public universities were put in place (El-Hawat, 2003). Right now, there are 18 public universities that consist of 148 specialized faculties and more than 500 specialized scientific departments.

Studies at the university level are divided into three stages Bachelor's, Master's, and Doctorate:

1. First stage: The Bachelor's degree is achieved after four to five years of university study (five years in Architecture and Engineering). This consists of universities and higher Education institutes.
2. Second stage: The Master's degree is achieved after two years of study following a Bachelor's Degree. Primarily large universities, such as Benghazi and Tripoli, offer these.
3. Third stage: The Doctoral degree may be awarded after two more years of research in fields like Arabic, Islamic studies and Humanities, and it is required to submit a thesis upon completion of the study. Students are often sent abroad to pursue doctoral degrees (Clark, 2004).

Higher education institutes offer a vast vocational and technical education that consists of three to five years in the fields of Electricity, Mechanical Engineering, Finance, Computer Studies, Industrial Technology, Social Work, Medical Technology and Civil Aviation. The Higher Technician Diploma is awarded after three years. After four or five years, a Bachelor's degree is awarded. Once their studies are complete, the graduates work on development

projects. Libyan authorities in the 1990s invited the private sector to participate in the education system of the nation. More than 1,000 primary and secondary schools and institutions have been established. They also created more than 30 private universities that provide education in all disciplines (Rhema & Miliszewska, 2010). Figure 2 shows a map of higher education institutions in Libya.

Universities in Libya

Libya has around 2.7 million students; and the number of university students has multiplied to 300,000 or more, with an additional 90,000 attending higher technical and vocational programs. During 1975-1980, the number of universities increased from two to nine. The number of higher vocational and technical institutes stands at 84.

The responsibility in all aspects of education in Libya lies with the Libyan Ministry of Education. The Ministry and the local education committees share the responsibility that controls all the education programs within their area. The Ministry oversees all the committees and the Libyan Higher Education Department assists in the operations of all the universities in Libya.

There are 18 government universities in Libya. Benghazi University and Tripoli University are the biggest and the oldest, and the number of their students is around 115,000 and 60,000, respectively.

There are 264 government-funded higher education institutes and universities that provide education in different fields, such as administration, technology, creative art, and teacher development. Also, another eight institutes for petroleum training and qualifying institutes are dedicated to the training and education of personnel for the oil industry. Five of these institutions are located in the capital and main cities, and three of them operate in regional

locations (Rhema & Miliszewska, 2010).

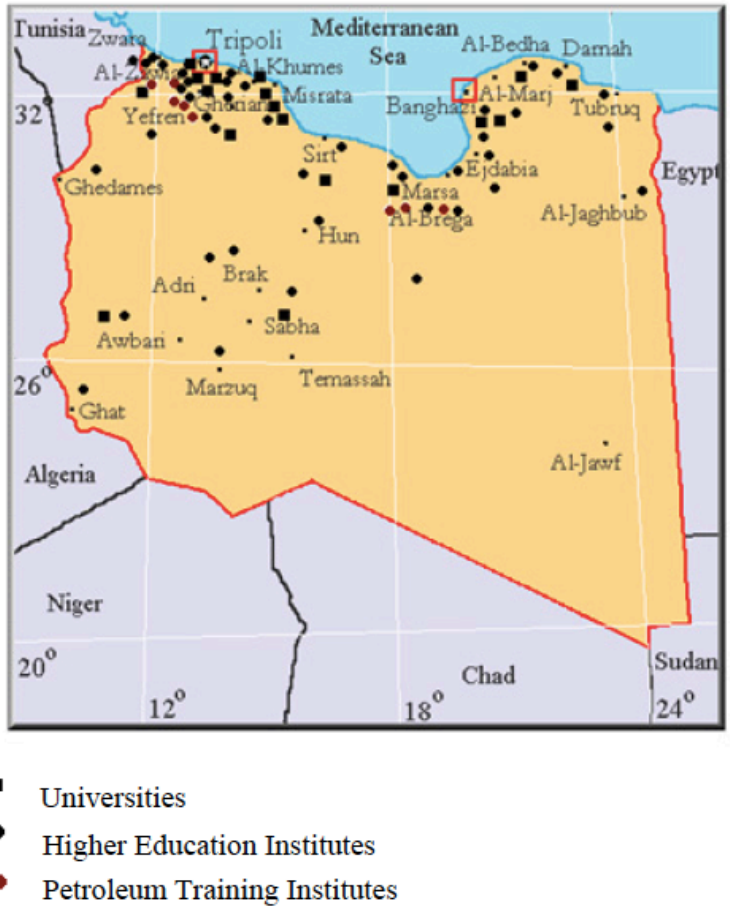

Figure 2: Institutions of Higher education in Libya. **Source**: (Rhema & Miliszewska, 2010,p 426)

Benghazi University

Benghazi University was established in 1955. It has been developing and expanding, with the result that it has become a town including a large number of schools as well as facilities. It has several campuses and scientific institutes inside and outside of Benghazi city. Benghazi University offers PhD and Master's degrees in some programs and offers bachelor's degree programs in all its 23 schools, 13 of them in Benghazi city, which are: School of Economics,

School of Law, School of Science, School of Information Technology, School of Education, School of Engineering, School of Arts, School of Media, School of Medicine, School of Nursing, School of Pharmacy, School of Dentistry, and School of Public Health. The rest of Benghazi Schools are in other cities: Agriculture in Solouq city, Education in Elmarj city, Education in Gamens city, Arts and Science in Elwahat city, Arts and Science in Elkufrah city, Arts and Science in Ajdabia city, Arts and Science in Alabear city, Arts and Science in Elmarj city, Engineering in Economics city, and Economics in Ajdabia city (University of Benghazi, 2014).

Unfortunately, integrating technology into the curriculum in Benghazi University has been very slow. As a traditional university, it still uses the traditional style of education, which is based on face-to-face interactions, in and outside of the classroom, between students and teachers, and learning activities that are only available on campus. There is no Internet available for teachers and students in Libyan classrooms, no online classes or activities, and very limited use of multimedia presentations. (Braun & Jones, 2013).

Information Technology in Libya

Information technology knowledge, renewal, and application has become a powerful driving force for maintaining competitiveness and economic development. Today's world is characterized by intensified international competition and technological change, and the key to development is an educated workforce producing knowledge-intensive goods, adding high-value to its production. The workforce has to be employed in enterprises that have the capacity for innovation to sell updated products with technology in domestic and global markets. Modern economies are knowledge-driven, and education is the main source of knowledge creation. The task is clear: the educational system has to deliver the new competencies, skills and expertise necessary to exceed in a competitive global environment (Braun & Jones, 2013).

Sadly, Libya has been absent from the scene and has not capitalized on the enormous business opportunities that can be gained by the deployment of a country-wide Internet infrastructure to benefit its citizens. The Libyan government (1969-2011) was struggling with the idea of giving freedom to its citizens and giving them unfettered access to information. True, there were many websites that promoted government views and many opposing views. However, there did not appear to be a strategy of IT deployment within the Libyan society. In fact, Libya is one of a handful of countries in the entire world that has no public Internet infrastructure; not even all components of its Domain Name (LY) have been claimed. In a recent study by the Reporters Sans Frontiers, Libya has been declared as one of 20 countries that are enemies of the Internet (The Tech Wiz, n.d.).

Reports from other sources also offer perspective on Libya's slow adoption of an Internet infrastructure. According to Internet World Stats (2014), 1,362,604 Libyans used the Internet as of 2014, which is about 0.5 % of Africa's total population of Internet users. This is a very small number in comparison to the rest of the world and shows a hesitance on Libya's part to grasp the technology that the global community is welcoming with open arms.

Libyan higher learning institutions continue to face many obstacles during the introduction process of IT learning and teaching. The challenges that are met consist of: (a) the language and cultural background of both teachers and students, (b) their understanding and attitudes towards learning, (c) the lack of technological infrastructure and the high cost of educational technologies, (d) the lack of local experience in educational development, and (e) the lack of educational equipment for management to support the new learning process (Hamdy, 2007).

Universities, such as Tripoli University, Benghazi University, and Academy of Postgraduate Studies and Economic Research, have the basic IT infrastructure (such as computers, Internet access, and a local area network). However, they are still using the "traditional" way of learning and teaching, which is based on interactions in and outside of the classroom between students and teachers, and learning activities that are only available for the students while on campus (Braun & Jones, 2013).

In 2005, Libya started to cooperate with UNESCO on programs for education and development. "National IT Project for IT Building" project activities include the establishment of Local Area Networks for all schools associated with multiple university campuses and institutes. An important part of the project is the way the teachers are being trained (digital literacy, basic IT skills, higher learning program training using IT's teaching and hardware development) and staff (system administrators, media center specialists, etc.). The project's expectation of a national IT resource center for educators and the advancement of the university's management system is through ITs (e.g., student information systems, university procedure financial operations, etc.).

Some public-access Internet facilities are available to the public. Plans are in progress to increase this service. This includes provision of IT infrastructure and tools, plans to use Internet connection for development, information and help with IT skills on a bigger scale in the whole community, such as health, education, culture, and technology. General Postal and Telecommunication Companies provide digital leased-line services.

Libyan national IT policy for education intends to provide access to IT tools and build a strong infrastructure. IT encourages research and development to secure proper learning materials, methods, and media to build a strong community capable of competing in the

worldwide forum. One of the main goals of the national IT policy for education is human resource development. The investment in human resources is the main component for achieving the goals and objectives of the national IT method. UNDP and UNESCO work together with Libyan government agencies to guarantee proper and timely introduction of the IT strategy. This support also opens the door for the surrounding community and encourages investment in Libya. Libya also has faced a number of constraints and challenges, especially during the embargo (which ended in 2006). Therefore, the implementation of the information and communications technology (ICT) policy is still at an early stage, as is access to IT tools. The implementation of the national ICT policy and the development projects in different domains still lag behind. In addition, there is an acute shortage of ICT qualified and trained teachers, who are needed to bring ICT into classrooms and educate a new generation of technically qualified students (Hamdy, 2007).

The advancement directed toward the deployment of learning in Libya is motivated by the country's desire further to develop and improve its higher education system. So, lately Libya is working hard to provide all Libyan universities with technological infrastructure as soon as possible. There also have been major developments in the use of the new technologies in education. Libya introduced an electronic system for submitting specialized secondary education examinations in 2008 (The General People's Committee of Education, 2008).

According to Linvill (2012), "In the more immediate future, support is needed to implement the latest technology. Student registration software and library database software are basic technologies often taken for granted in western institutions, but needed urgently in Libya". (para,3)

The Need for the Study

Despite all technology has to offer students, teachers, and classrooms, some educational systems have yet to adopt and integrate technology into their classrooms. Such is the case with Benghazi University in Libya, where the implementation efforts to integrate educational technology are still in an early stage because the previous Libyan government had no successful plans or strategies to integrate technology into its educational system and access to information was very limited. To date, integrating technology into Libyan educational practices is still a slow and complex process, even after the Libyan revolution. Libyan schools and universities still use the traditional style of education, which is based on face-to-face interactions between teachers and students. The researcher believes that there are prevalent barriers to successful integration of technology in Libya, including technological infrastructure, organizational support, teacher attitudes, and technology skills.

This study looked at various pieces of literature, which examined both why technology integration in Libya has been so slow and the benefits of technology integration into classrooms. Moreover, a study was carried out via a survey to measure the frequency of use of information technology tools in classrooms and investigate what faculty members perceive to be barriers to their attempts to integrate information technology into their teaching.

Purpose of the Study

The purpose of this study was to determine the current level of integration of information technology and explore the barriers that might prevent the effective implementation of integrating information technology into Libyan higher education from the perspectives of faculty members at Benghazi University. The integration of information technology and faculty members' perspectives about the barriers were measured by a survey.

Research Questions

1. To what extent do faculty members at Benghazi University know about information technology?
2. To what extent do faculty members at Benghazi University use information technology in their teaching?
3. What are the main barriers that might prevent the effective implementation of integrating information technology into Libyan higher education from the perspective of faculty members at Benghazi University?
4. Is there a difference between male and female faculty members at Benghazi University in regard to:
   a. Their knowledge of information technology?
   b. Their use of information technology?
   c. The barriers they encountered?
5. Are the selected demographic variables of faculty members (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer lab availability, technology skills level, technology professional development, computer location, computer use, Internet access in school, and the knowledge of information technology) related to the use of information technology in their teaching?

Hypotheses of the Study

1. Faculty members at Benghazi University have a weak knowledge about information technology.

2. Faculty members at Benghazi University have a limited use of information technology in their teaching.
3. There are barriers that might prevent the effective implementation of integrating information technology in Libyan higher education from faculty members' perspective at Benghazi University.
4. There is a significant difference between male and female faculty members at Benghazi University in:
   a. Their knowledge of information technology.
   b. Their use of information technology.
   c. The barriers they encountered.
5. There is a relationship between the selected demographic variables of faculty members (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer lab availability, technology skills level, technology professional development, computer location, computer use, Internet access in school, and the knowledge of information technology) related to the use of information technology in their teaching.

Significance of the Study

The study derived its importance from the following matters:

- Focus on integrating information technology as an important step in the process of educational development that Libyan higher education seeks to achieve.
- Highlights that, despite all the unlimited benefits that technology can offer in the education field, integrating technology into Libyan educational practices is still a slow and complex process.

- This study revealed that not nearly enough research has been done to discover the underlying reasons why IT adoption in Benghazi, Libya has been so slow and the environmental factors that may also be contributing to this.
- Detecting, through this study, the contribution of the variables (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer lab availability, technology skills level, technology professional development, computer location, computer use, Internet access in school, and the knowledge of information technology) in raising the use of technology in teaching.
- This study can help faculty members determine whether or not they are ready to integrate technology in their teaching.
- The results of this study would be useful to modify, develop, and adopt new methods of teaching training and preparation programs in Libya.
- The results of this study provide a variety of information that can benefit the relevant decision makers by considering the barriers that might prevent the effective implementation of integrating information technology in Libyan higher education.

Definitions of Terms

Barriers: Obstacles that prevent or delay instructional innovation or factors that prevent instructors from integrating technology into their teaching methods (Alaugab, 2007).

Faculty member: An educator who works at a college or university (Faculty Member, 2013).

Higher Education: Education beyond the secondary level, especially education provided by a college or university (Higher Education, 2013).

Information Technology: A broad term with varying components to define it. It is known as computational devices used for general purposes application software, and operating environments (National Research Council [NRC], 1999)

Technology Integration: Using technology seamlessly to support and extend curriculum objectives and to increase students' engagement in the learning process (Dias, 1999).

Chapter Summary

Chapter 1 was an introduction to the current study that was designed to investigate the current level of integration of information technology and explore the barriers that might prevent the effective implementation of integrating information technology in Libyan higher education from faculty members' perspective at Benghazi University. This chapter presented the significance of the study and the need for it. Research questions with hypotheses were also described in detail. An overview about Libyan education was provided as were the definitions of the terms used in the study.

CHAPTER 2: REVIEW OF THE LITERATURE

Introduction

Technology has strongly changed the level of higher education with access to all worldwide. It is the new phenomenon that is spreading the ability to learn and grow, although technology has a long history of serving education. Print has been seen as an important source of knowledge. Print facilitated the accumulation of knowledge by making discoveries more widely known, as well as by making it more difficult for information to be lost (Briggs & Burke, 2009).

Silent commercial films entered American culture in the late 1890s and 1900s. Films for classrooms were produced in the first decade of the last century. The first school use of motion pictures was in 1910. Early textbooks on the use of motion pictures furthered the influence of film, as did film-oriented college courses for teachers, which appeared in the 1920s (Cuban, 1986).

Radio and television also have been used to deliver knowledge and support learning. Many educational programs are broadcast through these mediums and reach millions of people (Briggs & Burke, 2009). Radio and television have also been used in the United States to broadcast educational programs since 1950. The initial goal of these programs was to solve the problem of a shortage of teachers and school facilities (Johnson, 2003). Computers serve as a "valuable and well-functioning instructional tool" (Becker, 2000, p. 29).

In the landmark report, *A Nation at Risk*, recommendations were made for the consideration of educational computing as an absolute necessary basic skill if American children were to compete in the worldwide spectrum. Since then, studies have also been conducted to ascertain the impact of computers on education in a larger capacity (Rogers, P. L., 2000).

Defining Information Technology

Information Technology is neither easily defined nor applied. The nature of technology information in its natural form is dynamic. This is seen in literature that offers definitions as to its application and development in numerous fields of work and education. To educators, the term information technology refers to introducing the application of computer equipment and devices (Zakaria 2001; Roblyer, 1997).

Information technology is a wide spectrum with various components that define it. It includes computational devices that are used for general purposes, application software, and operating environments (National Research Council,1999).

Information technology is a term that is applied in relation to computer hardware and software, input and output devices, visual display devices, communication networks, and communication hardware and software (Davis & Naumann, 1997; Al-Oteawi, 2000).

Al-Oteawi (2002) illustrated the importance of understanding and communicating that information technology includes both computer and technology communication. The technical bridge that has been built between digital technology and the earlier analog communication and broadcasting systems has huge implications for both teaching and content within schools and for the numerous amount of learners.

Educators use a vast variety of terms that refer to work and information communicated electronically, for example, media, multimedia, electronic wireless phones, tablets, technology, information, technical information, and so forth. The demand for access to higher education around the clock and from any location, has influenced how information technology has been used to cater to teaching, learning and service (Katz, 1999). There was a time that information technology was only accessible to specialists who were in control of all the information

technology. In today's society, everyone has taken responsibility for its impact, understanding that no individual or department directly controls it (McClure, 2003).

Information technology has become the strongest focal point in every aspect of higher education. The demand for information technology has increased faster than anyone in academia or society could have ever imagined.

The Integration of Information Technology

Integrating technology information into education has opened a vast spectrum for a lot of ideas to improve both learning and the teaching process for society as a whole, by the means of electronic devices such as computers, tablets, and smart phones. Access to the worldwide Internet has made it easier for corporations, higher education, government agencies, entertainment, social, and consumer agencies to gather needed technical information. (Sun et al., 2000).

Integrating information technology is very important in the field of education, specifically in higher education. The use of information technology may lead to the accomplishment of many educational goals by enabling qualitative improvements in teaching and learning in a short period of time. "The importance of information technology in today's world cannot be denied, and educators are aware that information technology is already an important force in modem education. Technology is found in schools everywhere, represented by different tools and instruments" (Al-Alwani, 2005, 2).

When educators realized that, by integrating technical information into the education process, students would be more adapted to learning, the teachers were eager to learn in order to teach. The educators would, thus, be able to teach and apply the use of technology information integration to any educational curriculum (Sandholts, Ringstaff & Dwyer, 1997).

As teachers moved through the different stages of the integrating technology information process and introduce it to the students, they found it hard to believe how they had been able to teach without it. Information technology will provide the students with the ability for critical thinking, problem solving, and learning and developing creativity skills. The Apple Classrooms of Tomorrow (ACOT) it was defined as a new method; the use of technology by students as well as teachers, enabling enhancing teaching and learning to support the following existing curricular goals and objectives:

1. Communicate effectively about complex processes.
2. Use technology routinely and appropriately.
3. Become independent learners and self-starters.
4. Know their areas of expertise and share that expertise spontaneously.
5. Work well collaboratively.
6. Develop a positive orientation towards the future (Sun et al., 2000).

The integration of information technology, like any other form of productive change in the status quo, requires a period of adaptation for the person and or people involved. How long a period? That depends on the productivity of the individual. As for educators, they have to wrestle with the problem of successful adaptation. It is useful in many cases to consider information technology as an instrument of change for the betterment of the whole. Many different viewpoints have been discussed about what factors contribute to successful and unsuccessful outcomes (Alwani, 2005). Again, this depends on the individual and his or her willingness to learn new ways of receiving and applying useful information.

Al-Oteawi (2002) pointed out the importance of inclusion in successful technology integration. He underlined the fact that a well-developed program of staff development is critical

to achieving successful implementation of computer use in the classroom. He strongly emphasized that everyone must be involved in technology integration: teachers, principals, administrators, students, supervisors, and parents.

Zakaria (2001) focused on the amount of time it would take to integrate technology. Based on Rogers' (1995) finding, that 25 years was the most likely time span required to integrate technology, Zakaria confirmed that "a considerable time lag was required for the widespread adoption of new educational ideas" (p. 64). ACOT studies revealed that teachers go through stages as they learn to infuse technology into teaching and learning (Sandholtz, Ringstaff, & Dwyer, 1997). Table 2 shows stages of technology integration.

Table 2

Stages of Technology Integration

Stage	**Example of What Teachers Do**
Entry	Learn the basics of using the new technology.
Adoption	Use new technology to support traditional instruction.
Adaptation	Integrate new technology into traditional classroom practice. Here they often focus on increased student productivity and engagement by using word processors, spreadsheets and graphics tools.
Appropriation	Focus on cooperative, project-based, and interdisciplinary work, incorporating the technology as needed and as one of many tools.
Invention	Discover new uses for technology tools (for example, developing spreadsheet macros for teaching algebra or designing projects that combine multiple technologies.

Source: *Adapted from Sun, J. (2000). Planning into practice resources for planning, implementing, and integrating instructional technology. Durham, NC: SEIR*TEC, WestEd, Southwest Educational Development Laboratory (SEDL), and SERVE, p. 56*

Integrating technology is more than just teaching basic computer skills and introducing software programs into the classroom without having a separate computer class. Technology

integration must happen throughout the educational system in ways that enhance the learning process. In depth, it is essential to encourage four main components of learning: (a) active engagement, (b) participation in groups, (c) frequent interaction and feedback, and (d) connection to real-world experts. Effective technology integration is achieved when the use of technology is routine and transparent and when technology supports curricular goals (Edutopia, 2008).

Activity is the key that opens the door between teachers and students who are Learner-centered and interactive. A teacher's role in an educational environment is to be the fact teller and collaborator as well as a learner of new educational tools. On the other hand, the student is not only the listener and learner but also a co-collaborator and sometimes expert. Integration of technology information is the fastest way to communicate valuable lesson plans and student participation.

Benefits of Technology Integration

The development of the computer and the emergence of the Internet created a revolution in education, which has resulted in an extensive use of this technology by both learners and instructors (Ess, 2009). New communication technologies provide learners with the tools and the space to create and share knowledge. Digital media production tools and social network sites are examples of the tools that learners can use to create and share knowledge (Ito et al., 2010).

There are numerous resources online that provide each individual classroom with more information, diverse cultural, and up to date current learning materials than any other source available today. The Internet brings expert information to students in the real world and opens

countless opportunities for the student to express and understand the new era of learning through images, sound, and text (Edutopia, 2008).

Students are not limited to schools or their teachers to get information or resources because the knowledge has become more accessible on the Internet. Search engines, social networks, and many other resources are available online for people to learn and share knowledge with others. Online communities have developed that students can join in order to produce and receive knowledge; these members usually share the same interests (Chayko, 2008).

Integrating technology in daily teaching has been recommended by many researchers in order to promote students' learning and to meet their interests. Information technology will provide the students with the ability for critical thinking, problem solving, and learning and developing creativity skills.

Technology also offers a new way for teachers to teach, providing educators with effective ways to reach different types of learners and understand student potential through multiple means. Technology brings new change to the relationship between teacher and student. When technology is properly integrated into the diverse subject areas, teachers not only teach but they also become part of a new learning experience as role models and advisers, eager to share expert advice and coach the student along. Technology changes teaching and learning into a far more meaningful and fun way to challenge the students' learning potential (Edutopia, 2008).

Technology uses hands-on communication, collaboration, information access, and expression. Common information-technology tools, such as spreadsheets and databases, allow the rapid and flexible manipulation of information, enabling students (and teachers) to analyze data and to form insights from a number of different perspectives and in sync with an individual's own particular pattern of mind.

The following is an explanation for the dominant theories that support the benefits of using technology in education. Generative theory of multimedia explains how people learn from multimedia presentations. It states that people learn better when the word and the picture are presented contiguously, and learners engage in active learning when the narration is aligned with them (Mayer & Anderson, 1992). Dual-coding theory that states human recall and recognition are enhanced when nonverbal information is accompanied by verbal information. The converse of this theory is that the recognition and recall of information will be weakened if only one medium of input is utilized (Paivio, 1986). Constructivist learning theory refers to the idea that learning can happen most effectively when people are also active in making tangible objects in the real world (Peter, 2006).

Fortunately, there are a number of research studies (Alaugab, 2007; Davis & Naumann,1997; Lawless & Pellegrino,2007; Mayer & Anderson,1992; Papert, 2004) that give evidence that effective teaching and learning with technology can improve student outcomes. For example, The **National Educational Technology Standards (NETS)** set a standard of excellence and best practices in learning, teaching, and leading with technology in education. The benefits of using the **NETS** include improving higher-order thinking skills, such as problem solving, critical thinking, and creativity; preparing students for their future in a competitive global job market; designing student-centered, project-based, and online learning environments; guiding systemic change in our schools to create digital places of learning; and inspiring digital age professional models for working, collaborating, and decision making. (NETS, 2012) Education leaders agree that all new teachers must graduate from teacher education programs with the knowledge and skills that will allow them to integrate technology easily and effectively into their daily teaching (Fulton et al., 2004).

Adoption of Information Technology

Rogers (2003) stated that learning by the adoption of technology information is equivalent to learning by doing. The adoption of new innovation is an active process that involves constant change. This is a new way of introducing challenges to teachers so that they, in turn, may teach the students using innovative techniques designed to reach a broader spectrum of student, allowing them to learn up to date information technology. It is necessary to make it very clear to staff how and when to use it, and to give them some freedom to adopt it in their own way. This pattern of support leads to broad-based diffusion. Teachers who learn it, like it, and apply it because they identify using technology as part of their own personal development. Rogers saw the adoption of an innovation such as technology as a social process. Building on the idea that change is a social process, he pointed to the role of "change agents." These agents are generally respected opinion leaders in the early adopters category who are technically proficient. Their role is to provide social influence to encourage others in the group to accept new ideas or technology.

Diffusion of Innovation Theory

It is important to review the literature on the diffusion of innovations because it shows how an innovation, such as information technology, is adopted by a social system. As well as when studying barriers to integrating information technology into higher education, this includes the participation and attitudes of faculty members towards adoption of information technology. Swanson (1994) defined an innovation as "an idea or behavior that is new to the organization adopting it" (p. 1070).

According to Sahin (2006), Medlin (2001) and Parisot (1995) agreed with him that argued that "Rogers' diffusion of innovations theory is the most appropriate and adequate for investigating the adoption of technology in higher education and all educational environments"(p.14).

Surry and Farquhar (1997), in their article "Diffusion Theory and Instructional Technology," openly discussed why certain changes in technology that are made are not widely accepted by many. They also explained that disciplines ranging from agriculture to marketing have used diffusion theory. Their discussion is based on how instructional technologists are using the theory of innovation diffusion with the expectation that it will increase the implementation and utilization of innovative instructional products and customs.

Surry (1997) gave three extra reasons for the importance of examining diffusion of innovation theory in the educational technology field:

1. For the most part, instructional technologists do not fully comprehend the reason why an innovation is a success or a failure. Frequently, Surry noted, in technology adoption the factors for failures are such things as resistant teachers, bureaucratic administrators, misinformed training or lack of funds.
2. Technology innovations present radical changes in the process of instruction, and innovation theory is the best way to prepare the social group for the innovation.
3. These studies may lead to a systematic model of innovation diffusion in educational technology related to the systematic models that set the format in the field of instructional design (Page, 2000).

Rogers (1962) synthesized a book, *The Diffusion of Innovations*, from over 508 diffusion studies and produced a theory for the adoption of innovations among individuals and organizations.

Rogers (2003) simplified his book and said, "An innovation is an idea, practice, or project that is perceived as new by an individual or another unit of adoption" (p. 12). He stated that many innovations required a lengthy period of many years from the time when they become available to the time when they are widely adopted (p. 1). Diffusion is defined as the process by which an innovation is communicated through certain channels over time among the members of a social system (p. 5). In simple words, there are four main factors that influence adoption of an innovation. These include (a) the innovation itself, (b) the vast and various forms of channeling that are used to spread the information about the innovation, (c) time, and (d) the nature of the society to which it is being introduced (see Table 3 and Figure 3).

Rogers's (2003) theory focused on four different aspects of the innovation process: (a) the innovation decision process, (b) individual innovativeness, (c) rate of adoption, and (d) perceived attributes:

1. *Innovation decision process*. This process includes five stages: (a) knowledge, (b) persuasion, (c) decision, (d) implementation, and (e) confirmation. According to this theory, a decision-maker starts with learning about the innovation, proceeds to the formation of an attitude that generates innovation, decides to adopt or reject, applies the innovation, and confirms the decision (see Figure 4).
2. *Individual innovativeness*. Individuals who are predisposed to being innovative are more likely to adapt to an innovation faster than those who are not predisposed. This theory is based on a bell shaped distribution curve (see Figure 5) amongst the adopters, ranging from

the innovators (2.5%), are the fast adopters (13.5%), the majority of early adopters (34%), the less likely to adopt (34%), and those who are expected to adopt and do not (16%). Rogers (2003) noted that being slow in the process is not a negative state of being, but a connotation of those people who are very late, or those who will never adopt an innovation.

3. *Rate of Adoption*. This theory states that innovations are diffused over a period of time in a way that represents an s-shaped curve (see Figure 6). On the other hand, this theory stipulates that an innovation goes through a process of stages, ranging from slow to gradual growth that will give way to a dramatic and quick growth. Nevertheless this part of the growth slows down, stabilizes, and, as time goes on, stops.

4. *Perceived Attributes*. Rogers's theory holds that some adopters judge an innovation based on their thoughts consisting of five attributes of the innovation: (a) Simplicity: can it be easily explained to others; (b)Trialability: can it be tried on a limited basis before adoption; (c) Observability: does it provide visible results to others, so that they can see how it works; (d) Relative Advantage: does it have an advantage over other innovation; and (e) Compatibility: is the innovation compatible with the existing practices, values, and needs.

Malan (1987) saw the process of discussion over an innovation as a important part of the adoption process. Creating social conversation over the different parts of the innovation is necessary in explaining a group's method and differences about the issue. Bichelmeyer (1991) pointed out that the "factors that affect technology use among teachers are rooted in much more fundamental human concerns and needs" (p. 293). Lundvall (1992) also wrote that the innovations are "ubiquitous phenomenon," gradual and important aspects. In

explaining models of financial innovations, Lundvall noted that in innovation theory, the different parts of the invention, innovation, and diffusion become unclear.

Table 3

The Four Main Elements in the Diffusion of Innovations

	Descriptions
The Innovation	An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. Therefore, if an idea seems new to the individual, it is an innovation. However, newness in an innovation need not just involve new knowledge because someone may have known about an innovation for some time but not yet developed a favorable or unfavorable attitude toward it, nor have adopted or rejected it.
Communication	Communication is the process by which participants create and share *Channels* of information with one another in order to reach a mutual understanding. Diffusion is a particular type of communication in which the message content that is exchanged is connected with a new idea. A communication channel is the means by which messages get from one individual to another.
Time	The time dimension is involved in diffusion in 1. The innovation decision process by which an individual passes from first knowledge of an innovation through its adoption or rejection. 2. The innovativeness of an individual or other unit of adoption compared with other members of a system. 3. An innovation's rate of adoption within a system usually measured as the number of members of the system who adopt the innovation in a given time period.
A Social System	A social system is a set of inter-related units are are engaged in joint problem solving to accomplish a common goal. The members or units of a social system may be individuals, informal groups, organizations, and/or subsystems.

Source: Adapted from (Moukale , 2012, p. 9)

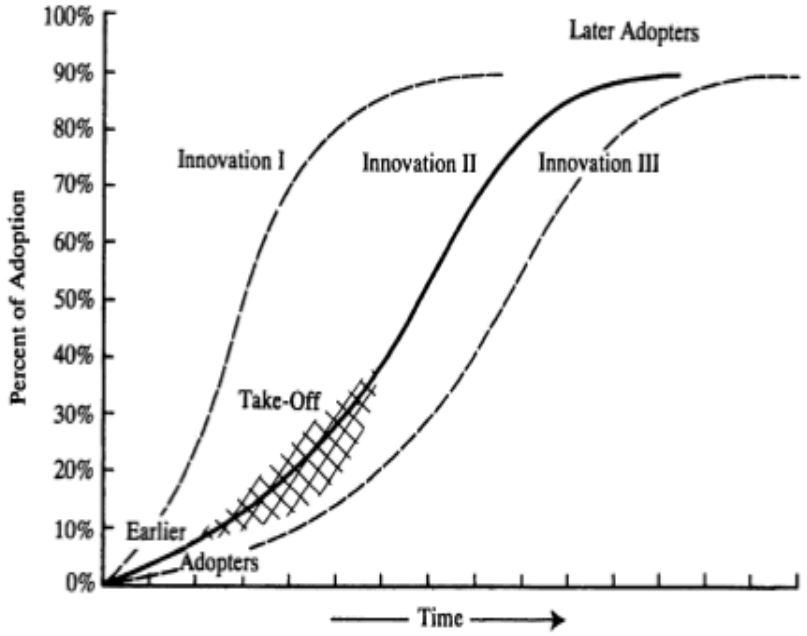

Figure 3: The Diffusion Process: Diffusion is the process by which (1) an Innovation is (2) Communicated through certain Channels (3) Over time (4) among the members of a Social System. **Source:** Adapted from (Rogers, 2003, p. 11).

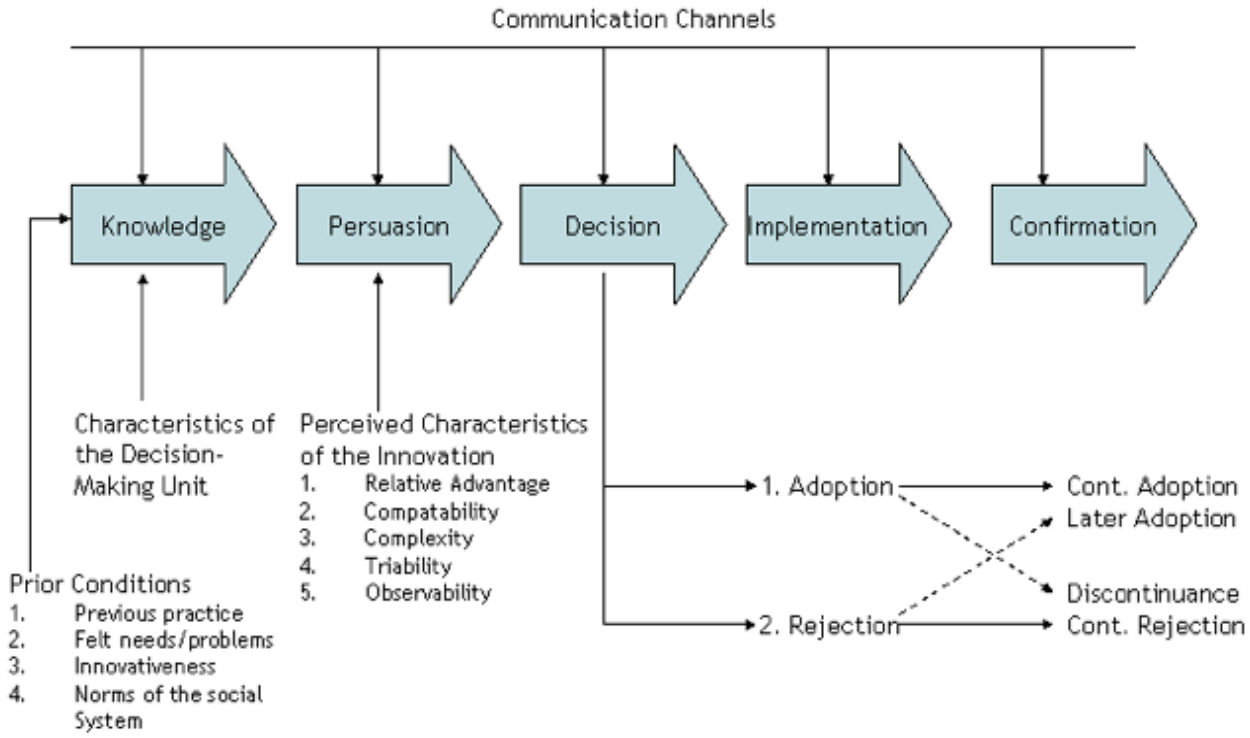

Figure 4. A Model of Five Stages in the Innovation-Decision Process. **The stages of the innovation-adoption process include: knowledge, persuasion, decision, implementation, and confirmation. Source:** Adapted from (Rogers, 2003, p.170).

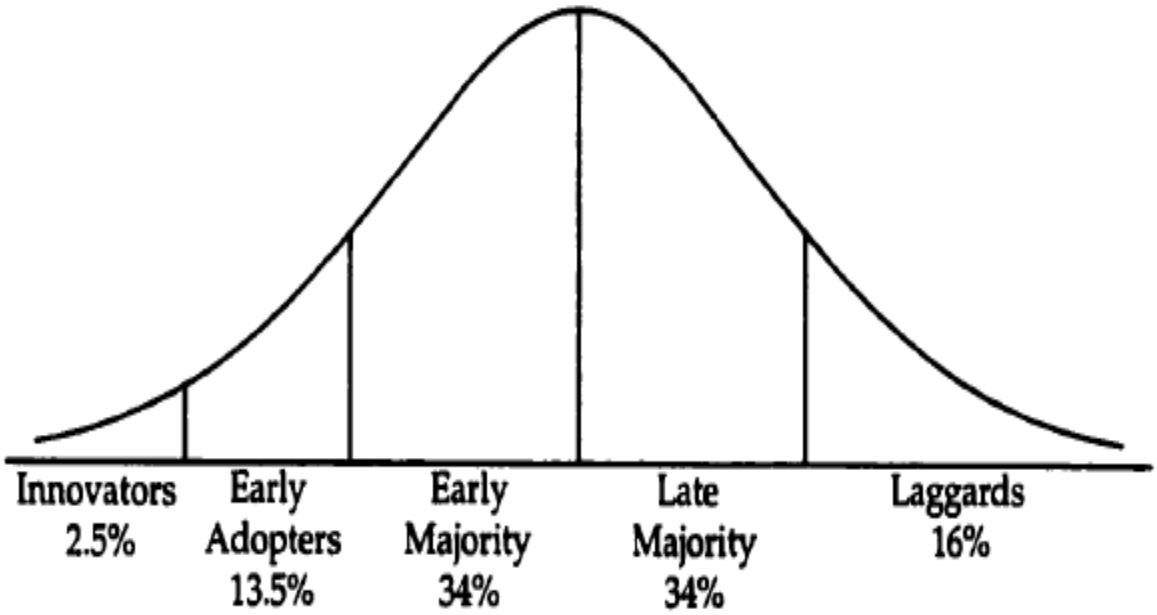

Figure 5: Individual innovativeness **Source:** Adapted from (Rogers, 2003, p. 281).

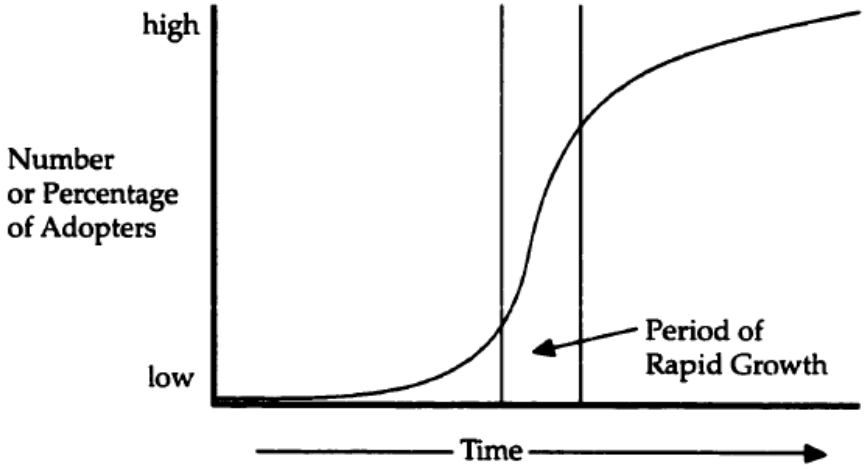

Figure 6: Rate of adoption. **Source:** Adapted from (Page, 2000, p. 63)

Barriers to Technology Integration

A vision without a task is only a dream.
A task without a vision is mere drudgery.
A vision with a task can change the world.
Attributed to Black Elk

Technology is part of almost every aspect in an individual's life. Some schools still try to explore the possibilities that technology gives for learning and teaching. When integrated correctly, technology helps the students gain the skills they need to survive and succeed in a very diverse and complicated world and technological knowledge-based economy (Edutopia,2008).

Teachers may think that technology will help them reach a professional and/or personal job more efficiently; they are skeptical about using the same tools in the classroom for different reasons, including the lack of much needed knowledge (Lawless & Pellegrino, 2007), low self-efficacy, and existing belief systems (Ertmer, 2005). The teachers are hesitant to adopt educational and/or instructional innovations (Ponticell, 2003). This is true for technology innovations because, unlike education changes (e.g., Everyday Math), which happen only sometimes, technology tools and resources are changing frequently (Straub, 2009; Ertmer, 2010).

Even though the circumstances for successful technology integration are in place, including ready access to technology, training for teachers, and a positive policy for the environment, use is still very low on a higher level of technology. This could be because barriers, specifically addressed to the teachers' minor changes, may be in action. The researchers who came before saw the impression of teachers' ideas on classroom instruction, especially in math, reading, and science, yet little research has been done to begin a similar connection to teachers' classroom uses of technology (Ertmer, 2005).

There has been considerable research done about the barriers to integration of information technology into education. Ertmer (2006) classified the barriers into two primary categories:

> Extrinsic (first-order) and intrinsic (second-order). While extrinsic barriers include lack of resources, adequate training, technical support, and time, intrinsic barriers include teachers' beliefs, visions of technology integration, and lack of confidence. Despite an acknowledged emphasis on barriers in the literature, little research has been conducted that examines the critical factors that enable teachers to overcome these barriers. (p. 55)

Corbin (2003) identified five barriers and grouped them into three areas: (a) lack of experience in preservice training, (b) lack of access to computers at school, and (c) lack of on-site technical support. He also stated that the most important barrier most teachers must deal with is lack of access to computers, either in a lab setting or in the classroom. He explained in detail what computer access means. It is not only the physical access to the computer but also access to the time to experiment with the computer, test out activities, and develop a general familiarization with the system and computer hardware.

Hope (1997) saw that the lack of good technology information training is an important barrier in teaching. He emphasized that teachers need technical support to get over any issues that they face.

Treumann (2013) collected 15 barriers to adopting new technology in education and public organizations. Those barriers were: (a) the lack of leadership/support for innovation, (b) comfort level–effect of a new method, (c) enough time to make the necessary changes and adjust, (d) the understanding and ability to begin a new process, (e) social implications–changes in planning and communication, (f) Current processes or procedures, (g) cost and value, (h) difficulty/availability/time for training, (i) resistance to learning new technology, (j) work

stress/overload, (k) cost, (l) proof of value, (m) Reliability–will it continue to provide value, (n) user acceptance, and (o) performance.

To get through the 15 major barriers to technology adoption, more success stories about adoption need to be heard; board members and users of software and hardware solutions in government agencies are of major benefit.

We must proceed with the idea of integration because the main reasons for negative integration are the failure of the technology chosen as classroom material and not taking notice of the true and individual needs of teachers or their students in the teacher training programs available today (Cuban, 2001). Furthermore, Brush (2003) studied what teachers themselves think are the barriers to information-technology-related instruction. Nine barriers included in his study survey were: (a) lack of hardware, (b) lack of software, (c) lack of network access, (d) lack of time to develop courses, (e) lack of support by department or school, (f) lack of salary support during the development period, (g) lack of students' preparation to handle technology, (h) lack of facilities for student laboratories, and (i) lack of central resources.

According to Ertmer et al., 2012), teachers noted that the strongest barriers preventing other teachers from using technology were their existing attitudes and beliefs toward technology, as well as their current levels of knowledge and skills. Teacher understanding and assurance with information and communication technology is the main determinant of productive classroom use by the students (Collis et al., 1996). Successful technology integration in a classroom setting seems to require will, skill, and access to technology tools on behalf of the teacher (Knezek et al., 2000).

Teacher advances in technology integration seem to proceed through a set of well-defined stages, and the highest stages require changes in attitude more than the skills (Knezek & Christensen, 2000).

Many studies have shown the barriers teachers face during technology integration, very little research, has been done using a human interaction system approach. Ertmer and her associates (Ertmer, et al, 1999; Ertmer et al., 2003; Park & Ertmer, 2007) identified barriers related to planning and implementing the technology-enhanced problem-based learning: lack of time to prepare, limited resources, lack of administrative support, and class time to implement problem-based learning (Park & Ertmer, 2008).

Rogers, D. L. (2000) emphasized, "The weak link in the knowledge infrastructure in most institutions is the skills and training in Information Age tools and processes for learners, faculty, staff, and other participants.... It is imperative that institutions realize that it is not only technology that is important, but also the learning methodologies utilized to employ the technology" (p. 21).

Alaugab (2007) pointed out that language is a barrier for students and faculty who do not speak English because most of the studies and research on the Internet are in English. Instructors and students who understand the English language are the main ones to benefit from this form of technology.

Al-Senaidi (2009) studied barriers to adopting technology for teaching and learning in Oman. His study focused on the expected barriers to adopting information and communication technologies (ICT) in Omani higher education. Five factors were extracted from the survey: (a) lack of equipment, (b) lack of institutional support, (c) disbelief of ICT benefits, (d) lack of confidence, and (e) lack of time. This showed that the faculty members expected moderate

levels of barriers in applying ICT to their way of teaching. Group differences based on gender, academic rank, and academic fields were, for the most part, not found except for the interaction effects on the barrier associated to lack of equipment; disbelief of ICT benefits were also a contributor. Male faculty members with less usage of ICT expected more barriers regarding the lack of computer equipment and disbeliefs of ICT benefits, than their female counterparts. It was recommended that the survey be adjusted to include subtle and culturally relevant items, larger sample sizes, and more genius samples to support and expand what was found. The implications of this study included the need to provide more institutional support, technical training, and personal time for faculty members to learn and improve their own personal knowledge and skills in educational technologies.

Information Technology and Gender Differences

There are several examples of studies that reported the differences between males and females in the information technology field. One such is the work of Al-Shankity and Al-Shawi (2008) who examined gender differences in Internet adoption and usage in higher education institutions in Saudi Arabia, as reported by faculty members, and found that there was no significant difference in the Internet usage. Spotts, Bowman and Mertz (1997) found that male faculty members rated their knowledge and experience with some innovative technologies higher than did female faculty members.

Brooks (2009) reported that female faculty had more positive attitudes toward blended online learning than did male faculty. Moukali (2012), in his study, concluded that both male and female faculty members at Jazan University had positive attitudes toward the adoption of technology-rich blended learning. He found that male faculty members had had more experience

with educational technologies than had female faculty members. Also, female faculty members had encountered more barriers than male faculty members in their adoption of blended learning.

Zhou & Xu (2007) focused in their study on the gender differences in the use of technology in higher education at a large Canadian university. They resulted that males were less likely to use student-centered pedagogical approaches in teaching than females. Males had higher confidence and more experience in the use of computers in teaching. They tended to learn how to use technology from their own experience, while females were more likely to learn from others.

Literature Review's Connection to the Purpose of the Study

After reviewing the literature that addressed information technology, the integration of information technology, benefits of technology integration, adoption of information technology and diffusion of innovation theory, barriers to technology integration, and information technology and gender differences, the researcher would like to point out the points of agreement, which meet with the purpose of this study in the following matters:

- Technology can be used as a powerful educational tool that can facilitate learning in students by providing great visuals and enhancing their imaginations.
- Technology has strongly changed the level of higher education with access to all worldwide. It is the new phenomenon that is spreading the ability to learn and grow.
- Educational technology will extend and be achieved, progressively, around the world. (Wright, 2014)
- In truth, the process of diffusion itself is a large part of the adoption and development of new technology. After the initial act of invention and innovation, the new technology goes through a slower stage, while going forward in the adoption process. During this

process, as Silverberg stated, the diffusion of the innovation becomes a "collective" process (Silverberg, 1991; Page, 2000; Alghonaim, 2005).

- Even though the circumstances for successful technology integration, including ready access to technology, training for teachers, and a positive policy for the environment, are falling into place, use is still very low on a higher level of technology (Ertmer, 2005).
- There has been considerable research into barriers to integration of information technology into education. There are external and intrinsical barriers as Ertmer (2006) classified them.
- Several studies have addressed the differences between males and females to understand the gender gap in information technology field.

Chapter Summary

Chapter 2 provided a review of literature related to integrating technology. To provide an overall understanding of integrating technology, this chapter described, in detail, the topics and previous studies that related to the purpose of the current study and its variables. In order, the chapter addressed defining information technology, the integration of information technology, benefits of technology integration, adoption of information technology and diffusion of innovation theory, barriers to technology integration, and information technology and gender differences. Finally, the previous studies were connected to this current study.

CHAPTER 3: METHODOLOGY

Introduction

This was designed to investigate the current level of integration of information technology and explore the barriers that might prevent the effective implementation of integrating information technology in Libyan higher education from the perspective of faculty members' at Benghazi University. This chapter describes the methods and procedures used to conduct this study. The descriptions of these procedures are explained in the following sections:

1. Research Design
2. Research Questions
3. Research Hypotheses
4. Research Setting
5. Data Collection Procedures
6. Description of the Variables
7. Participants
8. Limitation of the Study
9. Instrumentation
10. Data Analysis

Research Design

According to Gay and Airasian (2000), descriptive research is "useful for investigating a variety of educational problems, and concerned with the assessment of attitudes, opinions, and preferences" (p. 275). The descriptive parts of the research are used to explain existing relationships between the different variables (Fraenkel & Wallen, 2003).

This research is considered descriptive-correlational research that gives information about conditions, situations, and events that occur in the present and involves the search for relationships between variables through the use of quantitative research methods to test the hypotheses of the study (UNESCO, 2009).

A descriptive survey was conducted to measure the characteristics of the research sample and investigate a relationship between the selected demographic variables of faculty members (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer Lab availability, technology skills level, technology professional development, computer location, computer use, internet access in school, and the knowledge of information technology) and the use of information technology in their teaching.

Review of Research Questions

In order to know the current level of integration information technology and explore the barriers that might prevent the effective implementation of integrating information technology into Libyan higher education from faculty members' perspective at Benghazi University, the following research questions were created to guide this study:

1. To what extent do faculty members at Benghazi University know about information technology?
2. To what extent do faculty members at Benghazi University use information technology in their teaching?
3. What are the main barriers that might prevent the effective implementation of Integrating Information Technology in Libyan Higher Education from faculty members' perspective at Benghazi University?

4. Is there a difference between male and female faculty members at Benghazi University in:
    a. Their Knowledge of information technology?
    b. Their use of information technology?
    c. The barriers they encountered?
5. Are the selected demographic variables of faculty members (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer Lab availability, technology skills level, technology professional development, computer location, computer use, internet access in school, and the knowledge of information technology) related to the use of information technology in their teaching?

Research Hypotheses

The following hypotheses were generated in order to test the above research questions:

1. Faculty members at Benghazi University have a weak knowledge about information technology.
2. Faculty members at Benghazi University have a limited use of information technology in their teaching.
3. There are barriers that might prevent the effective implementation of Integrating Information Technology in Libyan Higher Education from faculty members' perspective at Benghazi University.
4. There is a significant difference between male and female faculty members at Benghazi University in:
    a. Their Knowledge of information technology.
    b. Their use of information technology.

c. The barriers they encountered.

5. There is a relationship between the selected demographic variables of faculty members (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer Lab availability, technology skills level, technology professional development, computer location, computer use, internet access in school, and the knowledge of information technology) and the use of information technology in their teaching.

Research Setting

Benghazi University was selected as the location for conducting this study. Benghazi University was established in 1955. The university has been developing and expanding, with the result that it has become a town, including a large number of schools as well as facilities. It has several campuses and scientific institutes inside and outside of Benghazi City. Benghazi University offers the PhD and Master's degrees in some programs and offers bachelor's degree programs in all its 23 schools, 13 of them in Benghazi City, which are: (a) School of Economics, (b) School of Law, (c) School of Science, (d) School of Information Technology, (e) School of Education, (f) School of Engineering, (g) School of Arts, (h) School of Media, (i) School of Medicine, (j) School of Nursing, (k) School of Pharmacy, (l) School of Dentistry, and (m) School of Public Health. The rest of the Benghazi Schools are in other cities: (n) School of Agriculture in Solouq city, (o) School of Education in Elmarj city, (p) School of Education in Gamens city, (q) School of Arts and Science in Elwahat city, (r) School of Arts and Science in Elkufrah city, (s) School of Arts and Science in Ajdabia city, (t) School of Arts and Science in Alabear city, (u) School of Arts and Science in Elmarj city, (v) School of Engineering in Economics city, and (w) School of Economics in Ajdabia city.

There are a variety of 230 programs that are offered through these Schools for approximately 85,000 undergraduate students as well as 3,000 graduate students (University of Benghazi, 2014). According to the administration of faculty members in Benghazi University (2014), there are a total of 2,734 faculty members; 1,329 of them have scholarships out of Libya, and 1,405 are supposed to work at Benghazi University in Fall 2014.

Data Collection Procedures

The data were collected via a survey that was developed for exploring barriers to integrating information technology into Libyan higher education. Since the target population for this study was native Arabic speakers, an Arabic version of the survey was used. Due to the war in Libya, especially in Benghazi City, where the main campus of Benghazi University is located, the researcher could not go to Libya after she got the Human Subjects' Committee approval by the end of October 2014. A request to conduct this study was sent to the faculty members' administration office at Benghazi University.

The survey was sent to Libya at the beginning of November 2014, to be given to the faculty members who were participating in the faculty members' meeting, which was held in December 2014. A total of 197 surveys were returned, and 14 incomplete surveys were excluded. The sample size was 183 participants, with 76 male participants and 107 female participants from Benghazi University.

Human Subjects' Committee Approval

A request to conduct this study was sent to the Human Subjects Committee at the Lawrence, Kansas campus, and approval was granted to collect the data (See Appendix A). Following that, the information statement, explaining the study and how it would be conducted was sent to the participants (see Appendix B).

Translation from English to Arabic

After the proposal and the survey were approved by the researcher's Ph.D. Committee members, the researcher modified the survey based on their suggestions then translated it into the Arabic language because all the participants in this study were native Arabic speakers. A backward translation was used in order to provide an understandable survey for the participants. The Arabic version of the survey was reviewed by three native Arabic speakers to examine the clarity before it was given to a person[1] who knows both Arabic and English well, and she was asked to translate the Arabic version back into English. This English version and the first English version were given to a native English speaker[2] to examine for any significant differences between the two versions. There were no significant differences between the two versions. The final drafts of both Arabic and English versions were reviewed by the researcher and sent to the Human Subjects Committee.

Description of the Variables

The following is a description of independent and dependent variables in this study:

The Independent Variables

The independent variables are derived from the demographic information and include:

1. Gender.
2. Academic Department

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[1] Alqahtani, Ebtisam (PhD student); Bachelor's degree in English literature & Master's degree in Educational Technology.
[2] Taylor, Deborah (PhD student); Bachelor of Arts, Chemistry/Biology & Master of Arts, Physiology and Cell Biology.

3. Years of Teaching
4. Location of Highest Academic Degree.
5. Level of education.
6. Computer Availability Classroom.
7. Computer Lab Availability.
8. Technology skills level
9. Technology Professional Development.
10. Computer Location.
11. Computer Use.
12. Internet access in school.
13. The knowledge of information technology

The Dependent Variables

The dependent variables in this study are:

1. The level of the faculty members' knowledge of information technology.
2. The level of faculty members' use of information technology in their teaching.
3. The barriers that might prevent the effective implementation of integrating information technology from faculty members' perspective at Benghazi University.

Participants

The participant sample for this study consisted of male and female faculty members who are supposed to work at Benghazi University during Fall 2014. Faculty members have different levels of education, different number of years of teaching experience, and different levels of technology skills. According to the faculty members' administration office in Benghazi

University (2014), there are a total of 2,734 faculty members; 1,329 of them have scholarships out of Libya, and 1,405 are supposed to work at Benghazi University during Fall 2014.

The survey was sent to Libya at the beginning of November 2014, to be given to the faculty members who were participating in the faculty members' meeting, which was at the end of December 2014. A total of 197 surveys were returned, and 14 incomplete surveys were excluded. The sample size was 183 participants from nine schools at Benghazi University, as shown in Table 4.

Limitations of the Study

The current study has faced some limitations as follows:

1. This study was conducted in the Fall 2014 and only focused on higher education teachers, and the sample was drawn from only one university in Libya, Benghazi University. Therefore, the findings of this study might not be generalizable to other Libyan universities.
2. This study was focused on investigating the relationship between the demographic variables (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer Lab availability, technology skills level, technology professional development, computer location, computer use, internet access in school) and the use of information technology.
3. The barriers that might prevent the effective implementation of integrating information technology into Libyan higher education were only from the perspective of faculty members at Benghazi University.
4. The participants were selected to participate in this study based on those who were available at the faculty members' meeting.

5. There was a limitation in communication, since the researcher did not have a chance to distribute the research surveys personally, due to the war in Libya.

Table 4

Number of Faculty by School at Benghazi University

School	Number of Faculty
School of Economics	27
School of Law	12
School of Science	26
School of IT	9
School of Education	17
School of Engineering	16
School of Arts	56
School of Media	3
School of Medicine	17
Total	138

Instrumentation

To collect data, the researcher used a survey that explored barriers to integrating information technology into Libyan higher education. The survey was developed after reviewing several existing surveys that are related to information technology. The researcher created some of the survey items, and used some from the literature review. Most items came from one source and were modified to fit the needs of this study. This source was a study conducted in 2005 by Al-Alwani, titled "Barriers to integrating information technology in Saudi Arabia science education." In order for the researcher to use items from the Al-Alwani survey, a permission request was sent to the original researcher, Dr. Al-Alwani, who provided the researcher with

permission to use the survey or some items from it (See Appendix C). After modification and development, the survey consisted of three main parts.

1. Demographic Information
2. Current Level of Integrating Information Technology
    a. Knowledge of Information Technology
    b. Usage of Information Technology
3. The Integration of Information Technology
    a. Policy and Support
    b. Infrastructure and Resources
    c. Attitudes of Faculty Members about IT
    d. Preparation and Development

Part 1: Demographic Information

The first part focused on the demographic information. This part has 12 questions to gather information about gender, the academic department, and so forth (see Appendix D for the English version and Appendix E for the Arabic version).

Part 2: Current Level of Integrating Information Technology

The second part evaluates the current level of integration information technology and includes two sections. One is for gathering information about knowledge of information technology, which includes 13 items. Faculty member responses were measured on a 4-point Likert-type scale of (1 = No Experience, 2 = Very Little Experience, 3 = Some Experience, 4 = A lot of Experience).

The items in this section included statements that measured faculty members' knowledge of information technology that helps them to integrate information technology into

their teaching at Benghazi University (see Appendices D and E).

Section two is for gathering information about usage of information technology, which includes 11 items. Faculty members' responses were measured on a 5-point Likert-type scale of (1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always). The items in this section included statements that measured faculty members' usage of information technology in their teaching at Benghazi University (see Appendices D and E).

Part III: The Integration of Information Technology

The third part measures the integration of information technology that includes four sections. Faculty members' responses were measured on a 5-point Likert-type scale of (1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, and 5 = Strongly Agree). Section one, about policy and support, includes 9 items. Section two is about infrastructure and resources and includes 11 items. Section three is about Attitudes of faculty members about integrating information technology and includes nine items. The last section is about preparation and development. It includes 6 items (see Appendices D and E).

Reliability and Validity

Reliability

The term reliability refers to the degree to which a survey instrument consistently measures whatever it is designed to measure (Slavin, 1992). According to McIntire and Miller (2006) "a reliable test is one we can trust to measure each person in approximately the same way every time it is used" (p. 181). In simple terms, reliability is how stable and dependable a test is in measuring the same thing each time. When a test can measure the same thing more than one time and yield the same results every time, then the test is said to be reliable.

The researcher calculated the internal consistency coefficient (Cronbach's Alpha) to evaluate the reliability of the survey instrument used in this study. There were two main sections of the survey–the current level of integrating information technology and the integration of information technology. In the first section, there were two dimensions: (a) knowledge of information technology, which includes 13 items, and (b) usage of information technology, which includes 11 items. In the second section, there were four dimensions: (a) policy and support, which includes eight items, (b) infrastructure and resources, which includes 10 items, (c) attitudes of faculty members about integrating information technology, which includes nine items, and (d) preparation and development, which includes six items.

The researcher calculated the Cronbach's Alphas separately for each dimension in order to measure the consistency of scores across items. The Cronbach's Alpha coefficients are 0.95 for the dimension of the knowledge of information technology, 0.84 for the dimension of the usage of information technology, 0.82 for the dimension of policy and support, 0.74 for the dimension of infrastructure and resources, 0.88 for attitudes of faculty members about integrating information technology, and 0.87 for dimension of preparation and development. The values of the Cronbach's Alpha coefficients for these dimensions were high enough to indicate that there is adequate consistency among the survey items in each dimension.

Validity

According to Frey (2006), validity is the extent to which the instrument measures what it is intended to measure (p. 136). Many people use the term of face validity to describe a set of items that assess what they appear to measure (DeVellis,2003, p. 57).

To ensure that the survey is accurate in measuring barriers to integrating information technology in Libyan higher education, the construct of the survey was reviewed and the

feedback was provided by a panel of experts (six faculty members)[3] from The University of Kansas who specialize in education. The researcher received some feedback and removed some survey items, added some new items, modified some items, and kept some items as they were based on their suggestions. After the researcher modified the survey based on their suggestions, she then translated it into the Arabic language because all the participants in this study were native Arabic speakers. Backward translation was used in order to provide an understandable survey for the participants. The Arabic version of the survey was reviewed by three native Arabic speakers to examine the clarity before it was given to a person who knows both Arabic and English well, and she was asked to translate the Arabic version back into English. This English version and the first English version were given to a native English speaker to examine for any significant differences between the two versions. There were no significant differences between the two versions. The final drafts of both Arabic and English versions were reviewed by the researcher and sent to the Human Subjects Committee.

Data Analysis

After gathering the data, the Statistical Package for Social Science (SPSS) program was used to analyze the data in light of the research questions.

Research Questions

1. To what extent do faculty members at Benghazi University know about information technology?

[3] Dr. Bruce Frey, Dr. Phil McKnight, Dr. Richard Branham, Dr. Ron Aust, Dr. Suzanne Rice, and Dr. Young-Jin Lee.

2. To what extent do faculty members at Benghazi University use information technology in their teaching?
3. What are the main barriers that might prevent the effective implementation of Integrating Information Technology in Libyan Higher Education from faculty members' perspective at Benghazi University?
4. Is there a difference between male and female faculty members at Benghazi University in:
   a) Their Knowledge of information technology?
   b) Their use of information technology?
   c) The barriers they encountered?
5. Are the selected demographic variables of faculty members (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer Lab availability, technology skills level, technology professional development, computer location, computer use, internet access in school, and the knowledge of information technology) related to the use of information technology in their teaching?

All analyses in this study required (P<. 05) As a level of statistical significance. In the first three questions (Q1, Q2, and Q3), descriptive statistics were used to provide information about the mean, standard deviation, frequencies, variance, range, and percentage of participants responding for each category.

For the fourth question (Q4), an independent-samples t-Test was conducted to examine the differences between male and female faculty members at Benghazi University in their knowledge of information technology, use of information technology, and the barriers they encountered.

For fifth question (Q5), a multiple regression analysis was conducted to evaluate how the selected demographic variables of faculty members could predict the use of information technology in their teaching.

Chapter Summary

Chapter 3 described the methods and procedures that were used to investigate the current level of integration information technology and explore the barriers that might prevent the effective implementation of Integrating Information Technology in Libyan Higher Education. This chapter included the research design, review of the research questions, hypotheses, and the research site. Also, it included an explanation of the data collection procedures, description of the variables, participants, limitation of the study, detailed description of the instrumentation, validity and reliability, and data analysis.

CHAPTER 4: RESULTS

Introduction

The purpose of this study was to determine the current level of integration information technology and explore the barriers that might prevent the effective implementation of Integrating Information Technology in Libyan Higher Education from the perspective of faculty members at Benghazi University. This chapter includes a description of population and sampling, descriptive statistics of the data, reliability analyses, results presented for the research questions, and a chapter summary

Description of Population and Sampling

The participants in this study were both male and female faculty members at Benghazi University, Libya. The study was conducted at the end of Fall 2014. The survey was sent to Libya to be given to participants in a faculty member meeting, which was at the end of December 2014. A total of 197 surveys were returned, and 14 incomplete surveys were excluded. The sample size was 183, with 76 male participants and 107 female participants from Benghazi University, as shown in Table 5.

Table 5

Numbers of Participants Based on Gender

Gender	Frequent	Percent
Male	76	41.5
Female	107	58.5
Total	**183**	**100.0**

Research Questions

The data for this study were collected using a survey that was developed especially for exploring the current level of integration information technology and investigating the barriers that might prevent the effective implementation of Integrating Information Technology in Libyan Higher Education from faculty members' perspective at Benghazi University. To collect the data for this study, 183 surveys were used.

All analyses conducted used $p < .05$ as a level of statistical significance. Research questions were analyzed using different statistical methods depending on the types of questions being addressed. The Statistical Package for Social Science (SPSS) software (Version 22) was used to analyze the data in this study.

Descriptive statistics were computed to analyze demographic data to give an overview of the sample distribution. These provide information about the frequencies, variance, range, and percentage.

This study included five research questions. They are as follows:

1. To what extent do faculty members at Benghazi University know about information technology?
2. To what extent do faculty members at Benghazi University use information technology in their teaching?
3. What are the main barriers that might prevent the effective implementation of Integrating Information Technology in Libyan Higher Education from faculty members' perspective at Benghazi University?
4. Is there a difference between male and female faculty members at Benghazi University in:
    a. Their knowledge of information technology?

b. Their use of information technology?

c. The barriers they encountered?

5. Are the selected variables of faculty members (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer Lab availability, technology skills level, technology professional development, computer location, computer use, internet access in school, and the knowledge of information technology) related to the use of information technology in their teaching?

Reliability Analysis

The researcher calculated the internal consistency coefficient (Cronbach's Alpha) to evaluate the reliability of the survey instrument used in this study. There were two main sections of the survey–the current level of integrating information technology and the integration of information technology. In the first section, there were two dimensions: (a) knowledge of information technology, which includes 13 items, and (b) usage of information technology, which includes 11 items. In the second section, there were four dimensions: (a) policy and support, which includes 8 items, (b) infrastructure and resources, which includes 10 items, (c) attitudes of faculty members about integrating information technology, which includes 9 items, and (d) preparation and development, which includes 6 items. The researcher calculated the Cronbach's Alphas separately for each dimension in order to measure the consistency of scores across items. As shown in Table 6, the Cronbach's Alpha coefficients are .95 for the dimension of the knowledge of information technology, .84 for the dimension of the usage of information technology, .82 for the dimension of policy and support, .74 for the dimension of infrastructure and resources, .88 for attitudes of faculty members about integrating information technology,

and .87 for dimension of preparation and development. The values of the Cronbach's Alpha coefficients for these dimensions were high enough to indicate that there is adequate consistency among the survey items in each dimension.

Table 6

Current Reliability Coefficients

Scales	**N of Questionnaire items**	**Cronbach's Alpha**
Knowledge of Information Technology	13	α = .95
Usage of Information Technology	11	α = .84
Policy and Support	8	α = .82
Infrastructure and Resources	10	α = .74
Attitudes of Faculty members about Integrating Information Technology	9	α = .88
Preparation and Development	6	α = .87

A four-point Likert scale was used for the measure of knowledge of information technology: 1 = No Experience, 2 = Very Little Experience, 3 = Some Experience, and 4 = A lot of Experience. A five-point Likert scale was used for the measure of usage of information technology: 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, and 5 = Always. A five-point Likert Scale was used for the other measures (i.e., policy and support, infrastructure and resources, attitudes of faculty members, and preparation and development): 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, and 5 = Strongly Agree.

Demographic Description

Participants' demographic information includes gender, the academic major, years of teaching experience, the place of highest academic degree, level of education, have a computer in the classroom, have a computer lab in the school, technology skills level, technology-training programs, place to have a computer, place to use a computer, and access to the Internet in the school. These demographic characteristics are described below in detail.

Participants' Gender

The participants in this study were male and female faculty members at Benghazi University in Libya. As shown in Table 5, 76 out of the 183 participants were male (41.5%); the remaining 107 were female (58.5%).

Participants' Academic Major

The participants were faculty members with different majors that were categorized under nine schools: School of Arts, School of Science, School of Education, School of Economics, School of Medical, School of Engineering, School of Media, School of Law, and School of Information Technology. The largest group was faculty members from the School of Arts–56 participants, making up 30.6% of the entire sample. The smallest group was faculty members from School of Media–only 3 participants, and they made up 1.6% of the entire sample. Table 7 shows the number of participants from different schools and the percentages in detail.

Table 7

Participants' Academic Major

Academic Major	Frequency	Percent
Arts	56	30.6
Science	26	14.2
Education	17	9.3
Economics	27	14.8
Medical	17	9.3
Engineering	16	8.7
Media	3	1.6
Law	12	6.6
Information Technology	9	4.9
Total	**183**	**100.0**

Participants' Years of Teaching

As shown in Table 8, 78 participants had 1-5 years of teaching experience, which represents 42.6% of the total number of the participants in the study. No participants had more than 45 years of teaching experience.

Table 8

Participants' Years of Teaching by Groups

Years of Teaching	Frequency	Percent
1-5	78	42.6
6-10	42	23.0
11-15	17	9.3
16-20	14	7.7
21-25	12	6.6
26-30	12	6.6
31-35	4	2.2
36-40	4	2.2
41-45	0	0.0
Total	**183**	**100.0**

Participants' Graduation Continents

As shown in Table 9, 56.8% of participants (N=104) graduated from African countries, 4.9% of participants (N = 9) graduated from Asian countries, and no participants graduated from Australia.

Table 9

Participants' Graduation Continents

Continents	Frequency	Percent
Africa	104	56.8
Asia	9	4.9
Australia	0	0.0
Europe	38	20.8
North America	32	17.5
Total	**183**	**100.0**

Participants' Highest Academic Degree

As shown in Table 10, 57.4% of the participants (N = 105) had a Master's degree, and 42.6% of the participants (N = 78) had a doctoral degree.

Table 10

Participants' Education Level

Academic Degree	Frequency	Percent
Master	105	57.4
Ph.D.	78	42.6
Total	**183**	**100.0**

Computer Availability in Participants' Classrooms

As shown in Table 11, 29.5% of the participants (N = 54) had computers in their classrooms, and 70.5% of the participants (N = 129) had no computers in their classrooms.

Table 11

Computers in Participants' Classrooms

Computer Availability in Classrooms	Frequency	Percent
Yes	54	29.5
No	129	70.5
Total	**183**	**100.0**

Computer Lab Availability in Participants' Departments

As shown in Table 12, 73.2% of the participants (N = 134) had computer labs in their departments for students, and 26.8% of the participants (N = 49) did not.

Table 12

Computer Lab Availability in Participants' Departments

Computer Lab Availability in Department	Frequency	Percent
Yes	134	73.2
No	49	26.8
Total	**183**	**100.0**

Participants' Technology Skill Level

As shown in Table 13, most participants (67.2% of the total sample, N = 123) believed that they had an intermediate level of technology skills; 14.2% of the participants (N = 26)

described themselves as a beginner regarding their level of technology skills; and 18.6% (N = 34) of the participants reported that they had advanced level of technology skills.

Table 13

Participants' Technology Skill Level

Technology Skill Level	Frequency	Percent
Beginner	26	14.2
Intermediate	123	67.2
Advanced	34	18.6
Total	**183**	**100.0**

Participants' Technology Professional Development

As shown in Table 14, many of the participants either received an in-service technology professional development program only (33.3% of the total, N = 61) or received both re-service and in-service technology professional development programs (41.5% of the total, N = 76). A considerable number of participants (22.4% of the total, N = 41) had never obtained technology professional development. Only 5 participants (2.7%) received a pre-service technology professional development program only.

Table 14

Participant's Technology Professional Development

Technology Professional Development	Frequency	Percent
Pre-service	5	2.7
In-service	61	33.3
Both Pre-service & In-service	76	41.5
No Development	41	22.4
Total	**183**	**100.0**

Participants' Computer Location

As shown in Table 15, 51.9% of the participants (N = 95) had a computer at home, 47% of the participants (N = 86) had a computer both at home and school, only one participant had just a computer at school, and just one participant had no computer.

Table 15

Participants' Computer Location

Computer Location	**Frequency**	**Percent**
At home	95	51.9
At school	1	0.5
Both at home and school	86	47.0
No computer	1	0.5
Total	**183**	**100.0**

Participants' Computer Use

As shown in Table 16, the majority of the participants (N = 101, 55.2% of the total) used computers only at home; 42.1% of the participants (N = 77) used computers at both home and school; two participants used computers only at school; and three participants did not use computers.

Table 16

Computer Use

Computer Use	Frequency	Percent
At home	101	55.2
At school	2	1.1
Both at home and school	77	42.1
No computer	3	1.6
Total	**183**	**100.0**

Participants Access the Internet

As shown in Table 17, the majority of the participants (N = 111, 60.7% of the total) had access to the Internet only at home; 33.3% of the participants (N = 61) had access to the Internet at both home and school; three participants had access to the Internet only at school; and eight participants had no access to the Internet.

Findings of the Research Questions

Research questions were analyzed by using different types of statistical methods. The following part explains how data were analyzed to address each of the research questions.

Table 17

Participants Access the Internet in School

Access the Internet	Frequency	Percent
At home	111	60.7
At school	3	1.6
Both at home and school	61	33.3
No access	8	4.4
Total	**183**	**100.0**

Research Question One

To what extent do faculty members at Benghazi University know about information technology?

The first research question examined the Benghazi University faculty's knowledge of information technology. Participants were asked to rate their knowledge of information technology in 13 categories (See Table 18).

Participants' responses were measured using a four-point Likert scale: 1 = No Experience, 2 = Very Little Experience, 3 = Some Experience, 4 = A lot of Experience. The higher the score is, the more knowledgeable the participant is regarding information technology. On the contrary, the lower the score is, the less knowledgeable the participant is.

Descriptive statistics were conducted to analyze the data to address this question. Means and standard deviation of the items were calculated and reported in Table 18. As shown in Table 18, the overall level of the faculty members' knowledge of information technology was not very high (M = 2.55, SD = 0.94). To be specific, the participants had sound knowledge in "web

searching" (e.g., Google, Yahoo, etc.; M = 3.11, SD = 0.87) and "online social networking service" (e.g., Facebook, Twitter, etc.; M = 3.12, SD = 0.92), compared to their knowledge in other areas. The participants had limited knowledge in "Online course support" (e.g., Course web pages, Blackboard, etc.; M = 1.80, SD = 0.84). Table 18 displays the means and standard deviations for participants' knowledge of information technology.

Table 18

Descriptive Statistics for Participants' Knowledge of Information Technology.

Statement	**Mean** [1]	**Std. Deviation**
1. Computers in general	2.99	0.78
2. Word processing programs (e.g., Microsoft Word)	2.83	0.85
3. Spreadsheet programs (e.g., Microsoft Excel)	2.55	0.91
4. Presentation programs (e.g., PowerPoint)	2.61	0.99
5. Image & Drawing editing applications (e.g., iMovie)	2.28	1.02
6. Multimedia programs (e.g., Flash)	2.14	1.00
7. Online course support (e.g., Course web pages, Blackboard, etc.)	1.80	0.84
8. E-mail programs (e.g., Outlook Express, Yahoo, Hotmail, etc.)	2.99	0.88
9. Web page creation programs (e.g., Front Page, Dream weaver)	1.96	0.94
10. Web searching (e.g., Google, Yahoo, etc.)	3.11	0.87
11. Specific learning programs (e.g., lab simulation)	2.10	1.08
12. Online social networking service (e.g., Facebook, Twitter, etc.)	3.12	0.92
13. Imaging device (e.g., using scanner, digital or video camera, etc.)	2.69	1.12
Average	**2.55**	**0.94**

[1] The scale was: 1=No Experience, 2=Very Little Experience, 3=Some Experience, 4=A lot of Experience.

Research Question Two

To what extent do faculty members at Benghazi University use information technology in their teaching?

The second research question focused on the frequency of the faculty's usage of information technology. Participants were asked to rate their frequency of using information technology in 11 categories (See Table 19). Their responses were measured using a five-point Likert scale: 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always.

The higher the score, the more frequently the participant uses information technology. By the same token, the lower the score, the less frequently the participant uses information technology. Descriptive statistics were computed to analyze the data for this question. The means and standard deviations of the items were calculated and are reported in Table 19.

As shown in Table 19, the overall level of the participants' usage of information technology was pretty low (M = 1.91, SD = 0.97). The highest level of their usage of information technology was creating multimedia presentations for the classroom (M = 2.26, SD = 1.27). In addition, the participants were also more likely to "access information and research on best practices for teaching" (M = 2.24, SD = 0.97) and "process data and report results" (M = 2.24, SD = 1.09), compared to other usages of information technology.

The lowest level of participants' usage of information technology was to "share my students' work on the web" (M = 1.46, SD = 0.77). In addition, the participants also had a pretty low level of using information technology in the following two areas: "manage my courses" (e.g., blackboard: post homework or other class requirements, grades, project information or suggestions) (M = 1.67, SD = 0.79) and "support learning and research" (e.g.,

use content-specific tools) (M = 1.67, SD = 0.92). Table 19 displays the means and standard deviations for participants' usage of information technology.

Table 19

Descriptive Statistics for Participants' Usage of Information Technology

Statement	Mean [1]	Std. Deviation
1. Access information and research on best practices for teaching.	2.24	0.97
2. Create multimedia presentations for the classroom.	2.26	1.27
3. Improve my instructional performance.	2.09	0.95
4. Manage my courses (e.g., blackboard: post homework or other class requirements, grades, project information or suggestions.)	1.67	0.79
5. Facilitate complex thinking skills.	1.81	1.01
6. Product creative works.	1.87	1.10
7. Share my students' work on the Web.	1.46	0.77
8. Support learning and research (e.g., use content-specific tools).	1.67	0.92
9. Collaborate with colleagues and experts/or other professionals.	2.18	1.04
10. Communicate with students outside of classroom hours.	1.55	0.80
11. Process data and report results	2.24	1.09
Average	**1.91**	**0.97**

[1] The scale was: 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always.

Research Question Three

What are the main barriers that might prevent the effective implementation of Integrating Information Technology in Libyan Higher Education from faculty members' perspective at Benghazi University?

The research question examined the perspectives of the faculty members from Benghazi University about the main barriers that might prevent the effective implementation of integrating

information technology in Libyan higher education. The participants were asked to rate their degree of agreement to 33 statements. Eight statements were about "policy and support;" ten were about "infrastructure and resources;" nine were about "attitudes of faculty members about integrating information technology;" and six were about "preparation and development." Their responses were measured using a five-point Likert scale: 1 = SD (Strongly Disagree), 2 = D (Disagree), 3 = N (Neutral), 4 = A (Agree) and 5 = SA (Strongly Agree). The higher score indicates the participants' positive attitudes toward the statement. In other words, a higher score does not indicate a barrier. On the contrary, a lower score indicates a barrier.

Descriptive statistics were conducted to analyze the data for this question by calculating the means and standard deviations of the items. The results are reported in the following tables.

Policy and Support. As shown in Table 20, the overall level of the participants' agreement to statements of policy and support was not high (M = 2.26, SD = 0.91), indicating that they were facing the barrier of policy and support. The biggest barrier of policy and support they were facing was Item 5, "There is a tangible motivation from education community to use information technology," (M = 1.61, SD = 1.01).

The minimum barrier of policy and support was Item 6, "Our department chair is knowledgeable about the integration of information technology," (M = 2.80, SD = 1.04). Table 20 displays the means and standard deviations for the policy and support barriers that might affect the implementation of integrating information technology.

Table 20

Descriptive Statistics for Policy/Support Barriers Affecting the Implementation of Integrating Information Technology

Statement	Mean [1]	Std. Deviation
1. Our university has a good strategic plan for integration information technology.	2.57	0.90
2. There is a specific budget for information technology in our university.	2.48	0.87
3. There is obligation from the ministry to let me use information technology.	1.97	0.77
4. Specialists follow the integration of technology that I use in my teaching.	1.89	0.83
5. There is a tangible motivation from education community to use information technology.	1.61	1.01
6. Our department chair is knowledgeable about the integration of information technology.	2.80	1.04
7. Our department chair has positive attitudes towards application of information technology.	2.62	0.80
8. There is enough technical support/advice for information technology integration in our department.	2.17	1.09
Average	**2.26**	**0.91**

[1] The scale was: (1=SD, 2=D, 3=N, 4=A, 5=SA).

Infrastructure and Resources. As shown in Table 21, the overall level of the participants' agreement with statements of infrastructure and resources was moderate (M = 2.60, SD = 0.94), indicating that they were facing some barriers of infrastructure and resources. The biggest barrier of statements of infrastructure they were facing was Item 7, "Internet connection is fast enough for use while teaching," (M = 2.02, SD = 0.91).

The minimum barriers of policy and support were Item 1, "There are enough computers and other computer peripherals at our university," (M = 2.98, SD = 1.03) and Item 2, "The architecture of classrooms is suitable enough to use the information technology," (M = 2.98, SD

= 0.94). Table 21 displays the means and standard deviations for the infrastructure and resources barriers that might affect the implementation of integrating information technology.

Table 21

Descriptive Statistics for Infrastructure and Resources Barriers Affecting the Implementation of Integrating Information Technology

Statement	Mean [1]	Std. Deviation
1. There are enough computers and other computer peripherals at our university.	2.98	1.03
2. The architecture of classrooms is suitable enough to use the information technology.	2.98	0.94
3. There is appropriate number of students in classrooms to use information technology.	2.79	0.93
4. There is Internet service in our department.	2.81	1.01
5. Students do have an opportunity to access the Internet during the school day.	2.67	1.00
6. Students do have adequate access to information technology outside of the university.	2.87	0.95
7. Internet connection is fast enough for use while teaching.	2.02	0.91
8. There are computerized textbooks for most of our curricula.	2.18	0.82
9. There are specialized Arabian websites on the Internet.	2.38	0.91
10. There are specialized Arabian software programs.	2.38	0.85
Average	**2.60**	**0.94**

[1] The scale was: (1=SD, 2=D, 3=N, 4=A, 5=SA).

Attitudes about Integrating Information Technology. As shown in Table 22, the overall level of the participants' attitudes toward integrating information technology was fairly high (M = 4.00, SD = 0.80), indicating that the faculty members' attitudes toward integrating information technology were not barriers that affected the implementation of integrating

information technology. The most positive attitude was Item 9, "I am willing to collaborate with specialists to integrating technology in my teaching," (M = 4.16, SD = 0.73).

The least positive attitude was Item 7, "I have time to develop the activities/lessons that use information technology," (M = 3.79, SD = 0.94). Table 22 displays the means and standard deviations for the participants' attitudes toward integrating information technology.

Table 22

Descriptive Statistics for Attitudes about Integrating Information Technology

Statement	**Mean** [1]	**Std. Deviation**
1. I believe in the importance of using information technology in teaching.	4.04	0.83
2. I am interested in implementing information technology to deliver courses.	4.01	0.85
3. I consider using information technology in teaching saving time.	4.02	0.82
4. Our department chair has positive attitudes towards integrating of information technology.	3.92	0.73
5. I believe that using information technology will improve my teaching skills.	4.01	0.79
6. I think it is easy for me to manage the classroom while applying information technology.	4.10	0.68
7. I have time to develop the activities/lessons that use information technology.	3.79	0.94
8. Integrating information technology increases the social interaction between my students and me.	3.97	0.81
9. I am willing to collaborate with specialists to integrating technology in my teaching.	4.16	0.73
Average	**4.00**	**0.80**

[1] The scale was: (1=SD, 2=D, 3=N, 4=A, 5=SA).

Preparation and Development. As shown in Table 23, the overall level of the participants' information technology preparation and development was moderate (M = 2.59, SD = 1.00), indicating that they were facing some barriers of preparation and development that

affected the implementation of integrating information technology. The biggest barrier of preparation and development was Item 2, "There is a pre-service training about the information technology skills," (M = 2.30, SD = 0.96).

The smallest barrier of preparation and development was Item 6, "I have enough time to learn skills of how to integrating technology," (M = 3.84, SD = 0.96). Table 23, displays the means and standard deviations for the participants' preparation and development of integrating information technology.

Table 23

Descriptive Statistics for Preparation and Development

Statement	Mean [1]	Std. Deviation
1. The information technology training opportunities are available in our university.	2.33	1.07
2. There is a pre-service training about the information technology skills.	2.30	0.96
3. There is an in-service training about the information technology skills.	2.37	1.02
4. My pre-service training to use information technology was good.	2.32	0.97
5. My in-service training to use information technology was good.	2.35	0.98
6. I have enough time to learn skills of how to integrating technology.	3.84	0.96
Average	**2.59**	**1.00**

[1] The scale was: (1=SD, 2=D, 3=N, 4=A, 5=SA).

Research Question Four

Is there a difference between male and female faculty members at Benghazi University in:

1. *Their Knowledge of information technology?*
2. *Their use of information technology?*
3. *The barriers they encountered?*

A series of independent samples t-tests were conducted to examine the gender differences regarding the three survey subscales: (a) knowledge of information technology, (b) use of information technology and (c) the barriers the participants encountered. As shown in Table 24, the difference in male and female faculty members' knowledge of information technology was not statistically significant, with $t(181) = -2.69$, $p = 0.78$. The mean knowledge level for male faculty members was 2.53 with SD = 0.82, while the mean knowledge level for female faculty members was 2.56 with SD = 0.68.

As shown in Table 24, the difference in male and female faculty members' usage of information technology was barely statistically significant, with $t(181) = 2.00$, $p = .047$. The mean level of using information technology for male faculty members was 2.02 with SD = 0.63; while the mean level of using information technology for female faculty members was 1.84 with SD = 0.60.

As shown in Table 24, the difference in male and female faculty members' opinions regarding the barrier in policy and support was statistically significant, with $t(181) = 2.75$, $p = .007$. The mean of the barrier in policy and support for male faculty members was 2.41 with SD = 0.60; the mean of the barrier in policy and support for female faculty members was 2.16 with SD = 0.62.

As shown in Table 24, the difference in male and female faculty members' opinions regarding the barrier in infrastructure and resources was not statistically significant, with $t(181) = 0.40$, $p = .69$. The mean of the barrier in infrastructure and resources for male faculty members was 2.62 with SD = 0.45; the mean of the barrier in infrastructure and resources for female faculty members was 2.59 with SD = 0.56.

As shown in Table 24, the difference in male and female faculty members' opinion regarding their attitudes toward integrating information technology as a barrier was not statistically significant, with t (181) = -0.64, p = 0.52. The mean attitude of male faculty members toward integrating information technology was 3.97 with SD = 0.54; the mean attitude of female faculty members toward integrating information technology was 4.02 with SD = 0.58.

As shown in Table 24, the difference in male and female faculty members' opinions regarding preparation and development as a barrier was not statistically significant, with t(181) = 0.58, p = 0.56. The mean level of preparation and development for male faculty members was 2.62 with SD = 0.71; the mean level of preparation and development for female faculty members was 2.56 with SD = 0.81.

Table 24

Differences in Faculty Gender by Subscales: Knowledge, Usage, and Barriers Regarding Information Technology (N = 76 for male, N = 107 for female)

Subscales	**Mean**	**SD**	**t**	**df**	***p***
Knowledge of Information Technology			-2.69	181	.782
Male	2.53	0.82			
Female	2.56	0.68			
Usage of Information Technology			2.00	181	.047
Male	2.02	0.63			
Female	1.84	0.60			
Barrier 1: Policy and Support			2.75	181	.007
Male	2.41	0.60			
Female	2.16	0.62			
Barrier 2: Infrastructure and Resources			0.40	181	.693
Male	2.62	0.45			
Female	2.59	0.56			
Barrier 3: Faculties' Attitude			-0.64	181	.522
Male	3.97	0.54			
Female	4.02	0.58			
Barrier 4: Preparation and Development			0.58	181	.560
Male	2.62	0.71			
Female	2.56	0.81			

Research Question Five

Are the selected demographic variables of faculty members (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability

classroom, computer Lab availability, technology skills level, technology professional development, computer location, computer use, internet access in school, and the knowledge of information technology) related to the use of information technology in their teaching?

A multiple regression analysis was conducted to evaluate how well the 13 demographic variables (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer Lab availability, technology skills level, technology professional development, computer location, computer use, internet access in school, and the knowledge of information technology) predicted the overall level of faculty members' use of information technology in their teaching at Benghazi University. The multicollinearity was checked to test if two or more predicting variables in a multiple regression model were highly correlated. The results showed no problems with multicollinearity.

As shown in Table 25, the linear combination of the 13 demographic variables was significantly predictive of the overall level of faculty members' use of information technology at Benghazi University, with $F(22, 160) = 14.10$, $p < .001$.

The adjusted R^2 for the overall multiple regression analysis was .61, indication that approximately 61% of the variance in faculty's use of information technology at Benghazi University in this sample can be accounted for by the linear combination of the 13 demographic variables entered in the model.

Table 25

Regression Model of Faculty's Use of Information Technology Predicted by Demographic Information

Sources of Variation	df	MS	F	Sig.	R	R^2	Adjusted R^2	Std. Error of the Estimate
Regression	22	2.04	14.10	<.001	.81	.66	.61	.38
Residual	160	0.15						
Total	**182**							

Dependent Variable (DV): Faculty's Use of Information Technology

As shown in Table 26, several predictors significantly predicted the faculty's use of information technology in the model. These are explained in detail below.

Academic Department. In the survey questionnaire, the participants were asked to answer the question "What is your Major?" and their answers were categorized under 9 schools: 1 = School of Arts, 2 = School of Science, 3 = School of Education, 4 = School of Economics, 5 = School of Medical, 6 = School of Engineering, 7 = School of Media, 8 = School of Law, and 9 = School of Information Technology. Since the measure of this variable is nominal, the researcher dummy-coded this variable so that it could be used as a predictor in the regression model. In dummy coding, "School of Information Technology" was used as the reference group. Results showed that faculty members working at School of Arts and School of Law had a significantly lower level of using information technology than faculty members working at School of Information Technology. For faculty members from School of Arts, $\beta = -3.22$, $p < .01$; for faculty members from School of Law, $\beta = -2.69$, $p = .008$.

Computer Lab Availability. In the survey questionnaire, the participants were asked to answer this question: "Is there a computer lab in your department for the students?" The choices

were Yes or No. Results showed that faculty members from departments with a computer lab for students had a significantly lower level of using information technology in their teaching than those from departments without a computer lab for students, $\beta = -0.14$, $p = .03$.

Knowledge of Information Technology. In the survey questionnaire, there was a scale measuring participants' knowledge of information technology with 13 statements. Participants were asked to rate their experience with the 13 statements with a 4-point Likert scale: 1 = No Experience, 2 = Very Little Experience, 3 = Some Experience, and 4 = A lot of Experience. The mean rating score across the 13 statements was used as an independent variable in the multiple regression model to predict participants' use of information technology. Results showed faculty members who had a better knowledge of information technology had a significantly higher level of using information technology, $\beta = -4.44$, $p < .001$. The knowledge of information technology is a strong predictor of the use of information technology.

As shown in Table 26, the other variables (i.e., gender, years of teaching, location of highest academic degree, level of education, computer availability in the classroom, technology skills level, technology professional development, computer location, computer use, and Internet access in school) had no significant relationship with participants' use of information technology. In other words, they were no significant predictors in the regression model.

Table 26

Regression Coefficients: Relationship between Faculty's Demographic Information and Their Use of Information Technology

Predictors	Unstandardized Coefficient		Standardized Coefficient		
	B	Std. Error	Beta (β)	t	Sig.
(Constant)	1.33	.25		5.25	.00
Gender	- 0.08	.07	-.07	-1.25	.21
School of Arts	- 0.59**	.18	-.44	-3.22	.00
School of Science	-0.24	.16	-.14	-1.49	.14
School of Education	-0.28	.19	-.13	-1.47	.15
School of Economics	-0.25	.18	-.14	-1.36	.18
School of Medical	-0.07	.18	-.04	-0.41	.68
School of Engineering	-0.17	.17	-.08	-0.99	.32
School of Media	0.18	.27	.04	0.67	.50
School of Law	-0.58**	.22	-.24	-2.69	.01
Years of Teaching	-0.02	.02	-.08	-1.01	.31
Asia	0.09	.15	.03	0.62	.54
Europe	0.13	.10	.09	1.40	.16
North America	-0.02	.11	-.01	-0.19	.85
Level of Education	0.01	.08	.01	0.16	.88
Computer in Classroom	0.16	.09	.12	1.75	.08
Computer Lab Availability	-0.19*	.09	-.14	-2.15	.03
Technology Skills	0.11	.09	.11	1.29	.20
Technology Professional Development	-0.01	.03	-.01	-0.20	.85
Computer Location	-0.11	.12	-.09	-0.98	.33

(continued)

Table 26: *Regression Coefficients: Relationship between Faculty's Demographic Information and Their Use of Information Technology* (continued)

Predictors	Unstandardized Coefficient		Standardized Coefficient		
	B	Std. Error	Beta (β)	t	Sig.
Computer Use	0.22	.12	.18	1.80	.07
Internet Access in School	0.04	.09	.03	0.40	.69
Knowledge of Information Technology	0.32***	.07	.38	4.44	.00

*** P<.001, ** P<.01, * P<.05
Dependent Variable (DV): Faculty's Use of Information Technology

Chapter Summary

Chapter 4 presented the results of the statistical analyses of the data collected in the study from 183 faculty members' perspective at Benghazi University. This chapter includes a description of population and sampling, descriptive statistics of the data, reliability analyses, and results presented by research questions.

CHAPTER 5: DISCUSSION

Introduction

In the light of the purpose of this study, this chapter reviews the research questions and hypotheses, and the description of participants, and discussion of the research findings. The chapter also presents the limitations of the study, implications of the major findings, recommendations, suggestions for future research, and conclusion.

Purpose of the Study

The purpose of this study was to know the current level of integration information technology and explore the barriers that might prevent the effective implementation of Integrating Information Technology in Libyan Higher Education from the perspective of faculty members at Benghazi University. The research was conducted to answer the following research questions:

1. To what extent do faculty members at Benghazi University know about information technology?
2. To what extent do faculty members at Benghazi University use information technology in their teaching?
3. What are the main barriers that might prevent the effective implementation of Integrating Information Technology in Libyan Higher Education from faculty members' perspective at Benghazi University?
4. Is there a difference between male and female faculty members at Benghazi University in:
    a. Their knowledge of information technology?
    b. Their use of information technology?
    c. The barriers they encountered?

5. Are the selected demographic variables of faculty members (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer Lab availability, technology skills level, technology professional development, computer location, computer use, internet access in school, and the knowledge of information technology) related to the use of information technology in their teaching?

Hypotheses of the Study

1. Faculty members at Benghazi University have a weak knowledge about information technology.
2. Faculty members at Benghazi University have a limited use of information technology in their teaching.
3. There are barriers that might prevent the effective implementation of Integrating Information Technology in Libyan Higher Education from faculty members' perspective at Benghazi University.
4. There is a significant difference between male and female faculty members at Benghazi University in:
   a. Their knowledge of information technology.
   b. Their use of information technology.
   c. The barriers they encountered. There is a relationship between the selected demographic variables of faculty members (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer Lab availability, technology skills level, technology professional development,

computer location, computer use, internet access in school, and the knowledge of information technology) and the use of information technology in their teaching.

Participants

The participant sample for this study consisted of male and female faculty members, who are supposed to work at Benghazi University during Fall 2014. The faculty members had different levels of education, number of years of teaching experience, and levels of technology skills. According to the faculty members' administration office at Benghazi University (2014), there was a total of 2,734 faculty members, 1,329 of whom have scholarships outside Libya, and 1,405 who were supposed to work at Benghazi University during Fall 2014.

The survey was sent to Libya at the beginning of November 2014, to be given to the faculty members who participated in the faculty members' meeting, which was at the end of December 2014. A total of 197 surveys were returned, and 14 incomplete surveys were excluded. The sample size was 183 participants from nine colleges at Benghazi University.

Discussion of Research Questions Findings

Research Question One

To what extent do faculty members at Benghazi University know about information technology?

Participants were asked, in the second part of the survey, to rate their current level of knowledge of information technology with 13 statements that described their experience with the following: (a) computers in general, (b) Word processing programs, (c) spreadsheet programs, (d) presentation programs, (e) image and drawing editing applications, (f) multimedia programs, (g) Online course support, (h) E-mail programs, (i) Web page creation programs, (j) Web

searching, (k) specific learning programs, (l) online social networking service, and (m) imaging device. Table 18 in Chapter 4 presented the descriptive statistics for these 13 items with more details.

As the results showed, the overall level of Benghazi University faculty members' knowledge of information technology was not high. The mean was 2.55 on the 4-point Likert scale (SD = 0.94). This is consistent with the finding from Hamdy (2007) who concluded that there is an acute shortage of ICT qualified and trained teachers, who are needed to bring ICT into classrooms and educate a new generation of technically, qualified students.

Faculty members' responses to this question ranged from 1.80 to 3.12, which indicated that most faculty members did not have much experience with the areas of information technology listed in the survey on this scale. The items that demonstrated the highest ratings on the scale were items 10 (M = 3.11) and 12 (M = 3.12); while the means from the other 11 items ranged from 1.80 to 2.99.

Item 10, "Web searching" (e.g., Google, Yahoo, etc.), received a mean of 3.11 (SD = 0.87). This indicated that faculty members at Benghazi University frequently used web searching engines, such as Google and Yahoo, to search for information. In addition, faculty members at this university also rated Item 12, "Online social networking service" (e.g., Facebook, Twitter, etc.), pretty high (M = 3.12, SD = 0.92). Responses to both items reflected that the faculty members were frequent web users. However, the lowest rating was for Item 7, "Online course support" (e.g., Course web pages, Blackboard, etc.), with a mean of 1.80 (SD = 0.84). Therefore, this contradiction indicated that the major purpose of the faculty members' use of the Internet was to search for information and/or to socialize. In other words, the faculty members seldom used the Internet for course development or support. This conclusion was

further supported by the faculty members' low rating on Item 9, "Web page creation programs" (e.g., Front Page, Dream weaver; M = 1.96, SD = 0.94). To conclude, the faculty members at Benghazi University used the Internet mainly for searching for information or networking, but not for course preparation, development or support.

The finding also showed that faculty members at Benghazi University believed that their knowledge of computers in general was pretty good, as reported for Item 1, "Computer in general," (M = 2.99, SD = 0.78). However, their overall rating across the items was not high (M = 2.55, SD = 0.94). This indicated that the faculty members in this sample had limited experience or knowledge in many areas of information technology and they may want to improve their knowledge in the areas, such as online course support, web page creation programs, specific learning programs (e.g., lab simulation), and so forth.

Research Question Two

To what extent do faculty members at Benghazi University use information technology in their teaching?

Participants were asked, in the second part of the survey, to rate their current level of use of information technology with 11 statements that described the frequency of their use of information technology. Table 19 in Chapter 4 presented the descriptive statistics for the 11 statements regarding faculty members' use of information technology.

Participants' responses to this question ranged from 1.46 to 2.26. The average rating regarding the use of information technology from the faculty members at Benghazi University was very low (M = 1.19, SD = 0.97). The item that demonstrated the highest rating on this scale was Item 2 with a mean of 2.26; while the means from the other 10 categories of using information technology ranged from 1.46 to 2.24. This was consistent with the findings of

Braun & Jones (2013) who mentioned that universities, such as Tripoli University, Benghazi University, and Academy of Postgraduate Studies and Economic Research, have the basic IT infrastructure (such as computers, Internet access, and a local area network), but faculty are still using the "traditional" way of learning and teaching; this is based on interactions in, and outside of, the classroom between students and teachers, and learning activities that are only available for the students while on campus.

The results showed that the faculty members' most frequent use of information technology was "creating multimedia presentations for the classroom" (M = 2.26, SD = 1.27), as reported by Item 2. The other two activities that the faculty members at Benghazi University were most frequently involved in using information technology were "accessing information and research on best practices for teaching" (M = 2.24, M = 0.97), as reported in Item 1, and "processing data and report results" (M = 2.24, M = 1.09), as reported in Item 11.

The results also showed that the faculty members seldom "share [their] students' work on the Web" (M = 1.46, SD = 0.77), based on participants' responses to Item 7, or "communicate with students outside of classroom hours" using information technology (M = 1.55, SD = 0.80), based on participants' responses to Item 10. These findings supported the argument of Braun & Jones (2013) that stated the "traditional" way of learning, teaching and communication was more popular in such universities as Benghazi University.

In conclusion, the faculty members at Benghazi University could make more effort to use information technology in their teaching, preparation for classes, communication and interaction with students, and sharing both their teaching materials and students' work.

Research Question Three

What are the main barriers that might prevent the effective implementation of Integrating Information Technology in Libyan Higher Education from faculty members' perspective at Benghazi University?

Participants were asked to rate their degree of agreement with 33 statements that represented the major barriers that might affect the integration of information technology. These 33 statements, or items, were categorized into four different areas: Policy and Support (8 items), Infrastructure and Resources (10 items), Attitudes of Faculty Members about Integrating Information Technology (9 items), and Preparation and Development (6 items). Tables 20, 21, 22, and 23 in Chapter 4 presented the descriptive statistics for the 33 barrier items in this third section of the survey.

Policy and Support. Faculty members' responses to the Policy and Support scale ranged from 1.61 to 2.80 (See Table 20). The overall rating of the barriers of policy and support from faculty members at Benghazi University indicated that they did not receive enough policy support from the ministry, the community, and the school or department regarding the integration of information technology (M = 2.26, SD = 0.91). The item that got the highest rating (i.e., the minimum barrier) was Item 6 ("Our department chair is knowledgeable about the integration of information"), with a mean of 2.80; while the means of the other 7 barriers in the Policy and Support category ranged from 1.61 to 2.62.

The results show that the faculty members at Benghazi University did not receive enough support from the education community regarding using information technology, as reported in Item 5, "There is a tangible motivation from education community to use information technology," (M = 1.61, SD = 1.01). This seems to be perceived as the main barrier of policy

and support that affected the integration of information technology at Benghazi University. The finding indicated that faculty members at Benghazi University need more support from the education community to integrate information technology.

The second largest barrier perceived by the participants was Item 4, "Specialists follow the integration of technology that I use in my teaching," (M = 1.89, SD = 0.83). The third largest barrier perceived by the participants was Item 3, "There is obligation from the ministry to let me use information technology," (M = 1.97, SD = 0.77). The low ratings on these two items show that the faculty members also need support not only from the specialists but also from the ministry in the process of integrating information technology.

Similar to one of the barriers identified by Moukali (2012)–lack of technical support offered by the university–participants in this study believed that the largest barrier was lack of support, from both the education community and the ministry, and from specialists who could follow the integration of technology.

Infrastructure and Resources. Faculty members' responses to the Infrastructure and Resources scale ranged from 2.02 to 2.98 (see Table 21). The overall rating of the barriers in infrastructure and resources by faculty members at Benghazi University indicated that there were some barriers in their integration of information technology (M = 2.60, SD = 0.94). The items that got the highest rating (i.e., the minimum barrier) were Item 2 ("The architecture of classrooms is suitable enough to use the information technology") and Item 1 ("There are enough computers and other computer peripherals at our university"), with a mean of 2.98; while the means of the other 8 barriers in the Infrastructure and Resources category ranged from 2.02 to 2.87.

The results showed that the faculty members at Benghazi University were not provided with fast enough Internet connections for use while teaching, as reported in Item 7, (M = 2.02, SD = 0.91). This seemed to be perceived as the main barrier of infrastructure and resources that affected the integration of information technology at Benghazi University. The second largest barrier perceived by the participants was Item 8, "There are computerized textbooks for most of our curricula," (M = 2.18, SD = 0.82). The low rating on this item reflected the faculty members' need of textbooks that could better help them integrating information technology in their teaching. These findings supported the findings regarding challenges in Libyan technological field by Rhema and Miliszewska (2010) who concluded that, even though computer labs are available in the majority of Libyan higher education institutions, Libyan universities still lack the required technological infrastructure; the lack of adequate network facilities places serious restrictions on Internet access. Educational software is very limited in Libyan higher institutions, as very few Arabic products are available, and the country lacks the capacity to develop its own products.

Attitudes about Integrating Information Technology. Faculty members' responses to the Attitude Toward Integrating Information Technology scale ranged from 3.97 to 4.16 (see Table 22). The overall rating of the barriers in attitudes toward integrating information technology from faculty members at Benghazi University indicated that they had a positive and high level of attitudes toward the integration (M = 4.00, SD = 0.80). The item that got the highest rating (i.e., the minimum barrier) was Item 9 ("I am willing to collaborate with specialists to integrating technology in my teaching"), with a mean of 4.16. The means of the other 8 barriers in the Attitude Toward Integrating Information Technology category ranged from 3.79 to 4.10.

The results showed that the faculty members at Benghazi University would like to have more time to develop activities/lessons integrating information technology, as described by Item 7 ("I have time to develop the activities/lessons that use information technology"), (M = 3.79, SD = 0.94). This seemed to be perceived as the main barrier of attitudes that affected the integration of information technology at Benghazi University. The second largest barrier perceived by the participants was Item 4, "Our department chair has positive attitudes towards integrating of information technology" (M = 3.92, SD = 0.73). The rating on this item indicated that the faculty members' would like to see more positive attitudes from the department chairs towards integrating information technology. These results were not consistent with the findings from Rhema and Miliszewska (2010) who stated educators had a low level of educational technology awareness and attitudes towards adopting information and communication technology for teaching in Libyan higher education institutions. This was due to a lack of computer experience by the majority of teachers and students, while others, who were familiar with computers, usually used them as a tool for communication or entertainment.

Preparation and Development Faculty members' responses to the Preparation and Development scale ranged from 3.97 to 4.16 (see Table 23). The Benghazi University faculty members' overall rating of the barriers in preparation and development indicated that they were facing some barrier in preparation and development regarding integrating information technology (M = 2.59, SD = 1.00). The item that got the highest rating (i.e., the minimum barrier) was Item 6 ("I have enough time to learn skills of how to integrate technology"), with a mean of 3.84. The means of the other 5 barriers in the Preparation and Development category ranged from 2.30 to 2.37.

The results showed that the faculty members at Benghazi University did not receive either enough or high quality pre-service and in-service technology professional development about how to use information technology. Item 2, "There is a pre-service training about the information technology skills," seemed to be perceived as the main barrier to preparation and development (M = 2.30, SD = 0.96). The rating on in-service training, as described in Item 3 ("There is an in-service training about the information technology skills"), was also not high (M = 2.37, SD = 1.02). In addition, faculty members' ratings on the quality of both pre-service (Item 4, M = 2.32, SD = 0.97) and in-service (Item 5, M = 2.35, SD = 0.98) training were low. Further, they were not satisfied with the information technology training opportunities provided in their university (M = 2.33, SD = 1.07). All these findings agreed with Moukali's (2012) finding that the participants in his study lacked technical training programs provided by the university.

Research Question Four

There is a significant difference between male and female faculty members at Benghazi University in:

a) Their Knowledge of information technology?

b) Their use of information technology?

c) The barriers they encountered?

A series of independent samples *t*-tests were conducted to examine the gender differences regarding three survey scales: (a) participants' knowledge of information technology, (b) their use of information technology, and (c) the barriers they encountered when using information technology. The statistical results of these analyses are displayed in Table 24 in Chapter 4.

The difference between male and female faculty members' knowledge of information technology was not statistically significant, with $t(181) = -2.69$, $p = 0.78$. The mean knowledge level for male faculty members was 2.53 with SD = 0.82, while the mean knowledge level for female faculty members was 2.56 with SD = 0.68. This indicated that both male and female faculty members at Benghazi University had a similar level of knowledge regarding information technology. This finding was not consistent with either Bowman and Mertz (1997), who found that male faculty members rated their knowledge and experience with some innovative technologies higher than did female faculty members, and Moukali (2012), who found that male faculty members had had more experience with educational technologies than had female faculty members.

The difference in male and female faculty members' use of information technology was barely statistically significant, with $t(181) = 2.00$, $p = .047$. The mean level of using information technology for male faculty members was 2.02 with SD = 0.63, while the mean level of using information technology for female faculty members was 1.84 with SD = 0.60. This meant male faculty members at Benghazi University probably used information technology more frequently than did their female peers. This was an interesting finding because it had been shown in previous analysis that the female faculty members' mean knowledge level of information technology was higher than that of male faculty members'.

The difference between male and female faculty members' opinion regarding the barrier in policy and support was statistically significant, with $t(181) = 2.75$, $p = .007$. The mean of the barrier in policy and support for male faculty members was 2.41 with SD = 0.60; the mean of the barrier in policy and support for female faculty members was 2.16 with SD = 0.62. This meant that male faculty members at Benghazi University encountered more barriers in policy and

support than did female faculty members when integrating information technology. Considering the previous finding that male faculty members used information technology more often than female faculty members, it makes sense that, the more male faculty members used information technology, the more likely that they encountered barriers.

The difference between male and female faculty members' opinions regarding the barrier in infrastructure and resources was not statistically significant, with $t(181) = 0.40$, $p = .69$. The mean of the barrier in infrastructure and resources for male faculty members was 2.62 with SD = 0.45; the mean of the barrier in infrastructure and resources for female faculty members was 2.59 with SD = 0.56. That meant, in regard to infrastructure and resources, both male and female faculty members at Benghazi University probably encountered the same amount of barriers.

The difference between male and female faculty members' opinions regarding their attitudes toward integrating information technology as a barrier was not statistically significant, with $t(181) = -0.64$, $p = 0.52$. The mean attitude of male faculty members toward integrating information technology was 3.97 with SD = 0.54; the mean attitude of female faculty members toward integrating information technology was 4.02 with SD = 0.58. This indicated that both male and female faculty members at Benghazi University basically agreed with each other when perceiving their attitude toward integrating information technology as barriers to using information technology.

The difference between male and female faculty members' opinions regarding preparation and development as a barrier was not statistically significant, with $t(181) = 0.58$, $p = 0.56$. The mean level of preparation and development for male faculty members was 2.62 with SD = 0.71; the mean level of preparation and development for female faculty members was 2.56 with SD = 0.81. This indicated that, when considering if there were barriers in preparation and

development, both male and female faculty members at Benghazi University shared similar opinions.

Research Question Five

Are the selected demographic variables of faculty members (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer Lab availability, technology skills level, technology professional development, computer location, computer use, internet access in school, and the knowledge of information technology) related to the use of information technology in their teaching?

Research Question 5 examined if, at Benghazi University, faculty members' use of information technology in their teaching could be predicted by their demographic information. A multiple regression analysis was conducted to evaluate how well the 13 demographic variables (gender, academic department, years of teaching, location of highest academic degree, level of education, computer availability classroom, computer Lab availability, technology skills level, technology professional development, computer location, computer use, Internet access in school, and the knowledge of information technology) could predict faculty members' use of information technology.

The linear combination of the 13 demographic variables was significantly related to the faculty members' use of information technology in their teaching, with $F(22, 160) = 12.39$, $p < .001$. The sample multiple correlation coefficient was $R = .81$, and the effect size for the overall regression analysis was $R^2 = 0.66$, which indicated that approximately 66% of the variance in faculty's use of information technology at Benghazi University was explained by the linear combination of the 13 demographic variables.

The results showed that the faculty members from the School of Arts and the School of Law had a significantly lower level of using information technology than faculty members from the School of Information Technology. Faculty members from the School of Media had a higher, but not significantly, level of using information technology than faculty members from the School of Information Technology. Faculty members from other schools had a lower, but not significantly, level of using information technology than faculty members from School of Information Technology.

Results also showed that faculty members from departments with a computer lab for students had a significantly lower level of using information technology in their teaching than those from departments without a computer lab for students, $\beta = -0.14$, $p = .03$. In addition, results showed that faculty members who had a better knowledge of information technology had a significantly higher level of using information technology, $\beta = -4.44$, $p < .001$.

It was shown that the rest of the factors (gender, years of teaching, location of highest academic degree, level of education, computer availability classroom, technology skills level, technology professional development, computer location, computer use, internet access in school) had no significant influence on faculty members' use of information technology.

Limitations of the Study

The current study faced some limitations as follows:

1. This study was conducted in the Fall of 2014 and only focused on higher education teachers, and the sample was drawn from only one university in Libya, Benghazi University. Therefore, the findings of this study might not be generalizable to other Libyan universities.
2. This study was focused on investigating the relationship between demographic variables (gender, academic department, years of teaching, location of highest academic degree, level

of education, computer availability classroom, computer Lab availability, technology skills level, technology professional development, computer location, computer use, internet access in school) and the use of information technology.

3. The barriers that might prevent the effective implementation of integrating information technology in Libyan higher education came only from the perspective of the faculty members at Benghazi University.
4. The participants were selected based on who was available at the faculty members' meeting.
5. There was a limitation in communication, since the researcher did not have a chance to distribute the research surveys personally, due to the war in Libya.

Implications

The purpose of this study was to determine the current level of integration information technology and explore the barriers that might prevent the effective implementation of integrating information technology in Libyan higher education from the perspective of faculty members at Benghazi University. This study found that the overall level of faculty members' knowledge of information technology was not high and the use of information technology was very low. The study also discovered the main barriers that might negatively affect integrating information technology into Libyan higher education (policy and support) were not high. Faculty members also faced some barriers of infrastructure and resources. In addition, they faced some barriers of preparation and development that affected the implementation of integrating information technology. However, faculty members at Benghazi University indicated that they had a positive and high level of attitudes toward the integration.

Administrators in Benghazi University should encourage its faculty members to implement information technology in their teaching by developing the necessary technological

infrastructure in the classrooms, such as providing computers and high-speed Internet, technical support, and technology professional development programs.

Furthermore, implications of this study revealed that not nearly enough research has been done to discover both the underlying reasons why information technology adoption in Libyan higher education has been so slow and the environmental factors, which may also be contributing to this. The results of this study provide valuable knowledge into participants' attitudes toward integrating information technology in their teaching. Furthermore, research in this relatively "new" population may reveal valuable findings regarding information technology learning motivation factors, attitudes and numerous other findings that are waiting to be studied.

Libya, as a society, must first understand the complex and unlimited benefits that computer technology can offer. It must also take an interest in trying to deploy skilled faculty members, and other professionals, to educate students on their use and benefits. The political and legal environment must also be ratified and reformed to allow its citizens more access to an Internet infrastructure, so they may begin to benefit from all it has to offer. Only after these changes and realizations occur will students, who are the main concern and focus, begin to transform their thinking and learning experiences. The Libyan higher education system must realize that the universities that integrate technology into their classrooms will survive and thrive, while those who do not do so will not.

Recommendations

In the light of the results of this study, the researcher offers the following recommendations that might assist higher education decision makers and faculty members in integrating information technology in Libyan higher education.

1. Higher education decision makers in Libya must have a strategic plan for integration of information technology into Libyan Universities.
2. Universities' administrators should create comprehensive plans of how and when to use technology appropriately.
3. Libyan universities should benefit from the experiments of other universities around the world in the field of integration of information technology.
4. Libyan universities should design effective technology professional-development programs to improve technological knowledge and skills.
5. There should be cooperation between universities and technology professional-development centers to assist faculty members fully to integrate information technology into their teaching practices.
6. Libyan universities should encourage everyone at the universities (faculty members, students, staffs, and administrators) to improve their technological skills by providing free technology professional-development programs.
7. All computer labs at Libyan Universities should be equipped with the newest technological tools, and high-speed Internet.
8. The necessary technological infrastructure should be developed in the classrooms.
9. Universities should be provided with adequate technical support to assist faculty members in using different technology.
10. Classrooms must have a technological infrastructure to be prepared for integration of information technology.
11. There must be sufficient access to digital libraries and a variety resources enabled.

12. Attention must be paid to the educational technology field by adding it as an academic program in all education schools in Libya.
13. The media should be used to deliver lectures to the whole society that will create an intensification of awareness about the unlimited benefits that using technology can offer in the education field.
14. Faculty members at Benghazi University should make more effort to use information technology in their teaching, preparation for classes, communication and interaction with students, and sharing both their teaching materials and students' work.

Suggestions for Future Research

The researcher recommends the following suggestions for future research:

1. This study should be replicated at other Libyan universities to determine the current level of integration of information technology and the barriers that might prevent the effective implementation of integrating information technology into Libyan higher education.
2. A study should be conducted at Benghazi University and other universities to investigate the barriers that might face other parties in the educational process, such as administrators and students.
3. A study should be conducted as a comparative study to find out if there are any differences between integrating information technology at Benghazi University and at other universities in Libya.
4. Future studies must look at the best strategies for effectively integrating information technology into Libyan higher education.
5. A qualitative study on the pros and cons of integrating information technology in Libyan higher education should be done.

6. Study should be done to investigate the barriers to integrating information technology from the perspective of the decision makers at the Libyan Ministry of Higher Education.
7. A study should be done to evaluate the existing technology professional-development centers that offer training programs for faculty members in the information technology field.

Conclusions

The purpose of this study was to determine the current level of integration of information technology and explore the barriers that might prevent the effective implementation of Integrating Information Technology in Libyan Higher Education from the perspective of faculty members at Benghazi University.

Benghazi University was selected as the location for conducting this study. The data were collected via a survey that was developed to explore barriers to integrating information technology in Libyan higher education. The participant sample for this study consisted of male and female faculty members, who worked at Benghazi University during the Fall of 2014. Faculty members have different levels of education, number of years of teaching experience, and levels of technology skills. The sample size was 183 participants from nine colleges at Benghazi University.

The results of the study showed the following:

1. The overall level of faculty members' knowledge of information technology was not high at Benghazi University: the mean was 2.55 on the 4-point Likert scale (SD = 0.94).
2. Most faculty members did not have much experience with the areas of information technology listed in the survey.
3. Faculty members believed that their knowledge of computers in general was pretty good.

4. The use of information technology from the faculty members at Benghazi University was very low (M = 1.19, SD = 0.97).
5. The most frequent use of information technology was "creating multimedia presentations for the classroom" (M = 2.26, SD = 1.27).
6. The faculty members seldom "share [their] students' work on the Web" (M = 1.46, SD = 0.77)
7. The overall rating of the barriers of policy and support from faculty members at Benghazi University indicated that they did not receive enough policy support from the Ministry, the community, the school, or department regarding the integration of information technology (M = 2.26, SD = 0.91).
8. The faculty members at Benghazi University were not provided with fast enough Internet connections for use while teaching.
9. There is a lack of computerized textbooks that could better help the faculty members in integrating information technology into their teaching.
10. The faculty members had positive and high levels of attitudes toward the integration (M = 4.00, SD = 0.80).
11. The faculty members would like to have more time to develop activities/lessons integrating information technology.
12. The faculty members would like to see more positive attitudes from the department chairs towards integrating information technology.

13. The faculty members did not receive either enough or high quality pre-service and in-service technology professional development about how to use information technology.

14. Faculty members' ratings on the quality of both pre-service service and in-service technology professional development were low.
15. The difference btween male and female faculty members' knowledge of information technology was not statistically significant, with $t(181) = -2.69$, $p = 0.78$. This indicated that both male and female faculty members at Benghazi University had similar levels of knowledge regarding information technology.
16. The difference between in male and female faculty members' use of information technology was barely statistically significant, with $t(181) = 2.00$, $p = .047$. The mean level of using information technology for male faculty members was 2.02 with SD = 0.63, while the mean level of using information technology for female faculty members was 1.84 with SD = 0.60. This means male faculty members at Benghazi University probably used information technology more frequently than their female peers.
17. The difference between male and female faculty members' opinions regarding the barrier in policy and support was statistically significant, with $t(181) = 2.75$, $p = .007$. The mean of the barrier in policy and support for male faculty members was 2.41 with SD = 0.60; the mean of the barrier in policy and support for female faculty members was 2.16 with SD = 0.62.
18. The difference between male and female faculty members' opinions regarding the barrier in infrastructure and resources was not statistically significant, with $t(181) = 0.40$, $p = .69$. The mean of the barrier in infrastructure and resources for male faculty members was 2.62 with SD = 0.45; the mean of the barrier in infrastructure and resources for female faculty members was 2.59 with SD = 0.56.
19. The difference between male and female faculty members' opinions regarding their attitudes toward integrating information technology as a barrier was not statistically significant, with

$t(181) = -0.64$, $p = 0.52$. The mean attitude of male faculty members toward integrating information technology was 3.97 with SD = 0.54; the mean attitude of female faculty members toward integrating information technology was 4.02 with SD = 0.58.

20. The difference between male and female faculty members' opinions regarding preparation and development as a barrier was not statistically significant, with $t(181) = 0.58$, $p = 0.56$. The mean level of preparation and development for male faculty members was 2.62 with SD = 0.71; the mean level of preparation and development for female faculty members was 2.56 with SD = 0.81.
21. Faculty members from the School of Arts and the School of Law had a significantly lower level of using information technology than faculty members from the School of Information Technology.
22. Faculty members from the School of Media had a higher, but not significantly higher, level of using information technology than faculty members from the School of Information Technology.
23. Faculty members from other schools had a lower, but not significantly lower, level of using information technology than faculty members from the School of Information Technology.
24. Faculty members from departments with a computer lab for students had a significantly lower level of using information technology in their teaching than those from departments without a computer lab for students, $\beta = -0.14$, $p = .03$.

The demographic variables (gender, years of teaching, location of highest academic degree, level of education, computer availability classroom, technology skills level, technology professional development, computer location, computer use, internet access in school) had no significant influence on faculty members' use of information technology.

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APPENDICES

Appendix (A)

THE UNIVERSITY OF KANSAS
Research

APPROVAL OF PROTOCOL

October 31, 2014

Faiza Elshaikhi
5735299185
faiza@ku.edu

Dear Faiza Elshaikhi:

On 10/31/2014, the IRB reviewed the following submission:

Type of Review:	Initial Study
Title of Study:	Barriers to Integrating Information Technology in Libyan Higher Education
Investigator:	Faiza Elshaikhi
IRB ID:	STUDY00001071
Funding:	Name: University Governance, Funding Source ID: CBIE
Grant ID:	
Documents Reviewed:	• Information Statement_HSCL.pdf, • Initial Submission Form.pdf, • survey_arabic version.pdf, • survey-english version.pdf, • 1000_FS_Kansas_FALL 2014(1).pdf

The IRB approved the study on 10/31/2014.

1. Notify HSCL about any new investigators not named in the original application. Note that new investigators must take the online tutorial at https://rgs.drupal.ku.edu/human_subjects_compliance_training.
2. Any injury to a subject because of the research procedure must be reported immediately.
3. When signed consent documents are required, the primary investigator must retain the signed consent documents for at least three years past completion of the research activity.

Continuing review is not required for this project, however you are required to report any significant changes to the protocol prior to altering the project.

Please note university data security and handling requirements for your project:
https://documents.ku.edu/policies/IT/DataClassificationandHandlingProceduresGuide.htm

You must use the final, watermarked version of the consent form, available under the "Documents" tab in eCompliance.

Sincerely,

Stephanie Dyson Elms, MPA
IRB Administrator, KU Lawrence Campus

Human Subjects Committee Lawrence
Youngberg Hall | 2385 Irving Hill Road | Lawrence, KS 66045-7568 | (785) 864-7429 | www.research.ku.edu

Appendix (B)

Information Statement

The Department of Educational Leadership & Policy Studies at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You should be aware that even if you agree to participate, you are free to withdraw at any time without penalty. The purpose of this study is to know the current level of integration information technology and exploring the barriers that might prevent the effective implementation of Integrating Information Technology from faculty members' perspective. The content of the study should cause no more discomfort than you would experience in your everyday life. Your participation is solicited, although strictly voluntary, and your name will not be associated with the research findings. Although participation may not benefit you directly, we believe that the information obtained from this study will help us gain a better understanding of the level of job satisfaction at this university. You will likely complete the survey in less than 20 minutes.

If you would like additional information concerning this study before or after it is completed, please feel free to contact us by phone or mail. Completion of the study indicates your willingness to participate in this study and that you are at least 18 years old. If you have any additional questions about your rights as a research participant, you may call (785) 864-7429 or write the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7563, email irb@ku.edu.

Sincerely,

Faiza Saad Elshaikhi
Student Researcher
Educational Leadership
& Policy Studies Dept.
University of Kansas
Lawrence, KS 66045
(573) 529 - 9185

Faiza@ku.edu

Dr. Ron Aust
Faculty Supervisor
Educational Leadership
& Policy Studies Dept.
University of Kansas
Lawrence, KS 66045
(785) 864 - 3466

aust@u.edu

Approval on Using Survey Instrument

From: Abdulkareem alalwani [[redacted]]
Sent: Saturday, November 02, 2013 5:49 AM
To: Elshaikhi, Faiza Saad
Subject: Re: a permission to use your survey

Salam Alekum Ms. Faiza,
You are welcome to use my dissertation survey.
Please provide me a copy of your dissertation when you are done with your study.
I wish you all the best.
Regards.

Dr. Abdulkareem Eid Al-Alwani

Hello Dr. Alwani,

My name is Faiza Elshaikhi, a PhD candidate at Educational Technology Program / University of Kansas. I would like to take your permission to use your dissertation survey that titled " Barriers to Integrating Information Technology in Saudi Arabia Science Education" for my dissertation survey. I might use the whole survey or some parts of it. Your assistance will be appreciated.

Thank you,

Faiza Elshaikhi
Department of Educational
Leadership and Policy Studies
School of Education
University of Kansas
Faiza@ku.edu

Appendix (D)

English Version

Integration Information Technology Survey

Part I: Demographic Information

Please choose one option to answer the following questions and do not forget to write your answers for questions 2, 3and 4.

Question	Answer		
1. Identify your gender:	Male	Female	
2. In which academic department do you work?			
3. How many years have you been teaching?			
4. I obtained my highest academic degree from:			
5. What is your level of education?	Master's degree	Doctorate	
6. Do you have computers in your classroom?	Yes	No	
7. Is there a computer lab in your department for the students?	Yes	No	
8. What is your level of technology skills?	Beginner	Intermediate	Advanced
9. When do you obtained the technology-training program?	Pre-service	In-service	
	Pre-service & In-service	None	
10. Where do you have a computer?	Home	School	
	Home & School	I do not have	
11. Where do you usually use a computer?	Home	School	
	Home & School	I do not use it	
12. Where you have access to the Internet?	Home	School	
	Home & School	I do not have	

Part II: Current Level of Integrating Information Technology

1: Knowledge of Information Technology

For each statement, please circle the appropriate number that best describes your current level of experience with technologies by using this scale:

1= No Experience. 2= Very Little Experience. 3= Some Experience. 4= A lot of Experience

Knowledge of Information Technology	No Experience	Very Little Experience	Some Experience	A lot of Experience
1. Computers in general	1	2	3	4
2. Word processing programs (e.g. Microsoft Word)	1	2	3	4
3. Spreadsheet programs (e.g. Microsoft Excel)	1	2	3	4
4. Presentation programs (e.g., Power point)	1	2	3	4
5. Image & Drawing editing applications (e.g., iMovie)	1	2	3	4
6. Multimedia programs (e.g., Flash)	1	2	3	4
7. Online course support (e.g. Course web pages, Blackboard, etc.)	1	2	3	4
8. E-mail programs (e.g. Outlook Express, Yahoo, Hotmail...etc.)	1	2	3	4
9. Web page creation programs (e.g., Front Page, Dream weaver)	1	2	3	4
10. Web searching (e.g. Google, Yahoo, etc.).	1	2	3	4
11. Specific learning programs (e.g., lab simulation)	1	2	3	4
12. Online social networking service (e.g., Facebook, Twitter, etc.)	1	2	3	4
13. Imaging device (e.g. using scanner, digital or video camera, etc.).	1	2	3	4
Other, please specify:				

2: Usage of Information Technology

For each objective listed below, please indicate how often you use information technology in your teaching by using this scale:

1= Never, 2= Rarely, 3= Sometimes, 4= Often, 5= Always

Using Information Technology to	Never	Rarely	Sometimes	Often	Always
1. Access information and research on best practices for teaching	1	2	3	4	5
2. Create multimedia presentations for the classroom.	1	2	3	4	5
3. Improve my instructional performance.	1	2	3	4	5
4. Manage my courses (e.g., blackboard: post homework or other class requirements, grades, project information or suggestions.)	1	2	3	4	5
5. Facilitate complex thinking skills.	1	2	3	4	5
6. Product creative works.	1	2	3	4	5
7. Share my students' work on the Web.	1	2	3	4	5
8. Support learning and research (e.g., use content-specific tools).	1	2	3	4	5
9. Collaborate with colleagues and experts /or other professionals.	1	2	3	4	5
10. Communicate with students outside of classroom hours.	1	2	3	4	5
11. Process data and report results.	1	2	3	4	5
Other, please specify:					

Part III: The Integration of Information Technology

For each statement, please indicate to what extent you agree or disagree with each of the following statements by circling the appropriate number.

1= Strongly Disagree; 2= Disagree; 3= Undecided; 4= Agree; 5= Strongly Agree

Policy and Support	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1. Our university has a good strategic plan for integration information technology.	1	2	3	4	5
2. There is a specific budget for information technology in our university.	1	2	3	4	5
3. There is obligation from the ministry to let me use information technology.	1	2	3	4	5
4. Specialists follow the integration of technology that I use in my teaching.	1	2	3	4	5
5. There is a tangible motivation from education community to use information technology.	1	2	3	4	5
6. Our department chair is knowledgeable about the integration of information technology.	1	2	3	4	5
7. Our department chair has positive attitudes towards application of information technology.	1	2	3	4	5
8. There is enough technical support/advice for information technology integration in our department.	1	2	3	4	5
9. The ministry of education does require me to use technology in my teaching.	1	2	3	4	5

Infrastructure and Resources	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1. There are enough computers and other computer peripherals at our university.	1	2	3	4	5
2. The architecture of classrooms is suitable enough to use the information technology.	1	2	3	4	5
3. There is appropriate number of students in classrooms to use information technology.	1	2	3	4	5
4. There is Internet service in our department.	1	2	3	4	5
5. Students do have an opportunity to access the Internet during the school day.	1	2	3	4	5
6. Students do have adequate access to information technology outside of the university.	1	2	3	4	5
7. Internet connection is fast enough for use while teaching.	1	2	3	4	5
8. There are computerized textbooks for most of our curricula.	1	2	3	4	5
9. There are specialized Arabian websites on the Internet	1	2	3	4	5
10. There are specialized Arabian software programs.	1	2	3	4	5
11. I can access to technical support in using information technology in my teaching	1	2	3	4	5

Attitudes of Faculty Members about integrating Information Technology	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1. I believe in the importance of using information technology in teaching.	1	2	3	4	5
2. I am interested in implementing information technology to deliver courses.	1	2	3	4	5
3. I consider using information technology in teaching saving time.	1	2	3	4	5
4. Our department chair has positive attitudes towards integrating of information technology.	1	2	3	4	5
5. I believe that using information technology will improve my teaching skills.	1	2	3	4	5
6. I think it is easy for me to manage the classroom while applying information technology.	1	2	3	4	5
7. I have time to develop the activities/lessons that use information technology.	1	2	3	4	5
8. Integrating information technology increases the social interaction between my students and me.	1	2	3	4	5
9. I am willing to collaborate with specialists to integrating technology in my teaching.	1	2	3	4	5

Preparation and Development	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
1. The information technology training opportunities are available in our university.	1	2	3	4	5
2. There is a pre-service training about the information technology skills.	1	2	3	4	5
3. There is an in-service training about the information technology skills.	1	2	3	4	5
4. My pre-service training to use information technology was good.	1	2	3	4	5
5. My in-service training to use information technology was good.	1	2	3	4	5
6. I have enough time to learn skills of how to integrating technology.	1	2	3	4	5

If you have any other barriers that are not mentioned above, please specify them:

_____

_____

_____

_____

_____

_____

-Thank You So Much-

Appendix (E)

Arabic Version

استبيان يخص دمج تقنية المعلومات

الأستاذ الفاضل/

تحية طيبة وبعد..

أفيدكم بأني طالبة في مرحلة الدكتوراه في جامعة كانسس في الولايات المتحدة الامريكية، وأقوم بإعداد بحث علمي بعنوان "معوقات دمج تقنية المعلومات في التعليم العالي في ليبيا".

ويهدف البحث إلي معرفة المستوى الحالي لدمج تقنية المعلومات مع تقصى المعوقات التي تحول دون التطبيق الفعال لهذه التقنيات من وجهة نظر أعضاء هيأة التدريس في جامعة بنغازي.

وشكراً لحسن تعاونكم سلفاً ،،

الباحثة/

أ.فائزة الشيخي
قسم القيادة التربوية والدراسات السياسية/ جامعة كانسس
Faiza@ku.edu

أولاً: المعلومات الديموغرافية

من فضلك، اختر الإجابات المناسبة للإجابة علي الأسئلة التالية، مع كتابة الإجابات بالنسبة للأسئلة 2, 3 و 4.

السؤال	الإجابة		
1 . حدد جنسك	ذكر ◯	أنثى ◯	
2 . في أي قسم أكاديمي تعمل؟			
3 . كم عدد السنوات التي قضيتها في التدريس ؟			
4 . من أين حصلت على أعلى درجة علمية لديك؟			
5 ما هي أعلى درجة علمية لديك.	ماجستير ◯	دكتوراه ◯	
6 هل لديك جهاز حاسب آلي "Computer" في قاعة التدريس؟	نعم ◯	لا ◯	
7 هل يوجد معمل حاسب آلي في قسمك العلمي للطلبة؟	نعم ◯	لا ◯	
8 حدد مستوى مهاراتك في استخدام الحاسب الآلي	مبتدئ ◯	متوسط ◯	متقدم ◯
9 متى حصلت على دورات في تقنية المعلومات؟	قبل الخدمة ◯	أثناء الخدمة ◯	
	قبل وأثناء الخدمة ◯	لا يوجد ◯	
10 أين يوجد لديك جهاز حاسب آلي؟	في المنزل ◯	في الكلية ◯	
	في المنزل والكلية ◯	لا يوجد ◯	
11 أين تستخدم عادة الحاسب الآلي؟	في المنزل ◯	في الكلية ◯	
	في المنزل والكلية ◯	لا استخدمه ◯	
12 أين يمكنك الحصول على الإنترنت" Internet"	في المنزل ◯	في الكلية ◯	
	في المنزل والكلية ◯	لا أحصل عليه ◯	

ثانياً: المستوى الحالي في دمج تقنية المعلومات

أ- الخبرة في مجال تقنية المعلومات

لكل فقرة، أرجو اختيار الرقم المناسب الذي يصف مستوى خبرتك في تقنية المعلومات معتمداً علي التدرج الأتي:

1= لا توجد خبرة 2= القليل من الخبرة 3 = بعض الخبرة 4= الكثير من الخبرة

الفقرة	لا توجد خبرة	القليل من الخبرة	بعض الخبرة	الكثير من الخبرة
1- أجهزة الحاسب الآلي بصفة عامة	1	2	3	4
2- برامج معالجة الكلمات مثل ((Microsoft word)	1	2	3	4
3- برامج الجداول الإلكترونية مثل (Microsoft Excel)	1	2	3	4
4- برامج العروض التقديمية مثل (Microsoft Power point)	1	2	3	4
5- برامج تعديل الصورة والرسومات مثل (Adobe Photoshop)	1	2	3	4
6- برامج الوسائط المتعددة مثل (Flash)	1	2	3	4
7- الدعم المباشر للمقررات الدراسية بواسطة الانترنت مثل (Blackboard, Course web pages)	1	2	3	4
8- برامج البريد الإلكتروني مثل (Hotmail, Yahoo)	1	2	3	4
9- برامج تصميم الصفحات علي الانترنت مثل (Front page, Dreamweaver)	1	2	3	4
10- البحث والتصفح مثل (Yahoo, Google)	1	2	3	4
11- برامج تعليمية خاصة مثل (Lab simulation)	1	2	3	4
12- برامج التواصل الاجتماعي مثل (Face book, Twitter)	1	2	3	4
13- أجهزة التصوير مثل (Scanner, digital or video Camera)	1	2	3	4
برامج أخرى (حددها من فضلك)				

بـ استخدام تقنية المعلومات

حدد من فضلك مدى استخدامك لتقنية المعلومات في تدريسك لإنجاز المهام المدرجة أدناه، معتمداً علي التدرج الآتي:

1 = أبداً، 2 = نادراً، 3 = أحياناً، 4 = غالباً، 5= دائماً

استخدم تقنية المعلومات	أبداً	نادراً	أحياناً	غالباً	دائماً
1 للعثور علي معلومات وأبحاث عن أفضل طرائق التدريس.	1	2	3	4	5
2 لإعداد عروض تقديمية لاستخدامها أثناء الدرس.	1	2	3	4	5
3 لتحسين أداني التعليمي.	1	2	3	4	5
4 لإدارة المقرر الدراسي مثل (التعليمات، الواجبات، الدرجات، والمقترحات. إلخ)	1	2	3	4	5
5 لتسهيل مهارات التفكير المعقدة.	1	2	3	4	5
6 لإنتاج الأعمال الابداعية.	1	2	3	4	5
7 لمشاركة أعمال طلابي علي الانترنت	1	2	3	4	5
8 لدعم البحث والتعلم: استخدام برامج تدعم محتوى معين مثل (Google Earth)	1	2	3	4	5
9 للتعاون مع الزملاء والخبراء والمحترفين في مجال التخصص.	1	2	3	4	5
10 للتواصل مع الطلاب في غير ساعات الدراسة.	1	2	3	4	5
11 لتحليل البيانات واستخلاص النتائج.	1	2	3	4	5
استخدامات أخرى، أذكرها من فضلك					

ثالثاً: دمج تقنية المعلومات

من فضلك، حدد مدى اتفاقك أو عدم اتفاقك مع الفقرات التالية، وذلك باختيار الرقم المناسب وفق التدرج الآتي:

1= غير موافق بشده ، 2=غير موافق ، = لا أدري، 4 = موافق ، 5 = موافق بشدة

مجال السياسات والدعم	غير موافق بشدة	غير موافق	لا أدري	موافق	موافق بشدة
1- لدى جامعتنا خطة استراتيجية جيدة لدمج تقنية المعلومات.	1	2	3	4	5
2- هناك ميزانية مخصصة لدعم تقنية المعلومات في جامعتنا.	1	2	3	4	5
3- يوجد إلزام من وزارة التعليم العالي بضرورة استخدام تقنية المعلومات في تدريسنا.	1	2	3	4	5
4- المتخصصون يتابعون دمج تقنية المعلومات في تدريسي.	1	2	3	4	5
5- توجد حوافز مادية للتشجيع علي استخدام تقنية المعلومات.	1	2	3	4	5
6- رئيس قسمنا لديه معرفة كافية بتقنية المعلومات.	1	2	3	4	5
7 رئيس قسمنا يشجع على تطبيق تقنية المعلومات	1	2	3	4	5
8- يوجد دعم فني لدمج تقنية المعلومات في قسمنا.	1	2	3	4	5

مجال اتجاهات أعضاء هيأة التدريس نحو دمج تقنية المعلومات	غير موافق بشدة	غير موافق	لا أدري	موافق	موافق بشدة
1 أنا أؤمن بأهمية دمج تقنية المعلومات في التدريس.	1	2	3	4	5
2- أنا مهتم بتنفيذ تقنية المعلومات وتقديم دورات.	1	2	3	4	5
3 ـ اعتقد أن استخدام تقنية المعلومات في التدريس يحافظ علي الوقت.	1	2	3	4	5
4 أعضاء هيأة التدريس في قسمنا لديه اتجاهات إيجابية نحو دمج تقنية المعلومات.	1	2	3	4	5
5 اعتقد أن استخدام تقنية المعلومات يحسن مهارات التدريس لدي.	1	2	3	4	5
6 اعتقد أنه من السهل على إدارة محاضرتي أثناء تطبيق تقنية المعلومات.	1	2	3	4	5

7 لدى الوقت لتطوير الدروس والأنشطة التي تطبق باستخدام تقنية المعلومات.	1	2	3	4	5
8 دمج تقنية المعلومات يزيد من التفاعل الاجتماعي بيني وبين طلابي.	1	2	3	4	5
9 ـ أنا مستعد للتعاون مع المتخصصين لدمج تقنية المعلومات في تدريسي.	1	2	3	4	5

مجال البنية التحتية والمصادر	غير موافق بشدة	غير موافق	لا أدري	موافق	موافق بشدة
1ـ توجد معدات وأجهزة حاسب آلي ومعامل كافية في جامعتنا.	1	2	3	4	5
2 التصميم الهندسي للحجرات الدراسية مناسب لاستخدام تقنية المعلومات.	1	2	3	4	5
3 عدد الطلاب مناسب لاستخدام تقنية المعلومات.	1	2	3	4	5
4 ـ توجد خدمات "انترنت" في قسمنا.	1	2	3	4	5
5ـ لدى الطلاب فرصة للحصول علي انترنت أثناء تواجدهم في الجامعة.	1	2	3	4	5
6 يتوفر للطلاب استخدام الإنترنت خارج الجامعة.	1	2	3	4	5
7ـ خدمات الانترنت سريعة بشكل يسهل معه استخدامها أثناء التدريس.	1	2	3	4	5
8ـ توجد كتب مبرمجة لمعظم مناهجنا.	1	2	3	4	5
9 توجد مواقع عربية متخصصة علي الانترنت	1	2	3	4	5
10ـ توجد برمجيات باللغة العربية.	1	2	3	4	5

مجال الإعداد والتطوير	غير موافق بشدة	غير موافق	لا أدري	موافق	موافق بشدة
1 فرص التدريب علي تقنية المعلومات متوفرة في جامعتنا.	1	2	3	4	5
2 يوجد تدريب "قبل الخدمة" يخص مهارات تقنية المعلومات.	1	2	3	4	5
3 - يوجد تدريب "أثناء الخدمة" يخص مهارات تقنية المعلومات.	1	2	3	4	5
4 التدريب قبل الخدمة علي استخدام تقنية المعلومات كان جيداً.	1	2	3	4	5
5 التدريب أثناء الخدمة علي استخدام تقنية المعلومات كان جيداً	1	2	3	4	5
6 لدى وقت كافي لتعلم مهارات دمج تقنية المعلومات.	1	2	3	4	5

إذا كان هناك أي معوقات أخرى لم تذكر أعلاه، أذكرها من فضلك