

# Improving engineering research quality in Libyan higher education institutions and their role in closing the digital divide

(Doctoral Study Program)

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**Abstract**— This report attempts to uncover the elements that enable Alfateh University to bridge the digital gap and improve the quality of engineering research through successful ICT deployment. The authors investigate the worldwide digital divide, focusing on the inequalities in information technology between developed and developing nations (including Libya), as well as overall rates of social and technical growth. Also, look at the connection between the digital gap and HE instruction, as well as the present state of the digital gap in Libya. It is self-evident that a successful ICT adoption should begin with a thorough grasp of particular faculty demands. The relevance of implementing electronic education at Libyan institutions, as well as the difficulties and solutions to ICT adoption, is then thoroughly investigated. Faculty members should be included at every phase of the design and implementation of cutting-edge technology, according to stakeholders.

This article examines the elements that influence staff members from Alfateh University's Engineering Faculty's use of the Internet. The following research issues are addressed via a questionnaire:

a. What are the internet usage tendencies among faculty members?

a. What are the major reasons for utilizing the internet?

b. What impact does the internet have on research and education?

**Keywords**— *Electronic education; internet; user acceptability; technology transfer; ICT gap; digital divide* **Keywords:** *electronic education; internet; user acceptability; technology transfer; ICT gap; digital divide*

## Introduction

According to the findings of Internet usage data for Africa given by Miniwatts Marketing Group (2011), 5.7 percent of users in Africa and 5.4 percent of users in Libya were subscribers.

In Libya, Internet subscriptions are frequently utilized by many members of a household, cybercafé customers, and library visitors.

Relative poverty, poor quality Internet services owing to infrastructure limitations, insufficient Internet bandwidth,

inconsistent energy, and antiquated end-users are the primary barriers to Internet adoption.

These issues impose significant constraints and difficulties on African users, as well as Libyans. Libyans gained access to the internet for the first time towards the end of last year. It was first released in 1998, but it wasn't generally available until early 2000. Internet penetration remains modest, at roughly 3.8 percent, with a 5.4 percent increase in 2011 (see Table 1).

Internet cafés are the most common way for users to connect. Libya's telecommunications infrastructure is regulated and operated by the state-owned General Post and Telecommunications Company (GPTC), which also owns and runs the country's principal Internet service provider. Libya Telecom and Technology (LTT) provides dial-up, DSL, broadband, and satellite Internet services. LTT has a monopoly on the country's international Internet gateway, therefore at least seven other firms have licenses but are functionally subservient to LTT. In October 2006, the Libyan government secured a deal with One Laptop per Child, a non-profit organization based in the United States, to build a low-cost educational laptop computer with the objective of providing one to every Libyan schoolchild by June 2008. This expected to be a huge increase to the availability of information communications technology (ICT) in the country, which had just 130,000 computers in 2002.

This was expected to have a significant impact on the availability of information communications technology (ICT) and the Internet. Libya has one of the greatest budgetary surpluses and one of the lowest government debt levels in the world, thanks to the current oil boom. Libya has begun an economic reform process, and the list of issues to be addressed is vast, notably the country's low GDP.

use of cutting-edge technology to raise the overall level and quality of education

Table 1 depicts the rise of Internet usage in Libya and neighboring countries.

**Table (1): The growth of internet usage in Libya and the adjacent countries 2011.(www.cia.gov.)**

The Countries	Population (2009)	Internet Users	Internet Users,	Population Penetration	User Growth

		Dec/ 2000	Latest Data (2009)		(2000- 2011)
Libya	6,324,357	50,000	353,900	5.4 %	3,44%
Tunisia	10,629,18	100,00	3,600,00 0	33.9 %	3,50 %
Algeria	34,994,93	50,000	4,700,00 0	13.4 %	9,30 %
Egypt	82,079,6	450,00	20,136,0 0	24.5 %	4,37%

It is impossible to discuss the Internet in Libya and neighboring countries without taking into account the condition of its applications, such as the number of Internet service providers (ISPs) and the cost of Internet access. In Libya, the LTT monopoly boosts the cost of an Internet connection and, to some extent, exacerbates service degradation. For political reasons, several Arab countries create monopolies in the ISP sector by blocking new enterprises from entering the market through measures such as license control. Another reason for the high cost of Internet access and slow connection speeds in Arab nations is that Internet service providers are not permitted to operate their own international gateways.

Table 2 shows the number of internet providers in each country

**Table (2): internet service providers in countries near Libya (Elzawi, 2008).**

Number of Internet Service Providers in countries near Libya		
Country	Number of ISPs	Example of ISP
Libya	1	Libya Net (www.libyanet.net)
Tunisia	5	Global Net (www.gnet.tn)
Algeria	11	Cerist (www.cerist.dz)
Egypt	38	Link Egypt (www.link.com.eg)

#### A. Literature review:

According to Hamdy (2007), numerous metrics may be used to estimate the digital gap across nations on a worldwide basis. According to Hamad (2006), most research initiatives at Libyan institutions are designed to meet academic criteria (student certifications, career promotions, and so on), rather than societal demands.

The findings of the Libyan business executive survey/global competitiveness report (LBES/GCR) are presented by Porter and Yergin (2006).

In terms of university-industry research partnership, Libya is ranked 97th out of 111 nations. Innovative approaches for the development and use of material, as well as the development of knowledge-based products, might improve the use of research operations (such as software). Increased Internet use will aid in the development of transdisciplinary researchers and entrepreneurs, as well as the rise of alternate approaches to digital copyright. Porter and Yergin (2006) propose a number of research issues to address in the coming five years:

- What new academic and scientific journal publication formats, as well as alternative IP licensing systems (such as creative commons), are best fit for African development and Libyan development?

- What effect will new Digital Rights Management technologies have on digital material access in Libyan universities?

#### Digital Divide of ICT in Libyan Education:

Libyan national ICT policy for education aims to provide access to ICT tools and build a

Infrastructure that is strong. It also promotes research and development to ensure the supply of appropriate learning. Human resource development is one of the primary objectives of the national ICT policy for education, and investing in human resources is a significant aspect in achieving the national ICT strategy's aims and objectives. UNDP and UNESCO collaborate with Libyan government entities to ensure that the ICT policy is implemented properly and on sch This assistance also welcomes the international community and encourages investment in Libya. Libya has had to deal with a lot of obstacles and hurdles. As a result, the implementation of the ICT policy, as well as access to ICT tools and the implementation of the national ICT strategy and development initiatives in several fields, is still in its early stages. The causes of the digital gap amongst researchers in member academic universities include (Table 3), the number of researchers (per million) from 1990 to 2005, and the UNDP's Human Development Report 2007/2008. UNDP. Furthermore, there is a critical lack of ICT-qualified and trained instructors, who are required to integrate technology into classrooms and educate a new generation of technically proficient pupils (Hamdy, 2007).

**Table (3): Number of Researchers (per million people) 1990-2005.**

(Source: Human Development Report 2007/2008 (UNDP).

No.	Country	Researchers
1	Libya	361
2	Tunisia	1013
3	Algeria	-
4	Egypt	493

The Digital Divide has long been associated with a lack of physical access to critical information technologies such as computers and the Internet (Gorski, 2003). The Libyan digital gap exists, and it has a detrimental impact on the group's capacity to utilise information technology. Geographic, infrastructure, and education constraints, as well as a history of restrictively traditional cultural beliefs, hinder ICT availability in Libya. This procedure has an impact on Libyan member universities' experience and progress, which in turn has an impact on students. This general issue manifests itself in two ways: inadequate research on Engineering Faculty members and an understanding of these universities' viewpoints in the context of the digital divide.

Support, on the other hand, research into new models for content generation and consumption, as well as the creation of knowledge-based goods like software. It will also aid the advancement of researchers in this transdisciplinary field, particularly academics' interests, as well as entrepreneurs' efforts to promote the emergence of alternate methods to digital copyright.

1. What innovative formats for publishing academic and scientific publications, as well as alternative IP licensing schemes (such as creative commons), are most fit for African Libya, as well?

2. What effect will new Digital Rights Management technologies have on digital content access? And where does

Libya stand in terms of development and implementation? development and Libyan development in the next five years?

**B. Research methodology:**

Surveys are often part of a positivist approach to research, according to Yin (2003).

There are flaws in surveys (such as low response rate, possible ambiguities in the questions).

Because of the benefits described by Remenyi et al. (1998) and Saunders et al. (2003), the use of a questionnaire is thought to be acceptable in this case:

- Low-cost research tool - vast amounts of data may be acquired quickly and easily from a big number of people;
- Easy comparisons and statistical analysis are possible with survey data generated using standardized questionnaires.

The replies are analyzed quantitatively and qualitatively, with questions of reliability, validity, bias, and triangulation taken into account.

**C. Findings:**

- The findings show that there is a digital divide, but they also show that digital content has aided in bridging the significant academic information gap. The purpose of the survey was to get feedback on the final results (Elzawi, 2008). The pilot study provided excellent experience in doing academic research on the internet, contacting and connecting with respondents, and explaining the survey's aim. The following are the key outcomes of this research:
- - Making any changes or modifications that are considered necessary.
- - Excluding non-academic engineering faculty members from the final poll, focusing on faculty members. The postal survey approach was chosen to meet the study's objectives as well as the necessity for a high sample size for data processing.
- The underlying conclusion was that the respondents' usage of the Internet was influenced by three key factors: employment needs, self-perception, and technological availability.
- However, there were complexities within these three pretty evident features that provided food for contemplation.

The analysis is provided here in a building block style to highlight the progression of the findings, beginning with each of the primary questions covered in the research.

**D. Usage of IT Strategy:**

To discover whether the Faculties should have an IT strategy independent of University IT

strategy. Table 4 shows that 31.25 % of respondents agreed with separate IT strategies while

the majority were in favour of having similar IT strategies at Faculty and University levels.

**Table (4): The faculty IT strategy should be independent from University IT strategy.**

CASE	Frequency	Percent
YES	10	31.25%
NO	22	69.75%

**E. Type of the network:**

Table 5 shows the responses to the questions on the type of computer network in faculty.

**Table (5): Types of the networks.**

SASE	Frequency	Percent
Only one computer/PC	2	6.25%
Currently in process of networking	4	12.50%
No need for networking	0	0.00
Networking is too expensive	12	37.50%
Networking is unreliable	6	18.75%
Need to improve understanding	8	25.00%
Other	0	0.00

These comments imply that the competent authorities need to provide management assistance, a new strategy, and financial assistance. Networking is just as important as computers and PCs.

**F. Usage of Internet:**

The replies to the question on how often people use the internet and its apps are shown in Table 6. Apparently, one-quarter of the crew has never used the internet, while slightly over a third utilizes it often.

**Table (6): Usage of the Internet. (Source:ITUestimate)**

Case (hours used/week)	Frequency	Percent
0—2	6	18.75 %
2—5	17	53.125%
6—10	7	21.875%
>10	2	6.25%

The distinction here is referring to differences in functionary office viewpoints for the (intranet and internet) to the degree that search serving is required. In Libya, the number of internet users per 100 population in 2010 was 14, compared to 10.80 in 2009 (Source: ITUestimate).

**G. Weekly use of Internet.**

Table 7 displays the respondents' weekly internet usage in hours. Nearly a quarter of the respondents spend fewer than two hours each week on the internet for academic purposes. Only a quarter of people spend more than an hour a day on the internet. Only two respondents (6.25 percent) said they spend at least 10 hours a week on the Internet. In the study, there was no discernible gender difference in the amount of time spent on the Internet. The belief that people with science credentials spend more time on the Internet is based on common sense, yet the research contradicts this.

Table 7 illustrates that reduced income does not prevent members from surfing the Internet; they spend more than 10 hours a week online. Displays the amount of time spent on the Internet by subject field.

**Table (7): Respondents weekly use of the internet**

Case	Frequency	Percent
Not used and no plans to use	0	0.00
Not used but plan within next 6 months	8	25.00%

Not used but considering it for the long term	0	0.00
Rarely	4	12.50%
Occasionally	2	6.25%
Quite often	6	18.75%
Frequently	12	37.50%

#### H. Barriers those are most likely to keep staff from using the Internet.

To avoid future issues with using the internet for research, it is vital to identify any potential barriers and take steps to eliminate them. The responders to this question identified fifteen issues that may prevent them from accessing the internet for academic research:

- 1- Lack of Internet access. The lack of Internet connectivity at their institutions was cited by twenty (62.5%) participants as the reason for academics not using it.
- 2- Lack of access of specialized online databases. Seventeen people (53.13 percent) said that they can't use the Internet for research since they don't have access to specialist online databases. In addition, members of Libyan universities are being used for study with the website's researcher. (For example, science direct/Emerald's/Cambridge Journals online) for every subscription before to 1998.
- 3- Low speed of connection. Twenty-six percent (62.5%) of respondents said that slow internet connectivity was preventing them from utilizing the internet.
- 4- Quality of the information source. (Information strategy, diversity and availability of information, information convenience, information quality, unfiltered information, speed of obtaining information, newness of information, and capacity to update).
- 5- System availability. The lack of computer access in their institution was noted by eighteen (56.25 percent) as a hindrance to their usage of the Internet.
- 6- Lack of educational institutions' encouragement and incentives. Fourteen (43.75%) members say that their institution's lack of encouragement or incentives is preventing them from using the internet.
- 7- Lack of skill in the English language. One of the biggest reasons for not accessing the internet, according to twelve (37.5 percent) members, is a lack of English proficiency.
- 8- Field of study. Thirteen members (40.63 percent) said they could access knowledge sources in their field of study without using the internet.
- 9- Unfiltered information. Eight (25%) participants said that unfiltered government information occasionally prohibited them from utilizing the internet.
- 10- Clarity and ease of use. Thirteen members (40.63 percent) said the internet was a confusing and ambiguous source of information.
- 11- Technical difficulties. Thirteen members (40.63 percent) stated that technical issues are preventing them from using the internet.
- 12- Lack of interest. Twelve (37.5%) respondents stated that they are unable to use the internet because they lack adequate interest in learning about it.
- 13- Social factors. Eleven (34.48%) of the participants stated that social constraints restrict them from utilizing the internet. (Because the internet is viewed by a big percentage of the

society as a source of illegal material, several schools and institutions impose internet usage limits.)

14- High cost of Internet connections. One-seventh of respondents (21.88 percent) said that the cost of an internet connection was one of the factors preventing them from accessing the internet.

15- Lack of training, support computer and Internet skills. Sixteen (50%) members stated that they are unable to use the internet due to a lack of computer and internet skills and training.

#### I. Results and future recommendations of the study:

There are considerable discrepancies in Libyan academics' assessments on the possible use of the Internet for study and the expected advantages of having access to the Internet. The report offers various suggestions for overcoming some academic staff members' aversion to adopting ICT tools broadly and executing the national ICT strategy.

The study's main finding is that there are considerable disparities in Libyan academics' beliefs about the possible use of the Internet for research and the expected advantages of Internet access. Staff who are focused on new information, such as engineering faculty members, are less likely to regard the Internet as a threat and more likely to regard it as a great instrument for work development. What was surprising was that none of the respondents highlighted the Internet as a tool to get over their culture's limits.

While some of the surveys acknowledged using the Internet to collaborate with coworkers, none expressly noted being able to work extra hours. Because the majority of the materials on the Internet are in English, it is obvious that skill in the English language is required for efficient Internet use. While most respondents recognize the need to enhance their computer literacy and Internet capabilities, many respondents also stated that they required additional Arabic websites as they realized they needed to develop.

their proficiency in the English language This abstraction points to a promising area for further investigation. The abstraction should, of course, be checked for validity. Furthermore, the interactions between the nodes and their levels or values may be investigated in order to build a comprehensive body of information on Internet access.

#### J. Conclusion:

Faculty use the Internet for instructional reasons rather than communication and research, according to our results. When compared to teaching or research, previous studies assessing faculty Internet usage in the local setting have consistently cited email and communication as the primary motivations for their online activity. When Internet technologies are integrated into the instructional process, students are more likely to use them. This might be a sign that previous research has shown that Internet adoption is still in its early stages. As materials become more available to professors at higher education institutions, the Internet is being used to a greater level. The study found no link between accessible university resources and Internet use throughout our analysis of the hypotheses. This result is consistent with previous research, which found that organizational characteristics had no impact on faculty Internet usage.

The use of research in higher education in Libya, undertaken across the world, explains low adoption rates by

blaming teachers; either they are trapped in old teaching techniques and labeled as resistors, or they have unfavorable views toward technology and are labeled as resistors. These unfair explanations are based on a misunderstanding of the various faculties' demands. Understanding individual faculty demands should be the emphasis of the problem of expanding the advantages derived through Internet technology. Faculty members should be included at every phase of the design and implementation of cutting-edge technology, according to stakeholders. If they are involved from the beginning, their demands will be satisfied, allowing for increasing levels of efficient integration of Internet technologies that fit their specific requirements.

This research provides an in-depth overview of Internet usage issues as well as engineering faculty attitudes about the Internet. Technology-based solutions are unlikely to be the panacea for all educational challenges. It is widely acknowledged that technological solutions do not enhance teaching techniques sufficiently. As a result, the emphasis should be on selecting the appropriate technological solution for the educational setting and the faculty members involved. The being element should always be addressed as a starting point when deciding how technology, notably the Internet, might be used to enhance education and research endeavors. Faculty members should be given the opportunity to participate in decision-making on the proper use of technology in their respective academic areas.

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