An Effect Of Digital Literacy On The Academic Performance Of University-Level Students

Dr. Farah Latif Naz[1] , Abdul Raheem[2] , Farid Ullah Khan[3] , Wali Muhammad[4]

[1]*Lecturer, Department of Education. Bahauddin Zakariya University. Multan Email: farahlatif@bzu.edu.pk*
[2]*Department of Disaster Management and Development Studies, University of Balochistan, Quetta. Email: a.raheemalizai@gmail.com*
[3]*Endeavour Fellow, Crawford School of Public Policy, The Australian National University (ANU), Canberra, Australia. Email: fariduk.anu@gmail.com*
[4]*Lecturer, Faculty of Social Sciences and Humanities, Balochistan University of Information Technology Engineering and Management Sciences, Quetta, Balochistan, Email: wali.mohammad@buitms.edu.pk*

Abstract

This research aims to determine how digital literacy influences the academic performance of university-level students in District Lahore , Punjab, Pakistan. It is a descriptive research where a survey was carried out in public sector universities to collect the responses of 120 students from District Lahore. The responses were analyzed using Mean-difference statistics. The results show that students with digital knowledge or technological skills performed better than those without these skills. Female students with digital skills outperformed male students with a similar digital literacy level. This study revealed, among other things, that all university-level students should be taught how to utilize library computers to locate reliable and authentic information for their research work. Recommendations and suggestions for future research have been provided at the end.

Keywords: Key Skills for University-level Students; Technological Skills; Digital Skills; Digital Literacy; Computer Literacy; Academic Achievement; Advancement in Technology

Introduction

It is no secret that the technological advancement has become a hot subject in academics and a major obstacle from K–12 to university level students all over the world, including Pakistan. The advancement in technology is the process and outcome of mechanizing the industries to maximize outputs of quantity and quality through advances in computer technology, and more specifically through the use of virtual models and cyber systems for monitoring processes with decentralized decision-making (Hammer, 2018). Major changes related to technological advancements include: 1) higher productivity, 2)

a shift in the nature of work that will eliminate some employment opportunities but create others, and 3) the substitution of physical labor with computerized digital machines or with computer-literate skilled workforce. Interoperability, the capacity to exchange information, technical assistance, and decentralized decision-making are the four principles the industry must adhere to in order to implement these three changes (Ibid, 2018). Interoperability may be defined as the capacity of two or more device systems to share data and use it for the benefit of a common purpose (Noura et al., 2019). Information is transparent when it is

simple to obtain, understand, interpret, and ready for action. This occurs when information systems integrate digital subsystems and sensors to create virtual models in real time. Technical assistance, on the other hand, is the capacity to automatically collect data and display it to aid in the resolution of critical problems. Therefore, the use of information technology in the production process is at the heart of the revolutionary changes in the current era of digital knowledge based economies. With the advancement of technology, global competition for industrial labor possessing digital skills has increased. This competition for industrial labor exists both domestically and internationally. Albay and Serbes (2017) argues that globalization has created competition in almost every field of life. This makes it difficult for students worldwide to survive without digital skills. In the realm of education, there are two significant issues; the first is connecting the skills of graduates with industry demands, and the second is the capacity to effectively compete with international graduates coming from various backgrounds carrying advance digital knowledge. With the efforts of multiple players, the educational innovation has undergone significant transformations (Shahroom & Hussin, 2018). In 2018, the higher education system in the Republic of Indonesia began to modify how it educates and assists students in four major areas: information technology, operational technology, the internet of things, and the big data analytics. This style of higher education mixes digital and real-world problems to produce graduates who are skilled with data, technology, and people to find tentative solutions to these problems (Maemunah, 2018). Moreover, the evolution of nature of doing jobs with the passage of time has resulted in bringing changes in both employment and unemployment trends. Those having digital skills survived. On the other hand, employees who were weak in digital skills were fired by their organizations. In other words, physical labor was replaced by intellectual workforce; particularly

students with better digital skills. With the advancement in technology, there were many individuals seeking employment; however, only those survived who planned their career well and acquired sufficient digital knowledge. As prospective employees, students must do a self-evaluation and choose a professional path based on their digital skills, interests, and personality. Prior to enrolling in a university, college or a vocational school, it is ideal for a student to have a strong grasp of market oriented skills which are in-demand, for instance, digital or information technology skills. With strong skills, students will strive diligently to prevent individuals from acting against the ideals of their profession. They will discover methods to apply their findings and evaluate the success of prior initiatives. Therefore, spending the time and making the effort to investigate and choose a professional career can instill confidence in student to acquire the necessary skills to succeed in that industry. Evidently, this will have an impact on the performance of the student. Today, we live in a world that is rapidly changing and vastly evolving, where new technologies are introduced to the market every now and then, and this is making life even more difficult. This world is evolving swiftly into a digital one. In the majority of prevalent civilizations, digital technology has become ingrained. Teenagers and adults use cell phones to an extensive degree. Various websites are used by a large number of individuals to get information about their particular area of interest. The majority of TV shows, movies, and music are archived on several websites and are freely available on PCs, MP3 players, and other online platforms. Worldwide, people interact instantaneously using electronic mail (E-mail) and the traditional way of communication through post (using physical papers) is diminishing. The prevalence of online banking and shopping has increased. Governments are also gradually moving their services online or on the internet. Numerous social networking

websites and Web 2.0 technologies enable users to collaborate by sharing and modifying online material (Oblinger & Oblinger, 2005). Despite the fact that we cannot and must not overlook the disparities that still exist in access to digital technologies and the internet, it is reasonable to assume that digital media is now a prominent feature of the lives of many people, regardless of their age or social standing. The majority of young people currently grow up in a society where digital technology and media play a vital role; thus, digital literacy skills, knowledge, and comprehension are becoming mandatory. These cultures of digital technologies have a significant impact on the dynamics of the current generation, particularly in the lives of young people. This environment of digital technologies created a hypothesis that its inhabitants, especially students, were inherently better equipped to negotiate the rapid and ongoing expansion of digital technology. People born after 1980, often known as 'digital natives' or 'the net generation' are commonly believed to have the greatest experience and proficiency with digital technology. Therefore, children grown up in such an environment would be very proficient with these technologies (Ibid, 2005). According to Frand (2000), 'digital natives' are the children of today who grew up with continual internet access and who depend extensively on various types of communication technology for everything from personal relationships to group assignments. Students cannot claim digital literacy if they just know how to utilize internet-based e-mail, word processing, and social networking sites (Littlejohn et al., 2010).

Objectives of the Study

In light of the above commentary on advancement in technology and digital literacy, the following objectives were established for investigation:

1. To determine the perceived degree of digital literacy among public sector university-level students in District Lahore, Punjab, Pakistan.
2. To determine the perceived degree of communication abilities among public sector university-level students in District Lahore, Punjab, Pakistan.
3. To examine the impact of digital literacy on the academic performance of public sector university-level students in District Lahore, Punjab, Pakistan.

Research Questions

With respect to the objectives, the following research questions were developed:

1. What is the perceived degree of digital literacy among public sector university-level students in District Lahore, Punjab, Pakistan?
2. What is the perceived degree of communication abilities of public sector university-level students in District Lahore, Punjab, Pakistan?
3. What are the obstacles to digital literacy in learning and practice at the public sector universities in District Lahore, Punjab, Pakistan?

Significance of the Study

Previous research shows that digital skills are crucial for the success in the modern world. Digital literacy, such as how to operate computers and other tech tools, how to access trustworthy information on the internet, how to utilize tech tools for communication, and how to manage data, are becoming more crucial in a variety of domains of employment. College and university students are frequently referred to as 'future leaders'. Therefore, it is logical that they will need to understand how to utilize technology to develop society and contribute its share in the national development. This study is beneficial because it may assist university-level students or sensitize other students or parents to

contextualize the types of skills required for digital literacy. The survey is especially significant since it measures the technological proficiency of university students. Research findings have ramifications for digital literacy teaching in the classroom. This study is significant because it establishes the framework for understanding the relationship between digital literacy and factors such as student communication, research, self-confidence, obstacles, and achievement in higher education institutions or universities. It thus serves to determine if an information is trustworthy and let students realize their rights and obligations as digital citizens. Resultantly, this study's findings might assist students, teachers, institutions, and governments in determining how to enhance digital literacy in educational institutions at different levels and help in filling the gap between market oriented digital skills and the required demand.

Literature Review

A person's academic achievement demonstrates both how well they can learn and adapt to new changes and surroundings. Digital literacy, technical literacy, and human literacy are likely to play a significant role in the adaptability of workers in the age of the advancement in technology. These three subjects are taught at all educational levels, but mainly at the university level. To become role models and leaders in lifelong learning in the classroom, prospective teachers must demonstrate creativity and originality in their research in these three areas (Djawad et al., 2018). As agents of change, teachers must foster a culture in which individuals recognize and appreciate their need to continue learning. As jobs and the skills required to do it evolve, so must the most effective methods of teaching and learning. In this digital literacy era, according to Shahbodin et al. (2019), students are responsible for their own education rather than depending on professors. Due to their

diligence in school, students were able to adjust to changes in the economic sector. All of the aforementioned reasons indicate that digital literacy, self-awareness, career planning, and student achievements must be examined further in order for higher education to face the difficulties of changing job needs throughout the period where digital knowledge evolved. Dibabe et al. (2015) studied why students choose accounting as a profession. It is evident that the four significant aspects influence undergraduate students' decisions about a profession in accounting. Internal and external influences, as well as public and professional attitudes about accounting and its structure, all play a part (Ibid, 2015). Research conducted by Goldfarb & Tucker (2019) revealed that internal variables are more influential than external influences in digital economies. Tomczyk (2020) examined the technological proficiency of future teachers. Using tools such as text editors, spreadsheets, and presentation and graphics applications, he investigated self-evaluation in the context of digital literacy. The Pedagogical Universities in Krakow, one of the leading teacher-training institutions in Poland, conducted an additional research with digital literacy of teachers as its primary focus. In this research, 450 teachers demonstrate that their digital literacy is plagued by a variety of issues (Tomczyk, 2020). Hof & Strupler Leiser (2014) investigated what motivates Swiss citizens to switch occupations and become TVET (Technical & Vocational Education & Training) instructors. Teachers of vocational trainings are needed to have prior experience of their fields. In other words, no vocational teacher has ever worked in the sector about which he/she is imparting training or teaching. Tolentino et al. (2019) subsequently examined the relationship between career flexibility, self-monitoring, academic effort, and job-search self-efficacy. It has been shown that the relationship between career flexibility and job search self-efficacy is better for students who

work hard (Ibid, 2019). Apriansyah (2014), an Indonesian teacher, observed that senior high school students who established future career goals performed better academically. Numerous studies have examined the impact of digital literacy and self-awareness on students' academic performance, as we have previously discussed. Nonetheless, these investigations were conducted using various methods and in different contexts; however, still further research in necessary to find the underpinning realities. For instance, Pala & Başıbüyük (2021) examined the impact of digital literacy on the academic performance of fifth graders. In addition, little study has been conducted on how self-awareness and digital literacy influence professional development. This study's primary objective is to determine how digital literacy and self-awareness influence students' academic performance at university level. The innovative aspect of the research is that it examines how advancement in technology has altered labor functions in the industry. This is crucial if university graduates want to be prepared for the changing nature of the field's job market.

Evolution of Digital Literacy Concept

Digital literacy became the new standard when reading, writing, math, science, history, and geography became less important. Many things have to be sacrificed in order to discover new, improved terms for the era of digital communication and the internet. Gilster & Glister (1997) believes that digital literacy extends beyond the ability to access and use networked computer resources. It is also about knowing others and being able to discuss difficulties with them and get assistance (Ibid, 2007). Even though Gilster did not invent the concept of digital literacy, the title of his book was criticized for misrepresenting what digital literacy entails due to Gilster's writing style. At the start of the 21st century, however, others were citing Gilster's work and its themes (Bawden, 2008). In the

meanwhile, the concept of digital literacy has grown in popularity, been critiqued, and undergone significant evolution as other writers have attempted to define it in their own terms. Bawden (2008) later defined the Gilster's perspective on digital literacy as follows:

1. Information aggregation, or the process of establishing a credible data repository from several sources.

2. Retrieval skills and critical thinking for forming an educated opinion on the reliability and totality of internet sources while evaluating retrieved material.

3. Skills in reading and comprehending non-sequential and dynamic content.

4. Understanding of the significance of common devices in connection with networked media.

5. Knowledge of 'people networks' as a source of guidance and assistance for managing filters and agents.

6. Be at ease with information dissemination, publishing, and evaluation.

Similarly, Martin (2008) derived the following five critical aspects from the earlier digital literacy study literature:

1. Digital literacy contains some skills to perform effective digital activities engrained inside working places, studying, relaxation, and all other features of daily life.

2. For individual, digital literacy will differ confirming to individual actual life condition in addition be a continuing permanent procedure developing as the individual's life situation develops.

3. Digital literacy is broader as compare to information and communication

technologies (ICT) literacy, and digital literacy will comprise components drawn from various allied digital literacies.

4. Digital literacy consisting of obtaining and using knowledge, methods, attitude and own talents and will contain the capability for planning, executing and evaluating digital activities within the scope of daily life responsibilities.

5. Digital literacy also contains the competency to understand one-self as a digitally equipped individual and to reflect on individual's own digital literacy development.

Consequently, Alkali and Amichai-Hamburger (2004) introduced the following skills framework:

1. Skills used for photo-visual (ability to read instructions from graphic representation).

2. Skills for reproduction (ability to use digital reproduction for creating novel and understandable material from earlier innovations or research).

3. Skills for branching out (building knowledge from non-linear, hyper-textual navigation).

4. Information skills (ability how to evaluate the worth and authority of information).

5. Socio-emotional skills (knowledge of fundamental cyberspace regulations and the ability to apply these regulations while participating in online forums).

Similar to the notion of media literacy, Tornero (2004) agreed with UNESCO's (2002) understanding of digital literacy (as cited in Laanpere, 2019). He outlined four components of the digital literacy process. According to him,

these traits enable individuals to communicate swiftly and efficiently utilizing digital technology. It also allows individuals to become active members of an online community in a virtual setting. These characteristics form the foundation of technology. These characteristics are listed below:

1. Operational (Capability to use computer and communication technology)

2. Semiotic (Skills regarding usage of languages that involved in the new multimedia world)

3. Cultural (Ability how to be a good member of an environment of intellectuals in an information society)

4. Civic (Awareness regarding rights, laws and duties relevant to new technological environment)

According to research conducted by Beetham et al. (2009) in the United Kingdom, digital and new literacies are defined as follows: 'Our understanding of studying literacies incorporates the range of practice that facilitates operational learning in the digital age' (p. 2). The phrase 'learning literacies' emphasizes the overall ability for thinking, communicating perspectives, and intellectual activity that universities have traditionally supported, as well as the digital tools and networks that are transforming what it means to work, study, and communicate. This definition of digital literacy is thus maybe intentionally vague: 'the set of activities that enable successful learning in a digital age, the confident and critical use of ICT for business, pleasure, learning, and communication'. This definition of digital literacy encompasses, among others, academic practices, information literacy, media literacy, and ICT skills. The digital literacies development framework focuses on the following:

1. Personal and social context

2. Learning context

3. Local environment

4. Work environment

5. ICT and Media Market

The foundation of JISC Framework is focused only on the ICT abilities that are needed by all contemporary citizens. This framework is composed of literacy practices based on information and communication technology competencies.

Digital Literacy

Gilster and Glister (1997) coined the phrase 'digital literacy'. It indicates that the individual is acquainted with and capable of using digital resources to discover and use information. To be digitally literate, one must have the 'desire, attitude, and ability' to utilize digital technology and communication tools to search, analyze, evaluate, generate new ideas, and share information (Djawad et al., 2018). Effective use of information and technology goes hand in hand with their availability. Information literacy stresses the significance of the information itself, while digital literacy focuses on technical proficiency. The JISC Digital Literacy Paradigm, as described by Tang and Chaw (2016), encompasses media literacy, information literacy, digital knowledge, learning skills, communication and collaboration, career and management identity, and ICT literacy. In literacy, you may estimate a user's chronological age in relation to digital media based on their proficiency with ICT. ICT Reading, writing, and the ability to effectively employ written language are vital for academic success and success in the job (Thammasaeng et al., 2016). To be digitally literate, one must be able to utilise, comprehend, manage, gather, and assess many types of information and communication technologies. This research defines 'digital literacy' as the capacity to use information and communication

technology to locate, select, gather, and evaluate data in a particular scientific or technical field.

Digital Literacy and Academic Performance

Research studies indicate that access to digital literacy alone is insufficient to improve student's academic performance. Additionally, academic institutions must provide students with meaningful opportunity to utilize technology and enough access to it (Selwyn, 2004). For students to learn how to use technology, they must use internet-connected computers. How people feel about a service is intimately tied to the infrastructure's efficiency and usability. This is seen by how simple it is to set up, exchange data with others, and backup and recover one's own data in the event of a catastrophe or loss of data. Access is the first digital gap, which must be addressed by increasing the scale of digital literacy to a wide number of individuals. The extent to which students use digital literacy in the classroom relies not just on their access to technology, but also on the kind of activities taught using that technology. There is a need to develop and implement learning models that enable individuals to increase their cognitive abilities and use them in educationally significant settings. This is the second form of digital divide, which has nothing to do with access and everything to do with how individuals use and benefit from digital technology (Johnson, 2007). Teachers have begun teaching digital literacy to improve student performance and transform the classroom environment. Due of this, several researchers have examined how these technologies impact students' academic performance (Machin et al., 2007). Spiezia (2011) also mentioned how students use technology at home. He did so by analyzing the impact of digital literacy on the average educational outcomes in 2006 across all participating countries. According to the author, using a computer at home enhances academic

performance more than using a computer in the classroom. Spiezia questioned plans to use computers more often in the classroom (2011). Machin et al. (2007) conducted comparable research. They examined the situation in England and determined how much money was spent on digital literacy programmes and what influence it had on the performance of students in school in various digital literacy programmes. English and science outcomes at the primary level were validated by the authors' findings, but math results were not. The city of Guayaquil in Ecuador provided the authors with the opportunity to examine a computer-based programme designed to aid primary school arithmetic and language instruction. They conducted an experiment and discovered that digital literacy improved arithmetic skills but had no impact on language proficiency. Beuermann et al. (2015) investigated the impact of the 'One Laptop per Child' initiative on enrolment, dropout, and graduation rates in rural Peru's elementary schools. They also found no correlations between intellect and math or language skills. However, they discovered that it helped students acquire more skills. Goolsbee

and Guryan (2006) examined the outcomes of a Programme that provided California schools with funding to pay for internet connection (known as the E-Rate Programme). The authors utilized several indicators to demonstrate that the Programme had expanded internet access in the classroom, but they were unable to establish a correlation between this rise and the students' test results or academic performance. In conclusion, each of the aforementioned research established that educating students more about technology improves their skills in some manner.

Methodology

This is a descriptive research where survey was conducted to collect the responses of the 120 students from the public sector universities of District Lahore, Punjab, Pakistan. These students were selected randomly and their responses were collected using a survey questionnaire. Questions were put into predefined categories like 'strongly agree', 'agree', 'disagree' and 'strongly disagree'. The responses were statistically analyzed using Mean-differences.

Results and Data Analysis

Table 1: Mean Difference Responses on Digital Literacy on Students' Academic Achievement

Variables	Responses	Total Score	Mean X	Mean Difference
Digital Literacy (DL)	80	1,8494	228.3	
Non-Digital Literacy (NDL)	40	8,616	220.9	7.4
Total	120	27,110	449.2	

Table 1 shows that the average score for the 80 DL students was 228.3 and the average score for the other 8,616 students was 220.9.

On average, there was a difference of 7.4 points. The results showed that there is a statistically significant difference between how well students perform in school if they know how to use computers or not. Students who know how to use computers do better in school than those who do not.

Table 2: Mean Difference Responses on Academic Achievement between Male and Female Students

Variables	Responses	Total Score	Mean X	Mean Difference
Male	70	7,543	109.3	
Female	50	5,836	114.4	5.1
	120	13,379	223.7	

Table 2 shows that, on average, male students got 109.3 out of a possible 200 points, while female students got 114.4. The average difference was 5.1%. So, the result showed that the average academic performance of male and female students who can use computers is different. So, female students who are good at using computers perform better in school as compared to male students.

Table 3: Mean Difference Responses between Addicted and Non-Addicted Computer Internet Facilities on Academic Achievement of Students

Variables	Responses	Total Score	Mean X	Mean Difference
Computer Addicted Students	40	4,332	111.1	4.3
Non-computer Addicted Students	80	9,346	115.4	
Total	120	13,678	226.5	

In Table 3, it can be noted that the average score for the group of 40 computer addicts was 111.1, whereas the average score for the group of 80 non-addicts was 115.4. Overall, the mean difference was 4.3 points. The results showed that, on average, computer addicts performed worse academically than

non-addicted students. This data supports the idea that students who limit their time spent on screens generally outperform those

students who spend excessive amounts of time online.

Table 4: Mean Difference Responses on Computer Literacy on Academic Achievement of Students in Co-Educational and Single-Sex Departments

Variables	Number of Responses	Total Scores	Mean (X)	Mean Difference
Single-sex departments	73	8,164	113:38	
Co-education departments	47	5496	114.37	
				0.99
	120	13,654	227.76	

Table 4 shows that the average score for the single-sex department was 113.38 out of 360, while the average score for the co-ed department was 114.37 (5,490 out of a possible 6,100). The mean difference, based on the data, was only 0.99, which is not statistically significant. This information shows that students in departments with more computer-savvy students had a slightly higher Grade Point Average (GPA) than students in departments with only single sex.

Conclusion & Recommendations

This research's findings support the notion that digital literacy improves students' performance in universities and that computer-literate students perform better than those who are not. Moreover, computer-literate female students perform better than their male counterparts; students who are not addicted to computers perform better than those who are, and those computer-literate students in co-educational settings perform better academically or vice versa.

It is essential to guide students to use computers properly so they may search for credible material

pertinent to their studies. If governments at all levels wish to improve students' academic performance, they can provide internet-connected computer laboratories that teachers and students may utilize. Students can spend less time using the internet in class to devote more time to their education. Most students viewed digital literacy positively in terms of understanding, utilizing digital tools to locate information, and analyzing it critically for online social interaction and online learning. Their perspectives on digital literacy were contradictory concerning organizing information, collaborating, and sharing digital material. Students' skills to communicate, perform research, and feel confident may be impacted by their digital literacy but not their GPAs. Most students claimed they improved their GPA by following their teachers' advice. Universities may consider providing training and arranging workshops and seminars to assist students in becoming more digitally literate and eliminate impediments.

Suggestions for Future Research Work

In the future, research may be carried out at private sector educational institutions, such as universities and colleges, as well as at the elementary and secondary school levels. Comparative research on digital literacy among public and private sector university students can also be considered for investigation.

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