Digital Literacy Effect on the Academic Performance of Students at Higher Education Level in Pakistan

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Abstract

Key Words
Digital Literacy,
Academic Performance,
Higher Education Level

The purpose of current study was to explore the effect of digital literacy on academic performance of the students at higher education level. The study was mixed method and data were gathered with a questionnaire & semi-structured interviews. The validity and reliability of the scales were ensured through experts' opinion, pilot testing and Croanbach Alpha score. The population comprised the students of M.S/M.Phil & Ph.D. A sample of 800 students was selected randomly from 10 Universities. The statistical tests like mean, standard deviation and correlation were used. Results revealed that digital literacy had significant effects on communication skills, research skills and confidence of the students and insignificant effect on students' CGPA.

Introduction

Students born after 1980 are known as Digital Natives, or the Net Generation and they were assumed to have had the highest experience to digital technologies. Therefore, students living in this environment would have broad abilities in using these technologies (Prensky, 2001a; Oblinger & Oblinger, 2005). Additionally, Oblinger and Oblinger (2005) termed that the students of present generation as "digitally literate" remained connected regularly to others, instant in nature, pragmatic learners and socially centered creatures. Moreover, Prensky (2001b) expressed that educational system of this period was not shaped to educate the students of current period.

Bawden (2001) explained the first definition of "Digital Literacy" which was made in the synonymous book of Gilster (1997). Gilster highlights the idea that digital literacy is not only about computer operating, but about the concepts that we master. Martin and Madigan (2006) too emphasize digital literacy as to discover a mixture of ideas of digital learning and how these ideas are empowered and sustained in dissimilar populations. Jacobson and Mackey (2013) proclaim that digital literacy is related to reasoning and ALA (2011) described as digital literacy is person's abilities about usage of ICTs to discover, assess, make, and communicate obtained information, using intellectual and technical talents. Institutions of higher education are considered as the dominant agents of development in the society. The main goal of university is to help in the growth of the nation by providing the high and skillful manpower which is compulsory for the development of the country. These goals can be achieved through program of education, studying research and communal favoring (Okiy, 2003). This place university education at the upper level in the rank of educational system as it is outlined for accommodating knowledge obtaining and making new discoveries (Anunobi & Nwogwugwu, 2013).

Review of Related literature

Advancements in technology are forming new possibilities, practices, demands and hence new, literacies. Various new literacies have developed with distinctive levels as well as usages changing across different situations, depending on developing needs (Belshaw, 2011; Churchill, 2009). The idea of digital literacy was taken from the book of Gilster (1997) on Digital Literacy. The publication of Gilster did begin to have an effect in the beginning of 21st century with other referencing his common declaration of concept as strength (Bawden, 2008). Meanwhile, the initiation of digital literacy it collected popularity, criticism and also gone through many stages of development by many authors who tried to explain digital literacy within their perceptions.

Eshet-Alkalai (2004) indicates that digital literacy goes beyond the mere abilities to handle a device and incorporates a multiplicity of difficult cognitive, motor, sociological, and emotional abilities compulsory for proper operations in digital environments. Ranieri, Fini, and Calvani (2009), Anderson, (2007), and O'Reilly's (2005) interpretations of digital literacy contains both information and Web 2.0 literacies. There are considerable overlaps between these definitions of digital literacy using different terminologies (Gillen, & Barton, 2009). But then, regardless of some inconsistency, digital literacy appears to be the most appropriate label to date, especially in an age when information comes mainly in this form (Bawden, 2008). It can be regarded as a general structure for the integration numerous other literacies, even though digital literacy does not need to encompass all of them (Martin, 2006). Additionally, an important fact is that digital literacy is a quality varying from one person to another or even from one life phase to another of a person (Martin, 2006; Bawden, 2008). Belshaw (2011) suggested the concept of digital literacies comprising of eight necessary elements which known as cultural, cognitive, constructive, communicative, confident, creative, critical and civic literacy.

The data reported by Chinese government showed that there is need of 7.5 million ICT experts, whereas Europe reported 500 million jobs for ICT experts going un-filled by 2020. The report of ITU (2018) suggested following level of digital skills to fill up the upcoming positions in the world by 2020:-

Basic digital literacy skills empower people to perform at a minimum level in society. These skills are known as foundational skills for performing basic tasks such as understanding about hardware (for example how to use a keyboard and operate touch-screen technology), software (for example word processing, how to manage files on laptops, how to manage privacy settings on mobile phones), and basic online operations (for example how to manage emails, searches, or how to complete an online form). These basic skills improve people lives, enable them to interact with others and access government, commercial and financial services available online. Intermediate skills of digital literacy enable people to use technologies in meaningful and beneficial way. It includes the ability to evaluate technology critically or create content. These skills are effectually job-ready skills which includes skills required to perform job related functions such as desktop publishing, digital graphic design and digital marketing. Advanced digital literacy skills are those which are needed by experts in ICT professions such as computer programming and networking managing. Internationally, there will be millions of jobs requiring advanced digital skills in the upcoming years. These skills comprises artificial intelligence (AI), big data, coding, cyber security, Internet of Things (IOT), and mobile application development, with some economic forecasting a talent breach for employees with advanced digital skills and others, raking ICT experts between their quickest growing roles. Most of the employer reported that they unable to find employee with the requisite skills. Occupations demanding advanced digital skills pay much more than occupations demanding basic digital skills or none at all.

Literature recommends that some proper digital literacy skills that might be more strongly related to students' academic performance and those that Gui (2007) describe substantial information skills such as an ability to find information using digital tools, ability to appraise information critically, and ability to utilize it in a responsible way to advance in their follow of their personal and professional goals.

It is difficult task to measure actual level of digital literacy skills of the people. Therefore, many studies showed beliefs on self-perceived measures of digital skills. The study of Shopova (2014) concluded that 76% of the students had good skills and ability to work with computer for assessing information. Another study investigated by Amiri (2009) concluded positive effects of digital literacy on the students' academic performance. Likewise the study explored by Brown (2009) about examining the relationship between digital literacy and students' achievement concluded a positive relationship between digital literacy and students' achievement. The investigation of Fairlie et al., (2010) discovered strong positive effects about school graduation and other outcomes relevant to education field. It was also discovered that computer literacy influences the results of the students as well as the performance in other academic assignments. Similarly, the study made by Lopez-Islas and Jose (2013) on deprived group of high school learner also discovered strong relationship among digital literacy and academic performance of the learners in an online learning program designed by the school. The research concluded that improved environment and easy access towards DL and (ICT) has positive effects on performance of the students. Ozdamar-Keskin, Ozata, and Banar (2015) completed a study about examining digital literacy competency of open and distance learners of university using a survey method in Turkey and revealed that learners have only primary capabilities of digital literacy regarding usage of ICTs. Many researchers indicated that changes in the level of digital literacy hinge mainly on age and education level, whereas the effect of gender is decreasing. Digital literacy levels in young people are high in its operational dimension because young people speedily move through hypertext and have a familiarity with various types of online resources. However, the skills to critically evaluate content found online show a shortfall (Gui & Argentin, 2011). The study of Eurostat (2015) concluded that nearly 80% of young individuals use internet only for social activities. But use of technology for education purpose by the people was very low. Adams-Becker et al., (2017) concluded that to meet the demands of industry in the future, the institution of higher education

required to include digital development within their undergraduate and postgraduate programs and consider further digital literacy training support.

Problem Statement

As Pakistan is lacking globally behind with respect to the digital literacy, there is earnest need to peep into the situation and take maximum benefits of digital literacy because in this era of innovation and technological advancement, digital literacy is recognized as the new label for education. There is no choice for teachers and students to gain a level of digital literacy walk with the rising digital world. Governments as well as higher education institutions (HEIs) are also striving hard to provide environments for online learning to acquire some levels of digital literacy of the common people as well as the university students. Hence, this study focused regarding effect of digital literacy on the academic performance of students.

Objectives of the Study

The objectives were as under:
1. To discover the level of digital literacy of the students at higher education level.
2. To investigate the effect of digital literacy on the academic performance of the students at higher education level.
3. To explore the effect of digital literacy on communication skills of the students at higher education level.
4. To probe the effect of digital literacy on research skills of the students at higher education level.
5. To discover the effect of digital literacy on confidence level of the students at higher education level.
6. To investigate the barriers in learning and practices of digital literacy at higher education level.

Research Questions

The research questions were as below:
1. What is the level of digital literacy of the students?
2. Is there any noteworthy effect of digital literacy on the academic performance of the students?
3. Is there any noteworthy effect of digital literacy on communication skills of the students?
4. Is there any noteworthy effect of digital literacy on research skills of the students?
5. Is there any noteworthy effect of digital literacy on the confidence level of the students?

Methodology

The researchers adopted mixed method approach for the study. Students of M.S/M.Phil & PhD studying at higher education institutions in Punjab province were the population. A sample comprising of 800 students was selected by using random sampling technique. Two research instruments were used. For the purpose of quantitative data, a researchers developed questionnaire and a semi-structured interview schedule employed for qualitative data. The face and content validity of the questionnaire was confirmed through obtaining expert opinion and for reliability pilot study was conducted. The Croanbach's alpha coefficient appeared as α= .83. The interview schedule was also validated from the same experts.

Data Analysis

In descriptive analysis below criteria was adopted to judge the students' perceptions towards digital literacy.

Mean: **Perception Degree**:

Less than 1.8   Very low
1.8 to 2.6   Low
2.6 to 3.4   Moderate
3.4 to 4.2   High
4.2 and above   Very High

RQ: 1: What is the level of digital literacy of the students?

Table 1. Means and SDs of Students' Perceptions about their Level of Digital LITERACY towards Digital Literacy Factors (N=800)

Sr.	Factors of Digital Literacy	Mean	SD	Perceiving Degree	Rank
1.	Understanding of digital literacy	3.47	0.99	High	4

2.	Digital literacy skills in finding information through digital tools	3.68	0.96	High	1
3.	Digital literacy skills in critically evaluating information, online interaction, and online tools	3.54	1.02	High	3
4.	Digital literacy skills in managing and communicating information	3.17	1.07	Moderate	6
5.	Digital literacy skills in collaboration and share of digital content	3.29	1.04	Moderate	5
6	Barriers in learning Digital Literacy	3.63	1.10	High	2
	Total	3.46	1.3	High	-

Table 1 illustrate that overall students' perceptions about the level of understanding of digital literacy factor were higher with a total mean of 3.47 (SD=0.99), level of digital literacy in finding information factor were higher with a total mean of 3.68 (SD=0.96), level of digital literacy in critically evaluating information, online interaction, and online tools factor was higher with a total mean of 3.54 (SD=1.02), level of digital literacy in managing and communicating information factor were moderate with a total mean of 3.17 (SD=1.07), level of digital literacy in collaboration and share of the digital content factor were moderate with a total mean of 3.29 (SD=1.04) and barriers in learning digital literacy factor were higher with a total mean of 3.63 (SD=1.10).

RQ: 2. Are there any Noteworthy Effect of Digital Literacy on the Academic Performance of the Students?

Table 2. Relationship between Effects of Digital Literacy on Academic Performance of the Students

	Variables	Digital_ Literacy	CGPA_ Last_ Exam
Digital_ Literacy	Pearson Correlation	1	-.025
	Sig. (2-tailed)		.475
	N=	800	800
CGPA_ Last_ Exam	Pearson Correlation	-.025	1
	Sig. (2-tailed)	.475	
	N=	800	800

Result of table 2 revealed a negative correlation among digital literacy and academic performance (r= -.025). The result of P-value (.475, P > 0.01 & 0.05 levels) verified that there is insignificant and negative correlation appeared between digital literacy and CGPA. It concluded that digital literacy has no effect on students' CGPA.

RQ: 3. Are there any Significant Effects of Digital Literacy on Communication Skills of the Students?

Table 3. Relationship between Effects of Digital Literacy on Students' Communication Skills

	Variables	Digital Literacy	Communication Skills
Digital_ Literacy	Pearson Correlation	1	.705[**]
	Sig. (2-tailed)		.000*
	N	800	800
Communication Skills	Pearson Correlation	.705[**]	1
	Sig. (2-tailed)	.000*	
	N	800	800

Result of table 3 discovered a positive correlation among digital literacy and communication skills (r= .705). The result of P-value (.000, P < 0.01 & 0.05 levels) verified that there is statistical significant and positive correlation observed between digital literacy and communication skills. It discovered that digital literacy had significant effects on communication skills.

RQ: 4: Are there any significant effects of digital literacy on research skills of the students?

Table 4. Relationship between Effects of Digital Literacy on Students' Research Skills

	Variables	Digital Literacy	Research Skills
Digital_ Literacy	Pearson Correlation	1	.624**
	Sig. (2-tailed)		.000*
	N	800	800
Research_ Skills	Pearson Correlation	.624**	1
	Sig. (2-tailed)	.000*	
	N	800	800

Result of table 4 exposed a positive correlation among digital literacy and research skills (r= .624). The result of P-value (.000, P < 0.01 & 0.05 levels) proved that there is statistical significant and positive correlation present between digital literacy and research skills. It revealed that digital literacy had significant effects on research skills.

RQ: 5: Are there any significant effects of digital literacy on the confidence level of the students?

Table 5. Relationship between Effects of Digital Literacy on Students' Confidence level

	Variables	Digital Literacy	Confidence
Digital_ Literacy	Pearson Correlation	1	.638**
	Sig. (2-tailed)		.000*
	N	800	800
Confidence	Pearson Correlation	.638**	1
	Sig. (2-tailed)	.000*	
	N	800	800

Result of table 5 reported a positive correlation among digital literacy and confidence (r= .638). The result of P-value (.000, P < 0.01 & 0.05 levels) proved that there is statistical significant and positive correlation present between digital literacy and confidence. It concluded that digital literacy had significant effects on confidence.

Analysis of qualitative data (Students' Interviews)

On the basis of quantitative data results, 20 students (10 low digital literacy level and high CGPA and 10 high digital literacy level and low CGPA) were interviewed for qualitative data. The qualitative data were analyzed through thematic analysis:-

(A). Theme 1: Students' awareness, and engaging in digital practices

Q.1. How do you perceive digital literacy?

Majority of the respondents stated that digital literacy is something about the use of a computer, smartphone, and other technological devices while the minority of the respondents explained digital literacy is the study about information and communication technology (ICT).

(B). Theme 2: Managing and communicating information

Q.2. How can you share your own work to website, blog, and online forum?

Most of the respondents answered that they could share their own work to others through social networking sites such as Facebook, Whatsapp, Twitter, and E-mail. None of them did know how to develop a website, write a blog and participate in an online forum.

Q.3. How can you create content in audio, video and webpage for people using online resources?

Maximum of the respondents answered that they could create audio, video files through smartphones and could easily share with other people but they had no such skills to create a webpage using online resources.

(C).Theme 3: Digital Literacy and communication skills

Q.4. How can digital literacy improves your communication skills?

Respondents voiced that Digital literacy was extremely helpful for improving communication skill. There are many ways to improve communication skills through Facebook, Twitter and Instagram, Messenger, Whatsapp, YouTube, Email, Chat Rooms etc.

(D).   Theme 4: Digital Literacy and research skills

Q.5. How can digital literacy improve your academic work and research skills?

Respondents answered that practicing and studying various books, articles, journals, and online database had improved our academic and research skills.

(E).   Theme 5: Digital Literacy and confidence ability

Q.6. How can digital literacy improves your confidence in sharing your own work to others?

Majority students expressed that digital literacy gives us a platform to express our thinking on different events on national and international issues. Interaction with different ethnic social groups and different genders improved their confidence level.

(F).   Theme 6: Barrier in Learning Digital Literacy

Q.7. How can these barriers in digital literacy be removed, please suggest some measures?

Majority of the respondents replied that teachers should motivate students to learn digital literacy, ICT literacy and other software related to their studies. It was also discovered through interviews that for improving students' interest in digital literacy, teachers should give guidance to the students. So, first of all the teachers should play their role in removing barriers than university must try to remove the barriers regarding learning and practices of digital literacy.

(G).   Theme 7: Promoting Digital Literacy

Q.8. What are your suggestions about promoting digital literacy at University Level?

Most of the respondents suggested that 1) Awareness should be created among different ethnic groups of the community. 2) Higher authority of University should arrange different workshops and seminars about digital literacy. 3) For Lectures on job, courses should be arranged. 4) Digital library provide students very easy online access. 5) Digital literacy should be an essential part of each educational program and 6) for promoting digital literacy, availability and easy access to digital devices should be ensured inside University with high speed and free Wifi connection.

(H).   Theme 8: Academic Performance

Q.9. Do you believe that CGPA is due to digital literacy skills or any other factor? Explain:

Majority of the respondents replied that CGPA is solely linked with the syllabus of the program and by completing teachers' assignments and through other academic work CGPA could be improved. Most of Respondents said that by following teachers' directions and guidelines students could achieve high CGPA in their coursework. Some respondents said that their higher CGPA was due to regular studying in departmental library and handouts provided by the teachers.

Discussion

The study discovered that most of the students had a higher level of perceptions towards digital literacy in three factors, a) understanding of digital literacy, b) finding information through digital tools, c) digital literacy in critically evaluating information, online interaction, and online tools whereas, students had a moderate level of digital literacy in managing and communicating information factor, and digital literacy in collaboration and share of the digital content factor. Moreover, the study exposed that digital literacy had significant effects on students' communication skills, research skills and confidence whereas digital literacy had insignificant effect on the CGPA. These findings were in line with the finding of Amiri (2009) who concluded that computer accessibility and digital literacy had positive effects on students' academic performance. Similarly conclusions made by Fairlie et al., (2010) that strong positive effects on school graduation and other outcomes relevant to the education field also supported the results

of this study. The findings of Brown (2009) were also in line with the current study's findings that had a positive relationship between digital literacy and students' performance.

Conclusions

This study concluded that the majority of the students had a higher level of perceptions towards digital literacy in understanding about digital literacy, finding information through the use of digital tools, usage of digital literacy in critically evaluating information, online interaction and online tools and had a moderate level of perceptions towards the factors of digital literacy in managing and communicating information & collaboration and share of digital contents. The study also concluded that digital literacy had significant effects on communication skills, research skills and confidence of the students whereas digital literacy had an insignificant effect on the CGPA of the students. Qualitative data concluded that CGPA is solely linked with the syllabus of the program of study and after completion of teachers' assignments and other academic work, CGPA could be improved. Majority of students told that after following the directions and guidelines of teachers, students could achieve higher CGPA in their coursework. The results of this study recommended that the general universities should plan various types of training, workshops, and seminars to enhance students' interest in learning and practicing digital literacy and minimize various barriers to learning and practicing digital literacy.

Suggestions for future research work

The study should be expanded to the other universities, secondary and higher secondary level and teachers should also be assessed in digital literacy skills.

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