
Generational and Gender Differences in Digital Literacy among Adults in Pakistan: A Cross-Sectional Comparative StudyNaba Noor¹ Muhammad Talha Khalid^{1*}, Rabia Rafique¹¹ Department of Humanities & Social Sciences, Gift University, Gujranwala, Pakistan.**Abstract**

This article examined the gaps in digital literacy between Generations Y and Z, concentrating specifically on gender and generational differences. A quantitative research design was used with the sample of individuals (N=200) including Generation Z (n=100) aged 18 to 30 years and Generation Y (n=100) aged 31-45 years were recruited through purposive sampling technique. The study sampled were chosen based on predetermined criteria in terms of inclusion and exclusion. The Digital Literacy Scale was used to gather data. Digital literacy was accessed by using six sub dimension Ethics and Responsibility, General Knowledge and Functional Skills, Daily Use, Professional Production, Privacy and Security, and Social Dimension. Data was analyzed through SPSS (Version 27). Independent-sample t -tests were used to investigate the digital literacy differences per generation and gender. The findings have shown there were significant differences in digital literacy based on generational differences, with younger participants showing higher levels in Ethics and Responsibility, General Knowledge and Functional Skills, Professional Production, Privacy and Security, and Social Dimension. Moreover, there were no differences in the overall digital literacy by gender, but females had a higher score on certain aspects of ethics, responsibility, and privacy. These findings suggest the necessity of creating specific digital literacy initiatives to fill the generational and gender-related gaps and promote the responsible and efficient use of technology in an increasingly digitalized world.

Keywords: Digital literacy, generational differences, Gender Differences

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1. Introduction

Digital literacy is characterized as the awareness and capability of a person to effectively utilize digital tools in the context of specific life situations to identify, access, examine, analyze and synthesize digital resources, create new knowledge, communicate with others, and create media expressions enabling constructive social action (Martin, 2006). Over the last few years, the concept of digital literacy has become one of the most vital competencies of effective functioning in an increasingly technological society here might be demographic variations among demographic groups, particularly in the developing nations where digital transformation is gaining pace, though it is still distributed unevenly. Although the global focus on digital competence is evident, the digital literacy level can be characterized by great difference among age groups due to changes in exposure to technology, learning conditions, and adjustment to digital tools. The generational differences are often considered as a relevant factor of the digital literacy proficiency.

Furthermore, digital literacy is a multidimensional construct that involves not only applied technological skills but also critical assessment, ethical awareness, communicative skills, and responsible use of digital technologies and could differ amongst various demographic groups. Within the framework of Pakistan, the increasing digitalization of educational, communicative, and professional spheres has made digital literacy one of the key competencies of both younger and older generations. However, the access, training, and participation differences can affect the level of digital literacy among these generations.

Digital natives, also known as generation Z, have grown in a highly digitized world that is constantly engaging with smartphones, social media, and online learning platforms, which in turn may result in the improvement of their functional and operational digital capabilities. On the contrary, Generation Y people lived through the transition from analogue to digital technologies and, as per the thesis of Prensky (2001), generally developed technological skills later on in life. In an emerging economy like Pakistan, the digital divide in terms of access, exposure to technology and access to education can potentially widen the digital literacy generation gap and, therefore, make comparative research in the given area especially important.

The differing patterns of early exposure and technological immersion purportedly introduce differences in the level of digital literacy between the two cohorts (Uhls et al., 2017). Despite the existing research on digital literacy among the various groups of people, there is a gap of comparative studies that focus on generational and gender disparities in digital literacy among non-Western populations, including Pakistan. The literature that remains is mostly focused on students or single age groups, thus ignoring a coherent comparative study between the adults of Generation Y and Generation Z.

Previously conducted empirical studies suggest that there can be gender-based differences in digital literacy. Even though technical skills might not show high levels of differences, research indicates that females are always more responsible and cautious about their online activities, particularly on online privacy, security, and ethical use of information (Van Deursen & Van Dijk, 2014). On the other hand, it is also evident that males tend to be more assertive in technical application and tend to place relatively low priority on protective and ethical digital practices (Ng, 2012). Since the digital literacy encompasses both technical competence and responsible use, differences across gender may be expected. Besides, the analysis of the relationship between generational cohort and gender provides a more comprehensive view of digital

literacy since technological exposure, sociocultural expectations, and patterns of use differ between age groups and genders.

In light of these gaps, the current research aims at examining the generational and gender-based inconsistencies in digital literacy. Specifically, this research will utilize a comparative approach to explore the differences in digital literacy rates between Generation Y and Generation Z and simultaneously address the issue of gender-specific differences among the adult population in Pakistan.

2. Method

2.1 Study Design

The study employed a quantitative cross-sectional comparative design to examine generational and gender differences in digital literacy. This design allowed direct comparison of the level of digital literacy between the generations Y and Z, as well as male and female respondents.

2.2 Participants

For this present quantitative study, a total sample of 200 participants, including males ($n=100$) and females ($n=100$) from Generation Y and Generation Z, was selected using purposive sampling from different colleges, local universities, and other occupations. The researcher specified exclusion and inclusion criteria. The study only considered the participants between the age of 18 to 45 years, who showed the literacy and proficiency in English to qualify as potential participants and those who were illiterate were not included. This inclusion criterion may limit the generalizability of the findings to non-English-speaking populations.

2.3 Measure

Digital literacy was assessed using a standardized and validated instruments. The current work has used the Digital Literacy Scale (DLS) created by Bayrakçı and Narmanlıoğlu in order to test the level of digital literacy among the participants. The scale assesses an individual's ability to interact effectively with digital environments beyond basic technical use. Digital literacy scale consists of 29 items having 6 sub dimensions (Ethics and Responsibility, General Knowledge and Functional Skills, Daily Use, Professional Production, Privacy and Security, and Social Dimension). Higher scores indicate greater levels of digital literacy and digital competence. The scale has a Cronbach's alpha of 0.86 which is consider as a strong internal reliability.

2.4 Procedure

The research was carried out after receiving the consent of the departmental ethics committee and the authorities of the affiliated institutions. Informed consent was taken from all the participants and the study was conducted in strict adherence to ethical standards. A systematic methodology was applied to examine differences between Generations Y and Z and genders to evaluate digital literacy differences. Initially, 254 participants were approached, out of which 200 were retained after data cleaning and exclusion of incomplete responses. The obtained sample was balanced in terms of gender and age (18-45 years). The study sampled were chosen based on predetermined criteria in terms of inclusion and exclusion. The data was collected through a structured questionnaire that was administered via Google Forms and in person.

The analysis of data was conducted in SPSS and the ethical principles, including the principles of confidentiality, voluntary participation and honest reporting were strictly adhered to.

3. Results

Independent-sample t-tests was conducted to compare the mean and standard deviations of two generations related to study variables across males and females.

Table 1 indicates significant generational differences in overall digital literacy scores. The digital literacy scores of Generation Z ($M = 109.1$, $SD = 10.19$) are higher than Generation Y ($M = 94.85$, $SD = 10.19$) t

(198) = 9.89, $p < .001$). Generation Y demonstrated significantly higher scores on the Daily Usage dimension ($M = 21.32$, $SD = 4.27$) than Gen

Z ($M = 19.83$, $SD = 3.20$), $t(198) = -2.78$, $p = .006$, other subscales showed no significant differences ($p > .05$).

Table 1

Mean, Standard Deviation, and t-test for digital literacy across generations Y and Z (N=200).

Variables	Generation Z 18-30 years		Generation Y 31-45 years		t(198)	p
	M	SD	M	SD		
Digital literacy scale	109.1	10.19	94.85	10.19	9.89	0.001
Ethics and responsibility	26.15	3.00	26.93	4.02	-1.55	0.12
General knowledge and functional skills	20.22	3.18	20.56	4.17	-0.64	0.51
Daily usage	19.83	3.20	21.32	4.27	-2.78	0.006
Advanced production	5.06	1.81	5.14	2.34	-0.27	0.78
Privacy and security	14.99	2.20	15.67	3.22	-1.73	0.08
Social dimension	12.13	2.50	12.88	3.46	-1.75	0.08

Note. M = Mean of variables, SD = Standard Deviation.

Table 2

Mean, Standard Deviation, and t-test for digital literacy among male and females (N=200).

Variables	Male		Female		t(198)	p
	M	SD	M	SD		
Digital literacy scale	100.2	10.0	100.8	10.3	-0.42	0.67
Ethics and responsibility	25.95	3.85	27.13	3.14	-2.36	0.02
General knowledge and functional skills	20.00	3.80	20.78	3.58	-1.49	0.13
Daily usage	20.72	3.91	20.43	3.77	0.53	0.59
Advanced production	5.20	2.09	5.00	2.09	0.67	0.50
Privacy and security	14.78	3.04	15.88	2.37	-2.84	0.005
Social dimension	12.33	2.81	12.68	3.26	-0.81	0.41

Note. M = Mean of variables, SD = Standard Deviation

The findings show that there was a significant difference between females and males based on scoring of ethics and responsibility ($M = 27.13$, $SD = 3.14$ / $M = 25.95$, $SD = 3.85$), $t(198) = -2.36$, $p = .02$ and privacy and security ($M = 15.88$, $SD = 2.37$ / $M = 14.78$, $SD = 3.04$), $t(198) = -2.84$, $p = 0.005$ in digital literacy. However, no significant differences were found between males ($M = 100.2$, $SD = 10.0$) and females ($M = 100.8$, $SD = 10.3$), $t(198) = -0.42$, $p = .67$ in digital literacy. The gender differences were also not statistically significant in the scores in general knowledge and functional skills, daily usage, advanced production, or social dimension ($p > 0.05$).

4. Discussion

The findings revealed significant generational differences in overall digital literacy, while gender differences were observed in specific dimensions rather than in total digital literacy scores. Generation Z was also more digitally literate than Generation Y. This observation is consistent with the earlier studies that indicate that in the case of the Generation Z, often described as digital natives, early and continuous exposure to digital technologies may contribute to their higher levels of digital literacy (Bhargava et al., 2023; Helsper & Eynon, 2010; Prensky, 2001). Conversely, Generation Y being digital immigrants has been exposed to technology in a dynamic form and might not have become as fluent and flexible in digital activities due to the influence of early exposure on digital skills.

It was also found that there were gender differences. Although there were no statistically significant differences in gender with regard to overall digital literacy, but women showed better results in the dimensions addressing ethics, responsibility, and privacy management. The results can be considered as the socially constructed norms of digital practice because women are more likely to express responsible and careful usage of technologies (Van Deursen & Van Dijk, 2014). These findings further support the idea that digital literacy is multidimensional, involving technical, ethical, and social components that may vary across

generations and gender. In turn, the findings indicate the need to create specific interventions that would bridge the generational divide and address dimension-specific gender differences in digital literacy. Educational and training programs should focus on the weaker areas identified in each group to improve safe and responsible technology use. Intergenerational learning is also encouraged as it may help to transfer knowledge and experience in the mutually beneficial way between Generation Y and Generation Z. Taken together, findings suggests that the digital literacy disparities depend not only on the access to technologies, but also on the trends of socialization, exposure, and contextual learning opportunities.

Limitations and Recommendations

The research will contribute to the existing literature on digital literacy in Pakistan; however, few methodological limitations need to be taken into consideration. Firstly, the cross-sectional structure that provides a description of generational and gender discrepancies at once, but does not allow making conclusions regarding causal mechanisms or developmental trends over time. Secondly, the use of purposive sampling technique can be a limiting factor to the external validity of the final results, especially considering the diversity of socioeconomic and geographic setting existing throughout Pakistan. Thirdly, Response bias, either in the form of socially desirable responses or exaggerated measures of abilities, is another danger of self-reported measures. Moreover, English proficiency requirement might have limited the participants involvement located in rural or lower education levels, therefore affected the representativeness of digital literacy measures. Future studies which combine longitudinal designs, probability-based sampling models, and capture linguistically heterogeneous groups of participants should be expected to strengthen the empirical evidence on the topic of digital literacy inequity in relation to demographic clusters.

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