

Understanding the Digital Divide: Gender, School Type, and Residential Background in Shaping E-Learning and Computer Skills Among College Students

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This study aims to examine the influence of gender, type of school, and residential background on e-learning engagement and computer skills among college students. Using a stratified sampling method, 200 undergraduate students from various degree colleges in Bathinda district, Punjab, are selected for the study. From the analysis conducted, it is inferred that female college students of Punjab have higher level e-learning as compared to their counterparts where as gender does not play any significant role in computer competency of college students. On other hand, students studying in private colleges not only have higher level of e-learning but also this difference is significant, conversely in case of computer competency reverse pattern can be observed as students from government colleges have higher level of computer competency in comparison to students studying in private colleges. From the results pertaining to residential background (Rural vs. Urban) on Students' access to E-Learning resources and computer Skills reveal that there is no significant difference in the e-learning of college students on the basis of residential background, paradoxically this difference is statistically significant in case of computer competency where college students having urban background have significantly possessed higher level computer competency.

Keywords: E-learning, gender, students.

1. Introduction

In recent years, the advent of e-learning has revolutionized educational paradigms worldwide. However, despite its widespread adoption, there remains a significant digital divide—a gap that affects students' access to technology and their ability to effectively use digital tools. This

divide is not merely a matter of access to hardware and internet connectivity but is also shaped by socio-cultural factors such as gender, type of school, and residential background. Understanding how these variables influence e-learning and computer competency is crucial, especially in regions like Punjab, where diverse educational and socio-economic contexts exist. Gender disparities in digital literacy have been a subject of concern globally, with studies indicating that women often lag behind men in terms of technological skills and e-learning engagement (Sethi & Sood, 2021). The type of institutions —whether public or private—can also significantly impact students' exposure to technology and quality of computer education (Yadav & Dey, 2020). Students from private institutions generally have better access to modern technology and skilled instructors, whereas public college students may face barriers such as outdated equipment and limited exposure. Similarly, the residential background, whether rural or urban, plays a vital role in determining students' digital proficiency. Urban students often have more access to the internet, technological devices, and e-learning platforms, while rural students struggle with infrastructural limitations (Singh, 2019). This research aims to explore how gender, school type, and residential background shape e-learning experiences and computer skills among college students in Punjab. By examining these factors, this study seeks to provide a deeper understanding of the digital divide within the region and offer recommendations to bridge the gap. This study holds significant importance in understanding the complexities of the digital divide among college students in Punjab, particularly in relation to gender, school type, and residential background. As e-learning becomes an integral part of modern education, it is crucial to identify the factors that influence students' access to digital resources and their ability to utilize them effectively. By examining how gender affects digital competency, the study aims to uncover gender-based disparities in technology access, engagement, and skill development, thereby contributing to the broader discussion on gender equality in education. Furthermore, this research sheds light on the role of school type—public vs. private—in shaping students' digital skills. Understanding how institutional differences impact e-learning experiences is essential for policymakers and educators aiming to create more equitable educational environments. The study also explores the rural-urban divide in digital access, focusing on how students' residential background influences their exposure to technology, internet connectivity, and e-learning opportunities. Ultimately, the findings of this study will be valuable for educational planners, government agencies, and NGOs working to reduce the digital divide in Punjab and similar regions. The insights gained will guide the development of targeted interventions and policies to promote digital literacy, ensuring that all students, regardless of gender, school type, or location, have equal opportunities to succeed in the digital age.

The digital divide, particularly in the context of e-learning and computer competency, has been a growing concern in educational research. Several studies have explored how socio-demographic factors, such as gender, school type, and residential background, influence students' access to technology and their digital skills. Sethi and Sood (2021) highlight that despite increasing access to technology, female students often face barriers such as societal expectations, lower self-confidence in using digital tools, and limited access to resources, resulting in lower levels of digital competency compared to male students. Similarly, Sharma (2020) found that women in rural areas of Punjab were significantly less likely to use e-learning platforms than their male counterparts, further exacerbating the gender gap in digital literacy. Yadav and Dey (2020) observed that students in private schools in urban

Punjab showed higher computer literacy and e-learning engagement compared to their counterparts in public schools. Public schools, particularly in rural areas, face challenges such as outdated computers, limited internet access, and insufficient training for both students and teachers, which hinder the development of computer skills. This review highlights the multifaceted nature of the digital divide, suggesting that targeted interventions, particularly in gender-sensitive and region-specific contexts, are necessary to bridge the gap in digital competency.

OBJECTIVES OF THE STUDY

- 1) To examine the impact of gender on e-learning participation and computer competency among college students in Punjab.
- 2) To assess the influence of college type (public vs. private) on students' computer competency and e-learning skills.
- 3) To investigate the role of residential background (rural vs. urban) in shaping students' access to e-learning resources and computer skills.

HYPOTHESES OF THE STUDY

- 1) There is no significant difference in e-learning participation and computer competency between male and female college students in Punjab.
- 2) There is no significant difference in digital literacy and e-learning skills between college students from public and private colleges in Punjab.
- 3) There is no significant difference in access to e-learning resources and computer skills between college students from rural and urban backgrounds in Punjab.

2. RESEARCH METHODOLOGY:

For this study, descriptive research method has been employed, utilizing quantitative approach to analyze the digital divide in e-learning and computer competency among college students in Punjab as this method provides an objective and reliable assessment of the impact of socio-demographic factors on digital competency.

Research Tools: Computer Competence by Nikkah Z. (2013) and E-Learning scale by Raj Kumar, S. (2015).

Sample of the Study: The study on the digital divide, specifically focusing on gender, college type, and residential background, aims to understand how these factors shape e-learning and computer skills among college students in Bathinda district, Punjab. A sample of 200 students from various degree colleges in the region was selected using a stratified sampling technique. This approach ensured that gender, locale (urban or rural), and the type of college (government or private) were adequately represented, allowing for a nuanced understanding of how these variables influence digital literacy.

ANALYSIS AND INTERPRETATION OF DATA

To assess the significance of the mean difference in e-learning among school students based on their gender, residential areas, and type of schools, the t-test was employed and results are presented here under:

Impact of gender on e-learning participation and computer competency among college students

Table 1 Mean, Standard Deviation, and Significance of the Difference in e-learning and Computer Competency across Gender among College Students

	Gender	N	Mean	SD	t-ratio	Significance
E-learning	Male	100	124.82	23.47	2.43 *	Significant
	Female	100	128.58	25.42		
Computer competency	Male	100	53.44	10.32	1.28	Not Significant
	Female	100	54.27	10.15		

Table 1 reveals that the mean e-learning score for female students is 128.58, while for male students, it is 124.82. The t-value for the two means is 2.43, which is statistically significant at the 0.05 level. The table further indicates that the mean computer competency score for female college students is 53.44, while for male students, it is 54.27. The t-ratio for the comparison of the two means was 1.28, which is not statistically significant at the 0.05 level. Based on this result, the hypothesis The hypothesis (I)“There is no significant difference in e-learning and computer competency between female and male college students” is rejected in case of e-learning but accepted in case of computer competency.

The influence of college type (public vs. private) on students' computer competency and e-learning skills

Table 2 Comparison of Mean, Standard Deviation, and Significance of the Difference in E-learning and Computer Competency across Different Types of Colleges among College Students

	Type of College	N	Mean	SD	t-ratio	Significance
E-learning	Government	100	126.60	24.25	1.98*	Significant
	Private	100	128.90	24.64		
Computer competency	Government	100	54.84	9.67	1.96*	Significant
	Private	100	52.87	10.70		

The study hypothesizes that there is no significant difference in the E-learning style and computer competency of college students based on the type of college, i.e., Government vs. Private. Table 2 reveals that the mean e-learning score for government college students is 126.60, while for private college students, it is 128.90. The t-ratio for the two means was 1.98, which is significant at the 0.05 level. Table 2 further indicates that the mean computer competency score for students in government colleges is 54.84, while for those in private colleges, it is 52.87. The t-ratio for the comparison of these two means is 1.96, which is statistically significant at the 0.05 level. Therefore, the stated hypothesis is rejected as statistically significant mean difference is observed.

Impact of Residential Background (Rural vs. Urban) on Students' Access to E-Learning Resources and Computer Skills

Table 3 Comparison of Mean, Standard Deviation, and Significance of the Difference in E-learning and Computer Competency across Different Types of residential background among College Students

	Residential Background	N	Mean	SD	t-ratio	Significance
E-learning	Urban	100	126.79	24.64	0.12	Not Significant
	Rural	100	126.60	24.25		
Computer competency	Urban	100	52.87	10.70	1.96*	Significant
	Rural	100	54.84	9.67		

The hypothesis of the study posits that there is no significant difference in e-learning and computer competency among college students based on their residential area (i.e., Urban vs. Rural). Table 3 reveals that the mean e-learning score for college students from urban areas is 126.79, compared to 126.60 for rural students. The t-ratio for testing the significance of the difference between the two mean scores is 0.12, which is not significant at the 0.05 level. Moving further the table also shows that the mean computer competency score for students from urban areas is 52.87, while for rural students, it is 54.84. The t-ratio for the two means is 1.96, which is significant at the 0.05 level. Therefore, the hypothesis (III) is rejected in case of e-learning but accepted in case of computer competency.

3. RESULT AND DISCUSSION

The analysis above clearly indicates that female college students in Punjab exhibit a higher level of e-learning engagement compared to their male counterparts. However, gender does not appear to have a significant impact on the computer competency of college students. In contrast, students attending private colleges not only engage more with e-learning, but this difference is statistically significant. On the other hand, when it comes to computer competency, students from government colleges outperform their private college peers, showing a reverse trend. Regarding the influence of residential background (rural vs. urban) on students' access to e-learning resources and computer skills, there is no significant difference in e-learning levels based on this factor. Interestingly, however, a statistically significant difference is observed in computer competency, with urban students demonstrating higher levels of computer skills compared to their rural counterparts. The findings from this study align with several global studies on gender and educational technology. For instance, research by Czerniewicz et al. (2020) and Mishra et al. (2021) highlights that women in various regions tend to engage more with e-learning platforms, a trend reflected in the higher e-learning participation of female students in this study. However, similar studies also emphasize that gender does not necessarily correlate with differences in computer competency, supporting the finding that gender does not play a significant role in computer skills among students (Mitra et al., 2018). The contrast observed between private and government colleges in e-learning engagement and computer competency is consistent with Cheng and Tsai (2019), who found that students in private institutions often have better access to e-learning tools, while government institutions focus more on computer literacy training. Furthermore, the urban-rural divide in computer competency corroborates findings by Al-Mukhaizeem (2020), which demonstrate that urban students typically have greater access to advanced technology and training opportunities.

4. EDUCATIONAL IMPLICATIONS AND RECOMMENDATIONS

In the context of higher education in Punjab, it is crucial for students, particularly those in rural areas and private colleges, to proactively improve their computer skills through workshops and online courses. Efforts should be made to encourage male students to engage more with e-learning platforms, fostering digital literacy across genders. College teachers must integrate more e-learning tools and digital resources into their teaching methods to enhance student engagement and computer competency. Additionally, college authorities must ensure equal opportunities for both male and female students to develop these skills, offering targeted support where necessary. In government colleges, there is a pressing need to implement additional computer literacy programs to ensure students are equipped for the digital age. Moreover, improving access to e-learning resources, especially for rural students, is essential to bridge the technological divide. Policymakers should focus on ensuring equitable access to digital tools and resources for all students, with special attention to underserved rural and government institutions in Punjab. These recommendations are essential for fostering a digitally inclusive higher education ecosystem in Punjab, where all students, regardless of their gender, location, or type of institution, are empowered with the skills needed for the future.

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