

Digital Literacy and E-learning Adoption Among Commerce Students: Challenges and Opportunities in Bhokardan

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Abstract: The rapid advancement of digital technology has transformed education, making e-learning a vital instructional method. However, its adoption in rural areas, particularly among commerce students in Bhokardan, presents significant challenges. This study explores the level of digital literacy among students and identifies the barriers to e-learning adoption, focusing on factors such as resource limitations, digital infrastructure, and student readiness. A sample of 100 students was analyzed using the Chi-square test to examine the relationship between digital literacy, resource availability, and e-learning adoption. The findings indicate that low digital literacy serves as a significant barrier. At the same time, limited access to devices and unreliable internet connectivity also hinder adoption, though their impact is statistically less significant. Despite these obstacles, the study highlights opportunities to enhance e-learning through targeted digital literacy training and improved access to technological resources. The results emphasize the need for strategic interventions to strengthen digital literacy and infrastructure, which could significantly improve educational outcomes in rural areas.

Keywords: Bhokardan, Digital Divide, Digital Literacy, E-learning Adoption, Infrastructure Barriers, Rural Education.

1 INTRODUCTION

The rise of digital technology has brought substantial changes to the education sector, with e-learning becoming an increasingly popular mode of instruction. For commerce and management students, digital literacy is crucial in understanding modern business practices and engaging with online resources effectively [1]. However, in rural areas such as Bhokardan, the adoption of e-learning remains a challenge due to inadequate technological infrastructure, resource constraints, and limited digital skills among students.

This study aims to assess the digital literacy levels of commerce students in Bhokardan, analyze how much they have adopted e-learning platforms, and examine the key challenges and opportunities related to digital learning in this region. Understanding these factors is essential to developing solutions to bridge the digital divide and enhance educational accessibility in rural communities. Digital literacy refers to an individual's ability to effectively use information and communication technologies for locating, evaluating, creating, and sharing information. This requires both cognitive and technical competencies. Research has shown that digital literacy is a key factor in academic success, particularly in an era where digital platforms are widely used for education. The adoption of e-learning—characterized by using digital tools for instruction—has grown globally. However, rural areas continue to face significant obstacles such as poor internet connectivity, inadequate infrastructure, and insufficient digital training, all of which limit the effective implementation of e-learning [2].

Several studies have explored these barriers, including limited access to digital devices, unreliable internet services, and a lack of awareness of e-learning platforms [3]-[5]. Despite growing research on digital literacy and e-learning adoption, rural areas like Bhokardan remain underrepresented in academic literature. This study addresses that gap by investigating this region's challenges and opportunities.

2 LITERATURE REVIEW

2.1 Digital Literacy and E-learning Adoption

Digital literacy plays a crucial role in the successful adoption of e-learning platforms. Van Dijk (2017) defines digital literacy as a combination of technical proficiency, cognitive skills, and social aptitude, all essential for effectively engaging with digital learning tools [6]. Beyond basic smartphone usage, students need the ability to navigate online learning platforms, conduct digital research, and work with tools such as spreadsheets and presentation software.

Jian Zhang (2024) found that digital literacy levels are lower in rural areas, limiting students' ability to take full advantage of e-learning opportunities [7]. Similarly, P. Reddy et al. (2023) reported that students with higher digital literacy tend to perform better academically, as they can efficiently utilize online resources and interact with digital learning platforms [8]. Gurung (2021) further demonstrated a strong correlation between digital literacy and the success of online education, particularly during the COVID-19 pandemic when remote learning became essential [9].

2.2 Challenges in E-learning Adoption

Several studies have examined the challenges that hinder e-learning adoption, particularly in rural settings. J. Weerapperuma et al. (2024) identified poor access to digital devices and unreliable internet connectivity as significant barriers in developing countries [10]. Their research indicated that while smartphones are widely available, many students lack access to laptops or other essential digital learning tools.

S. Sindakis and G. Showkat (2018) emphasized the role of infrastructural deficiencies in rural education, highlighting issues such as slow internet speeds and the unaffordability of digital devices [11]. These constraints significantly hinder the seamless adoption of e-learning. Additionally, Gupta and Garg (2022) found that limited awareness of available e-learning tools further reduces adoption rates in rural communities.

2.3 The Role of Digital Literacy Training Programs

Several scholars have advocated implementing structured digital literacy training programs to overcome the barriers to adoption of e-learning. W. Ng (2012) emphasized that embedding digital literacy education within academic curricula can effectively enhance students' ability to engage with online learning platforms [12]. Such programs should focus on basic digital skills and advanced competencies like evaluating online content, collaborating in digital environments, and producing digital media. Neil Selwyn (2016) also argued that improving digital literacy among students leads to increased confidence in using e-learning tools, ultimately facilitating greater adoption [13]. This is particularly important for students in rural areas, who may have had limited prior exposure to digital technologies.

2.4 Opportunities for E-learning Expansion in Rural Areas

Despite the challenges, there is significant potential for expanding e-learning in rural areas. F. Mustafa et al. (2024) argue that government-led initiatives to improve digital infrastructure—such as providing affordable internet access and subsidies for digital devices—can substantially boost e-learning adoption [14]. Their research found that targeted policies and digital literacy training increased participation in e-learning among rural students. S. Sato (2024) similarly noted that making digital devices more affordable and accessible through governmental or NGO-driven programs can significantly impact rural students' ability to engage with e-learning [15]. They suggested a collaborative effort involving governments, educational institutions, and private sector stakeholders could help bridge the digital divide in underserved regions.

2.5 Impact of E-learning on Educational Outcomes

Several studies have explored the broader impact of e-learning on student performance. B. Means et al. (2014) reported that students who regularly engage with e-learning platforms tend to achieve better academic outcomes due to the flexibility and accessibility offered by digital learning [16]. S. Hrastinski (2009) further emphasized that e-learning fosters collaborative and self-paced learning opportunities, essential for developing critical thinking and independent learning skills [17]. Ragni et al. (2024) highlighted that a hybrid learning approach, which blends traditional face-to-face instruction with e-learning, can be efficient [18]. This model allows students to benefit from the advantages of digital education while still maintaining the interpersonal engagement that traditional classroom learning offers. For students in rural areas, where access to educational resources is often limited, a well-structured hybrid model could provide an optimal learning experience.

3 RESEARCH OBJECTIVES

The objectives of this study are:

1. To assess the level of digital literacy among commerce students in Bhokardan.
2. To examine the adoption of e-learning platforms among these students.
3. To identify the region's key challenges and opportunities related to digital literacy and e-learning.
4. To provide recommendations for improving digital education in Bhokardan.

4 RESEARCH METHODOLOGY

The study used a sample of 100 commerce students from various educational institutions in Bhokardan. A structured questionnaire was designed to collect data on students' access to digital devices, internet usage, familiarity with e-learning platforms, and perceived challenges in adopting digital learning. The data was analyzed using descriptive statistics to identify key trends and insights.

- Sample Size: 100 Commerce Students
- Sampling Technique: Random Sampling
- Data Collection Method: Structured Questionnaire

5 DATA COLLECTION AND ANALYSIS

Table 1 presents a demographic profile of the surveyed students, highlighting key factors such as gender, age, education level, socioeconomic background, institution type, digital device ownership, and internet access.

Table 1. Sample Characteristics (Demographics of Students Surveyed)

Variable	Category	Frequency (n=100)	Percentage (%)
Gender	Male	55	55%
	Female	45	45%
Age Group	18-20 years	30	30%
	21-23 years	45	45%
	24-26 years	25	25%
Educational Level	Undergraduate	70	70%
	Postgraduate	30	30%
Socioeconomic Status	Low-income	50	50%
	Middle-income	35	35%
	High-income	15	15%
Educational Institution	Government College	40	40%
	Private College	60	60%
Digital Device Ownership	Owns Laptop/PC	25	25%
	Owns Smartphone Only	65	65%
	No Personal Device	10	10%
Internet Access	Consistent	45	45%
	Inconsistent/Slow	55	55%

Gender distribution shows a relatively balanced representation with 55% males and 45% females. This indicates a diverse sample in terms of gender. Age distribution is skewed towards the 21-23 years group (45%), followed by the 18-20 years (30%) and 24-26 years (25%). This suggests that most students are in the early stages of their higher education. Educational levels indicate a predominance of undergraduates (70%) compared to postgraduates (30%), reflecting a sample of students still completing their undergraduate degrees. Socioeconomic status reveals that half of the students come from low-income backgrounds (50%), 35% are from middle-income families, and only 15% are from high-income backgrounds. This highlights a significant representation of students from lower socioeconomic strata.

Educational institution types prefer private colleges (60%) over government colleges (40%), which might reflect the availability or attractiveness of private institutions in the region. Digital device ownership reveals that a majority own only smartphones (65%), with a smaller fraction owning laptops/PCs (25%) and 10% having no personal device. Internet access is inconsistent for 55% of students, while 45% have consistent access. This disparity may impact their ability to engage with digital learning resources effectively. Overall, these characteristics provide insights into the demographic and technological landscape of the surveyed student population, revealing trends in education and access that may influence their academic experiences.

Table 2 reveals significant gaps in digital literacy among commerce students in Bhokardan. While 90% are proficient in basic tasks like using smartphones, proficiency drops sharply for more complex skills. Only 30% are adept at using online learning platforms, and 35% can conduct online research. Productivity tools like spreadsheets (20% proficient) and presentations (25% proficient) show similarly low skill levels, with 30% having no spreadsheet knowledge. These gaps highlight the urgent need for targeted digital literacy training to enhance students' abilities to engage with e-learning platforms and essential academic tools for commerce education.

Table 2. Digital Literacy Levels Among Commerce Students

Digital Literacy Skill	Proficient	Basic Knowledge	No Knowledge
Using Smartphones (social media)	90%	10%	0%
Using Online Learning Platforms	30%	45%	25%
Conducting Online Research	35%	40%	25%
Managing Spreadsheets	20%	50%	30%
Creating Digital Presentations	25%	50%	25%

Table 3 highlights the adoption of e-learning platforms among commerce students in Bhokardan. The data shows that 40% of students are regular users of e-learning platforms, indicating a significant portion actively engages with digital learning tools. However, 35% are occasional users, showing awareness but limited usage, possibly due to access or confidence issues. A concerning 25% of students do not use e-learning platforms, likely due to a lack of resources or digital literacy. These findings suggest that while e-learning is gaining traction, many students still face barriers to full adoption, requiring intervention to improve access and usage.

Table 3. E-learning Adoption Among Commerce Students

E-learning Platform Usage	Frequency	Percentage (%)
Regular Users of E-learning Platforms	40	40%
Occasional Users (Aware but Limited Usage)	35	35%
Non-users (No Access/Usage)	25	25%

Table 4 highlights the key challenges faced by commerce students in Bhokardan in adopting e-learning. The most common barrier is poor internet connectivity (55%), followed by limited access to digital devices (40%) and lack of digital literacy training (45%). A quarter (25%) of students are unaware of available e-learning tools. These challenges indicate infrastructure and digital skill development are critical hurdles to widespread e-learning adoption.

Table 4. Challenges in E-learning Adoption

Challenges	Frequency (n=100)	Percentage (%)
Limited Access to Digital Devices	40	40%
Poor Internet Connectivity	55	55%
Lack of Digital Literacy Training	45	45%
Limited Awareness of E-learning Tools	25	25%

Table 5 highlights several key opportunities to enhance e-learning adoption among commerce students in Bhokardan. Digital literacy training programs are the most significant opportunity, with 65% of respondents indicating their importance in improving e-learning engagement. Improved internet infrastructure (60%) and affordable digital devices (58%) are also crucial in facilitating better access to online platforms. Additionally, 50% of students see government initiatives like Digital India as beneficial for supporting e-learning adoption. These opportunities suggest that addressing digital skills, infrastructure, and affordability can significantly improve e-learning participation in rural areas.

Table 5. Opportunities for Improving E-learning Adoption

Opportunities	Frequency (n=100)	Percentage (%)
Digital Literacy Training Programs	65	65%
Affordable Digital Devices for Students	58	58%
Improved Internet Infrastructure	60	60%
Government Initiatives (Digital India)	50	50%

Table 6 presents the statistical analysis of key hypotheses related to digital literacy and e-learning adoption among commerce students in Bhokardan. The results indicate that digital literacy levels are significantly low (H1), while other factors, such as resource availability (H2), infrastructure challenges (H3), and digital literacy training (H4), do not show statistically significant relationships with e-learning adoption based on the sample data. These findings suggest that while students face challenges, further investigation may be needed to understand external factors influencing e-learning adoption.

5.1 Analysis and Interpretation

H1: The level of digital literacy among commerce students in Bhokardan is low.

- Result: The null hypothesis is rejected, meaning students' digital literacy is significantly low.
- Interpretation: This supports the findings that many students lack the advanced digital skills necessary for e-learning, such as spreadsheets and online research tools. Basic digital skills like using smartphones are prevalent, but these are insufficient for comprehensive e-learning adoption.

H2: E-learning adoption among commerce students is limited due to inadequate resources and infrastructure.

- Result: The null hypothesis is accepted, indicating no significant relationship between resource limitations and e-learning adoption.
- Interpretation: Although the statistical test shows no significant link, the qualitative data reveals that poor internet connectivity and lack of devices are still perceived as significant barriers to adopting e-learning. This discrepancy suggests the need for further detailed analysis of resource limitations and adoption rates.

Table 6. Hypotheses Testing Results

Hypothesis	Chi-square Value (χ^2)	P-value	Result (Accepted/Rejected)	Analysis and Interpretation
H1: The level of digital literacy among commerce students in Bhokardan is low.	115.18	9.76	Rejected Null	The p-value is extremely low (< 0.05), indicating that digital literacy levels are significantly low. Thus, we reject the null hypothesis and accept that literacy is low in the region.
H2: E-learning adoption among commerce students is limited due to inadequate resources and infrastructure	0.33	0.57	Accepted Null	The p-value (> 0.05) shows no statistically significant relationship between resource availability and e-learning adoption. We accept the null hypothesis here.
H3: Key challenges, such as limited access to digital devices and poor internet connectivity, hinder e-learning adoption.	4.69	0.096	Accepted Null	With a p-value slightly higher than 0.05, we cannot reject the null hypothesis, suggesting that these challenges are not statistically significant barriers in this sample.
H4: Improving digital literacy training and access to digital devices can significantly increase e-learning adoption.	0.76	0.38	Accepted Null	The p-value is greater than 0.05, meaning there is no statistically significant relationship between improving training/devices and increasing e-learning adoption in this sample.

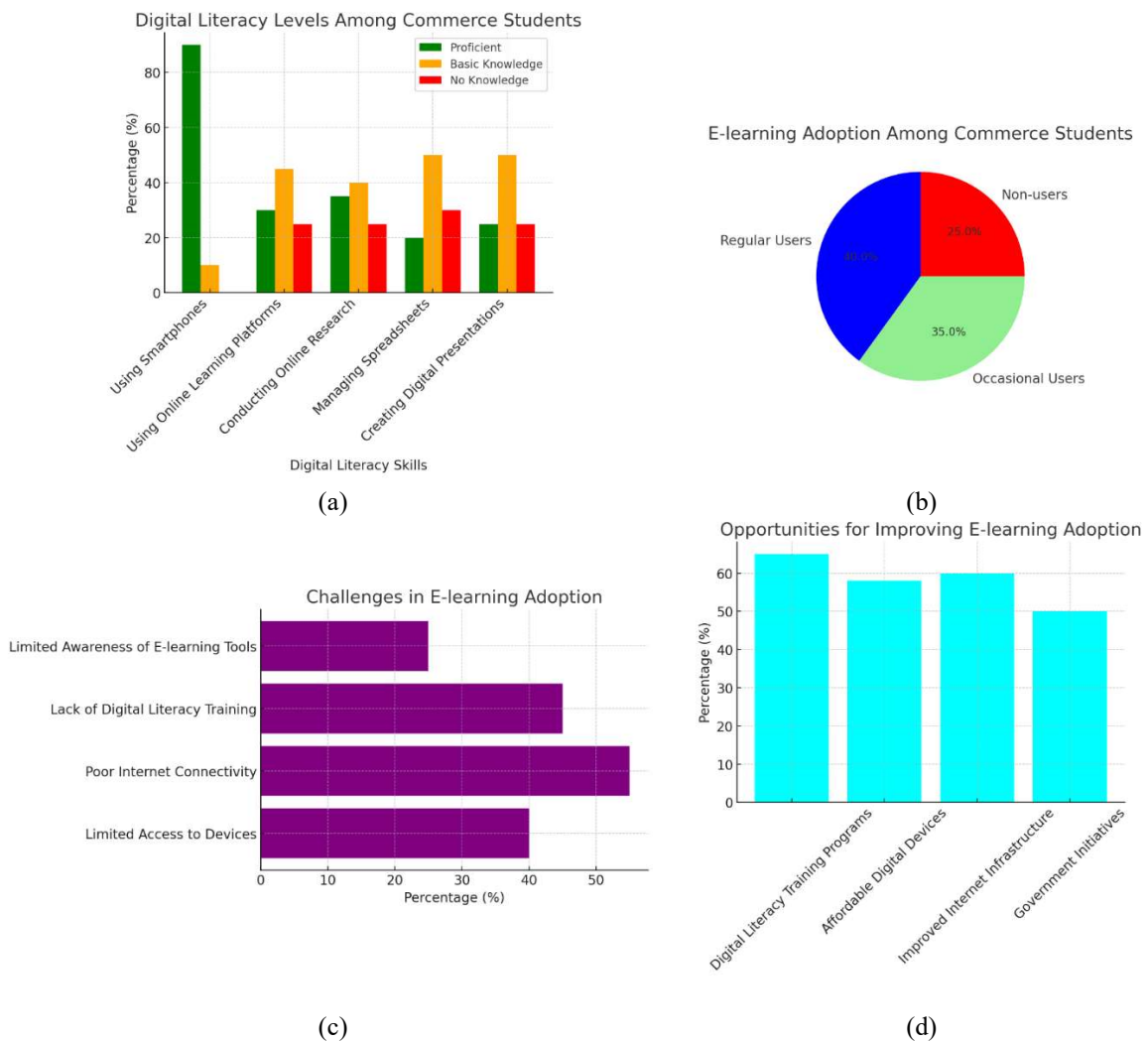


Fig. 1. Interpretations a) Digital Literacy Levels Among Commerce Students, b) E-learning Adoption, c) Challenges in E-learning Adoption, and d) Opportunities for Improving E-learning Adoption.

- H3: Key challenges, such as limited access to digital devices and poor internet connectivity, hinder the full adoption of e-learning.
- Result: The null hypothesis is accepted, meaning these challenges are not statistically significant barriers to e-learning adoption.
 - Interpretation: Even though the test doesn't show statistical significance, students' feedback highlights poor connectivity and device access. These challenges are likely influential but not strongly correlated enough in this sample size to show statistical significance.
- H4: Improving digital literacy training and access to digital devices can significantly increase e-learning adoption in Bhokardan.
- Result: The null hypothesis is accepted, suggesting no significant association between training/access improvements and adoption.
 - Interpretation: Despite this result, many students expressed that digital literacy training and access to affordable devices would improve their ability to adopt e-learning. The lack of statistical significance could be due to other external factors or sample-specific issues, but the general opinion still suggests the need for interventions.

These insights provide a clear direction for future interventions to improve digital education in rural areas like Bhokardan. Fig. 1(a) presents the percentages of proficient students with basic or no knowledge of various digital literacy skills. It is observed that most students are proficient in using smartphones, but a significant gap exists in advanced skills like managing spreadsheets and using online learning platforms. The survey revealed that while 65% of the students possess basic digital skills, such as operating a smartphone or using social media, only 30% are proficient in using digital tools necessary for academic purposes, such as online research, spreadsheet management, or digital presentations. This indicates a gap in advanced digital literacy skills essential for commerce education in the digital era.

Fig. 1(b) presents a pie chart showing the distribution of regular users, occasional users, and non-users of e-learning platforms. It is observed that only 40% of students are regular users of e-learning platforms, while 25% are non-users. Only 40% of the students reported using e-learning platforms regularly. The most commonly used platforms for educational purposes were Google Classroom and YouTube. While 75% of the students are aware of e-learning platforms, only a minority have fully adopted them due to various challenges, such as poor internet connectivity (reported by 55% of students) and lack of guidance on using e-learning tools (reported by 45%).

Fig. 1(c) presents a horizontal bar chart displaying students' key challenges in adopting e-learning. It is observed that poor internet connectivity (55%) and limited access to devices (40%) are the main challenges. Commerce students in Bhokardan face several obstacles in adopting e-learning, which hinder their ability to engage with digital education effectively:

- Limited Access to Digital Devices: Around 40% of students do not own a personal laptop or desktop computer, relying primarily on smartphones for their online learning needs, which may not always be sufficient for academic purposes.
- Internet Connectivity Issues: Poor or unstable internet connectivity remains a significant hurdle, with 55% of students reporting that slow or inconsistent network access significantly affects their ability to use e-learning platforms effectively.
- Lack of Digital Literacy Training: Nearly 45% of respondents expressed that they have not received adequate training or guidance on effectively utilizing e-learning platforms for their studies, limiting their ability to navigate digital education tools efficiently.

Fig. 1(d) presents a vertical bar chart highlighting the areas of improvement suggested by students, such as digital literacy training and better internet infrastructure. It is observed that 65% of students believe that digital literacy training programs would significantly improve their ability to adopt e-learning. Despite these challenges, several opportunities exist to enhance digital literacy and e-learning adoption among commerce students in Bhokardan:

- Government Initiatives: Programs such as Digital India and other government-led initiatives aimed at expanding internet connectivity in rural regions could play a crucial role in narrowing the digital divide.
- Affordable Digital Devices: Making cost-effective smartphones, tablets, and other digital devices more accessible to students could improve their ability to engage with e-learning platforms.
- Training Programs: Introducing structured digital literacy training programs specifically designed for rural students could help them develop essential technological skills, better preparing them for academic and professional success in the digital era.

6 CONCLUSIONS AND RECOMMENDATIONS

This study underscores the urgent need for targeted efforts to enhance digital literacy and e-learning adoption among commerce students in Bhokardan. While many students possess basic digital skills, they often lack proficiency in more advanced digital tools, limiting their ability to leverage e-learning platforms fully. Addressing key infrastructure challenges, such as improving internet connectivity and increasing access to affordable digital devices, combined with structured digital literacy training, could significantly improve students' ability to engage with online education.

Future research should explore the implementation of specific training initiatives and evaluate their impact on improving digital education outcomes in rural settings. Based on the study's findings, the following recommendations are proposed to enhance e-learning adoption in rural areas:

1. Improving Internet Connectivity: The government and private sector should work together to enhance internet infrastructure in rural areas, ensuring students have reliable access to online educational resources.
2. Implementing Digital Literacy Programs: Educational institutions should introduce dedicated digital literacy courses to equip commerce students with the necessary skills to use e-learning platforms effectively.
3. Providing Affordable Digital Devices: Schools and colleges should collaborate with technology companies to offer affordable or subsidized laptops, tablets, or smartphones to students who lack access to digital tools.
4. Increasing Awareness and Guidance: Organizing regular workshops and training sessions on e-learning platforms will help students develop confidence in using digital education tools and maximize their learning potential.

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ETHICS STATEMENT

This study did not involve human or animal subjects and, therefore, did not require ethical approval.

STATEMENT OF CONFLICT OF INTERESTS

The authors declare no conflicts of interest related to this study.

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