



<https://doi.org/10.64672/IJIFR/26.09.14.01.005>

PUBLISHED ON: 3rd September, 2026

PAGE NO. : 1963-1969

PAPER ID: IJIFR/202609158/1401005

DIGITAL LEARNING PREPAREDNESS AND TECHNOLOGY ENGAGEMENT AMONG HIGHER EDUCATION STUDENTS: AN EMPIRICAL STUDY

DR. T. S. KAVITHA

Associate Professor, Department of Commerce,
NGM College, Pollachi, Tamil Nadu - India

ABSTRACT

Aim & Objectives: This study aims to assess digital learning preparedness and technology engagement among higher education students. Specifically, it seeks to: (i) examine patterns of engagement with digital learning resources; (ii) identify the digital resources most frequently used for academic purposes; (iii) determine the principal barriers restricting effective digital learning participation; (iv) examine the relationship between digital literacy and academic performance; and (v) assess whether digital literacy differs significantly across selected student groups.

Research Methodology: A descriptive and analytical research design was adopted. Primary data were collected through a structured questionnaire from 564 higher education students in Coimbatore District, India. Descriptive statistics and mean ranking were used to examine digital-resource engagement and perceived barriers. Pearson's correlation and simple linear regression were employed to assess the association and predictive relationship between digital literacy and academic performance. Independent-samples t-test and one-way ANOVA were used to examine differences in digital literacy across selected student groups.

Analytical Outcomes: The results demonstrate substantial variation in students' engagement with digital learning resources. Google Search recorded the highest mean score (0.66), followed by SWAYAM/NPTEL (0.63) and Google Classroom (0.57), whereas online libraries/e-journals recorded the lowest mean (0.15). Poor internet connectivity and financial constraints emerged as the most prominent barriers, both recording a mean of 3.19, followed by lack of training in advanced digital tools (3.16), stress/distraction (3.15), language barriers (3.06) and inadequate digital devices (3.01). A strong positive relationship was observed between digital literacy and academic performance ($r = 0.794$, $p < 0.01$). Regression analysis further indicated that digital literacy accounted statistically for approximately 63.1% of the observed variation in academic performance, with the model being statistically significant ($F = 959.834$, $p < 0.001$). No statistically significant differences in digital literacy were identified according to course of study, level of study or locality of residence.

Conclusiveness: The study concludes that effective digital learning depends on more than technological access; it requires digital competence, reliable infrastructure, affordability, training and meaningful academic integration. The strong association between digital literacy and academic performance highlights the importance of strengthening students' digital capabilities. Higher education institutions should therefore adopt inclusive, skills-oriented digital-learning strategies that improve connectivity, digital training, scholarly resource utilisation and responsible technology engagement

KEYWORDS: Digital learning preparedness; digital literacy; technology engagement; higher education; digital learning resources; academic performance; online learning; digital learning barriers; educational technology

How to Cite this Article:

Kavitha, T S : "Digital learning preparedness and technology engagement among higher education students: An empirical study" *International Journal of Informative & Futuristic Research (IJIFR)*, Volume 14(1), September 2026, pp 1963–1969.

Open Access and Copyright: This is an Open Access article distributed under the terms of the Creative Commons Attribution License CC BY-NC-SA 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0/>). By publishing under the license, any subsequent use, reproduction, citation, adaptation or redistribution of the work must appropriately acknowledge the Author(s) and the original publication. Copyright © 2026 by the Author(s). The Author(s) retain full copyright and ownership of their original scholarly work.

1. INTRODUCTION

Digital technology has become an integral component of contemporary higher education. Students increasingly depend on online search engines, virtual classrooms, open educational platforms, video-based learning resources, artificial intelligence tools and digital academic resources to support their educational activities. The expansion of digital learning has created opportunities for students to access information beyond the traditional classroom and to participate in flexible, self-directed and technology-supported learning.

The transition towards digitally enabled education has also changed the nature of student engagement. Students are no longer dependent exclusively on textbooks, lecture notes and classroom instruction. Search engines can provide immediate access to information, online platforms can facilitate structured learning, video resources can supplement classroom teaching and artificial intelligence-based tools can provide interactive assistance. Consequently, the ability of students to navigate, evaluate and effectively use digital resources has become increasingly important.

Nevertheless, the availability of digital technologies does not automatically result in effective digital learning. Students may experience difficulties arising from inadequate internet connectivity, financial limitations, insufficient training, language barriers, digital distraction and other contextual factors. Therefore, digital learning should be viewed not merely in terms of access or adoption but also in terms of students' preparedness to use digital resources effectively for educational purposes.

The present study adopts this broader perspective. Instead of concentrating exclusively on the relationship between digital literacy and academic achievement, the study examines the digital learning environment from three interconnected dimensions: technology engagement, learning preparedness and barriers to effective digital participation. The study also considers the established relationship between digital literacy and academic performance as an important contextual component.

2. REVIEW OF LITERATURE

- Zhao, Pinto Llorente and Sánchez Gómez (2021) subsequently provided a systematic review of digital competence research in higher education and reported that most studies assessed students' and teachers' perceived levels of digital competence. Their findings indicated that many university students and teachers possessed basic rather than advanced digital competence, reinforcing the need for institutions to develop appropriate learning strategies and support mechanisms. Sillat, Tammets and Laanpere (2021) further examined methods used to assess digital competence in higher education and highlighted the increasing diversity of competence frameworks and assessment approaches. Their review also drew attention to challenges concerning the reliability and validity of digital-competence assessment instruments.
- Audrin and Audrin (2022) extended the conceptual understanding of digital literacy by demonstrating that it encompasses substantially more than basic technical skills. Their systematic review identified digital literacy as involving the ability to access, understand, evaluate and use digital information effectively within learning and educational contexts. This perspective is consistent with the DigComp 2.2 framework proposed by Vuorikari, Kluzer and Punie (2022), which conceptualises digital competence through interconnected areas including information and data literacy, communication and collaboration, digital content creation, safety and problem-solving. Thus, digital preparedness increasingly reflects not simply whether students can operate digital devices but whether they can use digital technologies critically, safely, strategically and productively.
- The empirical literature also indicates that digital competence alone does not fully explain students' preparedness for technology-mediated learning. Hoang and Hoang (2023), in a study involving 1,304 university students, identified online-learning motivation, online-learning self-efficacy and self-directed learning as important dimensions of online-learning readiness. Their findings suggest that preparedness involves behavioural and motivational capacities in addition to technical skills. Similarly, research examining online-learning readiness in higher education has demonstrated that

students' previous digital skills and familiarity with institutional digital resources can be relevant to their academic experiences and achievement in online learning environments.

- The literature further demonstrates that institutional and contextual conditions shape students' ability to participate effectively in digital learning. Farias-Gaytan, Aguaded and Ramirez-Montoya (2023) argued that digital transformation in higher education requires more than technological infrastructure and must be accompanied by appropriate digital competencies and institutional support. Majid and Lakshmi (2024) similarly identified technology, digital skills, infrastructure, resources, attitudes and institutional support as interconnected dimensions of e-learning readiness. These findings reinforce the argument that digital preparedness should be understood as an interaction between student-level capabilities and the educational environment in which those capabilities are exercised.
- An additional dimension concerns digital inequality and digital exclusion. Access to devices and internet connectivity remains an important prerequisite for participation, but contemporary scholarship increasingly recognises that the digital divide also encompasses differences in skills, quality of access, patterns of use and educational outcomes. Jaiswal and Sarraf (2024), in a systematic review focused on higher education, conceptualised digital exclusion as extending beyond physical access and identified broader socioeconomic and social factors that can contribute to unequal digital participation. This perspective is particularly relevant to higher education contexts in which students may possess nominal access to digital technologies but encounter financial, infrastructural, linguistic, or capability-related constraints that restrict meaningful educational use.
- The emergence of artificial intelligence and generative AI has further expanded the meaning of digital preparedness. Digital competence increasingly requires students to understand not only conventional digital resources but also AI-enabled technologies, their opportunities, limitations and responsible use. Recent research has begun to distinguish AI literacy as an emerging component of higher-order digital capability. For example, a 2024 mixed-methods study of higher education students examined how generative-AI tools and cyber-social teaching approaches could contribute to the development of AI literacy, indicating that meaningful engagement with AI requires guided educational experiences rather than unstructured technology exposure. Consequently, contemporary digital preparedness increasingly involves the capacity to critically evaluate AI-generated information, use AI tools appropriately and integrate them into academic learning without compromising academic integrity or independent thinking.
- The pedagogical integration of technology is equally important. Otto et al. (2024) emphasised that digital technologies can support student-centred higher education when they are appropriately embedded within teaching and learning practices. This suggests that the educational value of a digital resource depends not merely on its availability or frequency of use but on how, why and for what academic purpose students employ it. In this regard, frequent use of general-purpose search engines or multimedia platforms may indicate high technology engagement without necessarily demonstrating advanced scholarly digital literacy. Conversely, effective use of academic databases, electronic journals, open educational platforms and specialised learning technologies may represent more academically purposeful forms of digital engagement.

3. STATEMENT OF THE PROBLEM

The increasing availability of digital technologies has created substantial opportunities for higher education students. However, the effectiveness of technology-enabled education depends on how students engage with digital resources and whether they possess the necessary skills and supporting conditions to use them productively.

Students may have access to several digital resources but may primarily depend on general search engines rather than scholarly databases. Similarly, the availability of online learning platforms does not necessarily indicate effective academic engagement. Connectivity problems, financial constraints, lack of training and digital distraction can further reduce the effectiveness of technology-supported learning.

Therefore, there is a need to move beyond a simple assessment of whether students use digital technologies and examine the broader conditions under which digital learning becomes meaningful and productive. This study addresses this issue by examining digital resource engagement, perceived barriers and the association between digital literacy and academic performance among higher education students.

4. OBJECTIVES OF THE STUDY

- (i) To examine the pattern of digital resource engagement among higher education students.
- (ii) To identify the digital resources most commonly used by students for academic purposes.
- (iii) To assess the major factors that may restrict effective participation in digital learning.
- (iv) To examine the relationship between digital literacy and academic performance.
- (v) To determine whether digital literacy varies significantly across selected student groups.
- (vi) To suggest measures for strengthening students' preparedness for effective digital learning.

5. RESEARCH METHODOLOGY

The study adopted a descriptive and analytical research design. Primary data were collected from 564 higher education students in Coimbatore District using a structured questionnaire. The study examined students digital literacy, academic performance, digital learning resource usage and perceived challenges associated with digital learning. The study is based on primary data collected from 564 higher education students in Coimbatore District. By examining patterns of digital resource use together with students' perceived challenges and digital literacy levels, the study attempts to provide a more comprehensive understanding of the transition from digital access to effective educational engagement. Descriptive statistics, mean ranking, Pearson correlation, independent samples t-test, one-way ANOVA and simple linear regression were employed for analysis.

6. HYPOTHESES

H01: There is no significant relationship between digital literacy and academic performance among higher education students.

H02: Digital literacy does not significantly predict academic performance among higher education students.

H03: There is no significant difference in digital literacy between the two groups considered in the study.

H04: There is no significant difference in digital literacy among students based on course of study.

H05: There is no significant difference in digital literacy among students based on level of study.

H06: There is no significant difference in digital literacy among students based on locality of residence..

7. DATA ANALYSIS & INTERPRETATION

7.1 Digital resource engagement among Students

The pattern of digital resource usage provides an important indication of how students participate in technology-enabled learning.

Table 1: Digital resource engagement among Students

Digital Learning Resource	Mean	Rank
Google Search	0.66	1
SWAYAM/NPTEL	0.63	2
Google Classroom	0.57	3
YouTube	0.38	4*
AI Chatbot	0.38	4*
Zoom/Google Meet	0.23	6
Online Libraries/E-Journals	0.15	7

Source: Primary Data

Note: * indicates a tied rank.

Google Search recorded the highest mean value of 0.66, indicating that approximately two-thirds of the respondents used it for academic purposes. SWAYAM/NPTEL followed with a mean of 0.63, indicating

considerable engagement with structured online educational resources. Google Classroom recorded a mean of 0.57, demonstrating its relevance for academic communication and course-related activities. YouTube and AI chatbots each recorded a mean of 0.38. Their identical scores indicate moderate engagement with video-based and AI-supported learning resources. Zoom/Google Meet recorded a comparatively lower mean of 0.23. This may indicate that synchronous video-based learning has become less dominant compared with the period when emergency remote teaching was wide spread. The lowest mean was recorded for online libraries and e-journals at 0.15. This finding is noteworthy because scholarly databases and electronic journals are particularly important for higher-level academic work.

7.2 Key Barriers to effective digital learning

Effective digital learning is influenced by a range of technological, economic, behavioural and learner-related factors. To identify the major constraints experienced by higher education students, the study assessed their perceived challenges associated with technology-enabled learning. The mean scores and corresponding ranks presented in Table 2 indicate the relative importance of these barriers

Table 2: Challenges to digital learning

Challenge	Mean	Rank
Poor internet connectivity	3.19	1*
Financial constraints	3.19	1*
Lack of training in advanced digital tools	3.16	3
Stress/distraction	3.15	4
Language barriers	3.06	5
Lack of proper digital devices	3.01	6

Source: Calculated by author *Note: * indicates a tied rank.*

The findings indicate that poor internet connectivity and financial constraints constitute the most prominent barriers to effective digital learning, with both recording the highest mean score (3.19). This suggests that infrastructural reliability and affordability remain critical conditions for sustained digital participation. Lack of training in advanced digital tools ranked third (mean = 3.16), highlighting the importance of continuous digital-skills development beyond basic technology use. Stress and distraction (mean = 3.15) further indicate that effective digital learning involves behavioural and concentration-related challenges. Language barriers (3.06) and lack of proper digital devices (3.01), although ranked lower, remain relevant constraints. Overall, the results suggest that digital learning preparedness depends on a combination of infrastructure, economic accessibility, digital competence and learner-support factors, rather than technology access alone.

7.3 Relationships between digital literacy and academic performance

Pearson correlation was employed to determine the relationship between digital literacy average (DLAVG) and academic performance average (APAVG).

Table 3: Pearson Correlation between Digital Literacy and Academic Performance

Variables	DLAVG	APAVG
DLAVG	1	.794**
APAVG	.794**	1
Significance	—	.000
N	564	564

Source: Calculated by author *Note: Correlation is significant at the 0.01 level (2-tailed).*

The results show a strong positive correlation between digital literacy and academic performance ($r = 0.794$, $p < 0.01$). This indicates that students reporting higher levels of digital literacy also tend to report higher academic performance. The magnitude of the correlation suggests a substantial linear association between the two variables within the study sample.

7.4 Regression Analysis

A simple linear regression analysis was conducted to examine whether digital literacy (DLAVG) significantly predicts academic performance (APAVG). Digital literacy was specified as the independent

variable, while academic performance was treated as the dependent variable. The regression model was statistically significant ($F = 959.834$, $p < 0.001$), indicating that digital literacy provides a statistically significant prediction of academic performance in the study sample. The model yielded an R^2 of approximately 0.631, indicating that digital literacy statistically explains approximately 63.1% of the observed variance in academic performance among the 564 respondents.

7.4 ANOVA of the Regression Model

The significance of the overall regression model was assessed using ANOVA. The obtained F-statistic of 959.834 ($p < 0.001$) confirms that the regression model is statistically significant. Accordingly, H02 is rejected, indicating that digital literacy significantly predicts academic performance within the study sample. The finding reinforces the earlier Pearson correlation result and demonstrates a substantial statistical relationship between students digital literacy and academic performance.

7.5 Demographic comparison of digital literacy

Independent Samples t-Test

The independent samples t-test produced the following result: Levene's test produced $F = 0.283$, $p = 0.595$, indicating that the equal-variance assumption was satisfied. The t-test result ($t = -0.255$, $p = 0.799$) indicates no statistically significant difference between the two groups examined.

7.6 One-Way Anova

Factor	F	Sig.
Course of Study	1.026	.427
Level of Study	1.065	.347
Locality of Residence	.957	.575

All three p-values are greater than 0.05. Course of Study does not produce a significant difference. Level of Study does not produce a significant difference. Locality of Residence does not produce a significant difference. These findings suggest that digital literacy is relatively consistent across the student groups examined.

8. DISCUSSION

The findings provide an interesting picture of digital learning among higher education students. The high use of Google Search indicates that students continue to rely strongly on easily accessible information-search technologies. The relatively high use of SWAYAM/NPTEL demonstrates the importance of structured online educational platforms, while Google Classroom reflects the continuing role of institutional learning-management technologies.

At the same time, the low utilisation of online libraries and e-journals raises an important academic concern. Higher education requires students to develop abilities in scholarly information retrieval, critical evaluation and research-based learning. The relatively limited use of scholarly digital resources suggests that institutions may need to provide greater orientation and training in academic databases and electronic information resources.

The strong association between digital literacy and academic performance further emphasises the academic importance of students' digital capabilities. Digital literacy may enable students to search for relevant information, participate in online learning, access supplementary resources and complete technology-supported academic tasks more effectively.

However, the findings concerning barriers demonstrate that individual digital capability cannot be considered independently of the learning environment. Connectivity and affordability remain major concerns. Similarly, lack of advanced-tool training indicates that students require continuous development rather than one-time exposure to technology.

The absence of significant differences across the demographic groups examined is also noteworthy. It suggests that digital literacy may not be strongly differentiated by the selected characteristics within this

sample. Consequently, institutional digital-learning initiatives may be designed broadly for the student population rather than being limited only to particular demographic groups.

9. CONCLUSION

The study demonstrates that the transition towards digital learning in higher education involves more than the availability or adoption of technology. Students engage with a variety of digital resources, but their patterns of usage differ considerably. Google Search, SWAYAM/NPTEL and Google Classroom emerged as the most commonly used resources, whereas online libraries and e-journals remained comparatively underutilised. At the same time, poor internet connectivity and financial constraints emerged as the most prominent challenges. These findings demonstrate that effective digital learning requires an enabling technological and economic environment in addition to individual digital capability. The strong positive relationship between digital literacy and academic performance and the statistically significant regression model indicate that digital literacy is an important factor associated with academic outcomes in the present sample. Nevertheless, the findings should be interpreted as evidence of statistical association and prediction rather than definitive causation.

Overall, the study highlights the need for higher education institutions to move from a narrow “technology access” approach to an “effective digital learning” approach. Such an approach should combine infrastructure, affordability, digital skills, scholarly resource awareness, responsible AI use and digital wellbeing. By creating this supportive ecosystem, institutions can help students transform digital access into meaningful and productive learning experiences.

Acknowledgement

This Research Paper has been published using the Seed Money Grant provided by NGM College, Pollachi.

10. REFERENCES

- [1] Audrin, C., & Audrin, B. (2022). Key factors in digital literacy in learning and education: A systematic literature review using text mining. *Education and Information Technologies*, 27, 7395–7419.
- [2] Farias-Gaytan, S., Aguaded, I., & Ramirez-Montoya, M. S. (2023). Digital transformation and digital literacy in the context of complexity within higher education institutions: A systematic literature review. *Humanities and Social Sciences Communications*, 10, 386.
- [3] Gallego-Arrufat, M. J., et al. (2022). Digital literacy in the university setting: A literature review of empirical studies between 2010 and 2021. *Frontiers in Psychology*, 13, 896800.
- [4] Majid, I., & Lakshmi, Y. V. (2024). Models of e-learning readiness in higher education: A systematic review. *Indian Journal of Educational Technology*, 6(1), 54–67.
- [5] Otto, S., Bertel, L. B., Lyngdorf, N. E. R., Markman, A. O. andersen, T., et al. (2024). Emerging digital practices supporting student-centered learning environments in higher education: A review of literature and lessons learned from the Covid-19 pandemic. *Education and Information Technologies*, 29, 1673–1696.
- [6] Vuorikari, R., Kluzer, S., & Punie, Y. (2022). *DigComp 2.2: The digital competence framework for citizens: With new examples of knowledge, skills and attitudes*. Publications Office of the European Union.
- [7] Zhao, Y., Pinto Llorente, A. M., & Sánchez Gómez, M. C. (2021). Digital competence in higher education research: A systematic literature review. *Computers & Education*, 168, 104212.