International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435 (Online) Volume 15, Issue 08, August 2026)

Digital Competency and Learning Outcomes among Higher Education Students: An Empirical Study in Coimbatore District

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***Abstract*-- Digital literacy has become an important component of higher education because students increasingly depend on digital technologies for information search, communication, online learning, academic collaboration and self-directed study. This study examines the relationship between digital literacy and academic performance among higher education students from Coimbatore District of Tamil Nadu. The analysis is based on 564 responses. Digital Literacy Average is treated as the predictor variable and Academic Performance Average as the dependent variable. Pearson correlation, simple linear regression, an independent-samples t-test and one-way ANOVA were used to analyse the data. The findings indicate that digital literacy is strongly associated with academic performance and that strengthening students' digital competencies can support effective learning.**

***Keywords*-- Digital literacy, academic performance, higher education, digital learning, online platforms, students, regression analysis**

I. Introduction

The rapid expansion of digital technologies has transformed the higher education environment. Students now encounter learning activities through digital classrooms, search engines, online learning platforms, video resources, electronic publications and artificial intelligence-enabled applications. Digital technology is no longer restricted to computer laboratories; it has become embedded in everyday academic practices such as finding information, accessing course materials, communicating with teachers, submitting assignments and participating in online learning. Consequently, the ability to use digital resources effectively has become an important dimension of student capability.

Digital literacy extends beyond the ability to operate a device. It involves the capacity to locate, evaluate, understand, create and communicate information through digital technologies. In an academic setting, digitally literate students should be able to identify relevant information, distinguish useful sources, navigate online learning environments and use digital tools responsibly. These competencies may influence the way students approach academic tasks and may therefore have implications for academic performance.

The present study focuses on the empirical relationship between digital literacy and academic performance. Rather than examining digital literacy only as a technological skill, the study considers its association with academic outcomes. The analysis uses data from 564 higher education respondents from Coimbatore District and applies statistical techniques to determine the strength, significance and explanatory power of the relationship.

The study is particularly relevant because digital learning environments provide students with extensive opportunities, but these opportunities can be realized only when students possess adequate digital competencies. The findings can assist higher education institutions in designing digital literacy programmes, orientation activities, technology-supported teaching practices and student support systems.

II. Review Of Literature

The existing literature highlights the growing importance of digital learning and technology adoption in higher education. Dhawan (2020) emphasized the flexibility and accessibility of online learning, while Nambiar (2020) and Muthuprasad et al. (2021) highlighted students' experiences and preferences regarding online education. Pokhrel and Chhetri (2021) further discussed the role of digital technologies in maintaining educational continuity and the challenges associated with online learning. Vishnu et al. (2022) focused on digital competence among higher education learners and emphasized the importance of students' ability to effectively use digital technologies. Audrin and Audrin (2022) examined the key factors influencing digital literacy and highlighted the importance of digital skills for effective learning. Haleem et al. (2022) discussed the broader role of digital technologies in improving educational processes and learning opportunities. More recently, Crompton and Burke (2023) examined the growing application of artificial intelligence in higher education, while Vargas-Murillo et al. (2023) discussed the opportunities and challenges associated with AI-assisted learning and ChatGPT.

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Overall, these studies indicate that effective digital learning depends on accessibility, digital competence, technological infrastructure, learner readiness and appropriate institutional support. However, there is a need for further empirical investigation into the adoption of different digital learning platforms and the constraints experienced by higher education students, which forms the focus of the present study.

III. Statement Of The Problem

The increasing availability of digital resources does not automatically ensure effective academic use. Students may have access to online platforms but differ in their ability to search for information, select appropriate resources, participate in virtual learning and use emerging technologies productively. This creates a need to examine whether digital literacy is associated with measurable differences in academic performance. The main problem addressed by this study is therefore the extent to which digital literacy is related to academic performance among higher education students.

IV. Objectives Of The Study

- To examine the relationship between digital literacy and the academic performance of students in higher education institutions.
- To assess whether digital literacy significantly predicts academic performance.
- To examine whether digital literacy differs between the two groups considered in the independent-samples analysis.
- To determine whether digital literacy differs significantly according to course of study, level of study and locality of residence.

V. Research Methodology

The study follows a descriptive and analytical approach. The analysis is based on 564 responses collected from Coimbatore District of Tamil Nadu.

Digital Literacy Average (DLAVG) represents the digital literacy construct, while Academic Performance Average (APAVG) represents the academic performance construct. The statistical analysis reported in the dataset includes Pearson correlation, simple linear regression, an independent-samples t-test and one-way ANOVA. A significance level of 0.05 is used for group-comparison tests, while the correlation is interpreted at the 0.01 level as reported in the results.

The analysis is quantitative in nature. Pearson correlation is used to measure the direction and strength of the linear association between DLAVG and APAVG. Simple linear regression is used to assess the predictive contribution of DLAVG to APAVG. The independent-samples t-test is used to compare DLAVG across two groups, while one-way ANOVA is used to assess differences across course of study, level of study and locality of residence.

The available statistical output does not specify the labels of the two groups in the independent-samples t-test. Accordingly, this article reports the analysis as a comparison between the two groups rather than assigning an unsupported demographic label.

VI. Hypotheses

- *H01:* There is no significant relationship between digital literacy and academic performance.
- *H02:* Digital literacy does not significantly predict academic performance.
- *H03:* There is no significant difference in digital literacy between the two groups considered.
- *H04:* There is no significant difference in digital literacy among respondents based on course of study.
- *H05:* There is no significant difference in digital literacy among respondents based on level of study.
- *H06:* There is no significant difference in digital literacy among respondents based on locality of residence.

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VII. Results And Discussion

7.1 Pearson Correlation between Digital Literacy and Academic Performance

Variables	DLAVG	APAVG
DLAVG	1	0.794**
APAVG	0.794**	1
Sig. (2-tailed)	—	0.000
N	564	564

The Pearson correlation coefficient between DLAVG and APAVG is 0.794, with a significance value of 0.000 and a sample size of 564. The result indicates a strong positive association between digital literacy and academic performance. As digital literacy increases, academic performance also tends to increase. The relationship is statistically significant at the 1% level, supporting rejection of the null hypothesis of no relationship. The strength of the coefficient suggests that digital literacy is closely associated with academic outcomes in the study population.

The finding has an important educational implication. Digital literacy can support students in locating academic information, interacting with learning platforms, accessing digital content and managing learning activities. However, the correlation result establishes association rather than proving that digital literacy alone causes academic performance. Other factors may also contribute to academic achievement.

7.2 Regression Analysis

Statistic	Value
R	0.794
R Square	0.631
Adjusted R Square	0.630
Std. Error of Estimate	2.12427
F	959.834
Sig.	0.000

The regression model demonstrates a strong relationship between DLAVG and APAVG. The R value is 0.794 and R^2 is 0.631. Therefore, 63.1% of the variation in APAVG is explained by DLAVG in this model. The adjusted R^2 of 0.630 indicates that the explanatory power remains almost unchanged after adjustment. The standard error of estimate is 2.12427.

The ANOVA results show $F = 959.834$ with $p < 0.001$. The regression model is therefore statistically significant. The regression sum of squares is 4331.263 compared with a residual sum of squares of 2536.033. The results indicate that DLAVG contributes substantially to the prediction of APAVG.

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The magnitude of R^2 is particularly noteworthy. In practical terms, the model suggests that digital literacy accounts for a substantial proportion of observed variation in academic performance in this dataset.

This provides empirical support for institutional investment in digital competency development, while also indicating that 36.9% of the variation is associated with factors outside this single predictor.

7.3 Independent-Samples t-Test

Measure	**Value**
Levene's F	0.283
Levene's Sig.	0.595
t	-0.255
df	562
Sig. (2-tailed)	0.799
Mean Difference	-0.11670
95% CI	-1.01473 to 0.78134

Levene's test produced F = 0.283 and p = 0.595, indicating that the equal-variance assumption is satisfied. The t-test produced t = -0.255 with 562 degrees of freedom and p = 0.799. Since p is greater than 0.05, there is no statistically significant difference in DLAVG between the two groups. The confidence interval also includes zero.

This result indicates that the two groups considered in the analysis have broadly similar levels of digital literacy. The absence of a significant difference suggests that group membership, as operationalized in the dataset, does not meaningfully differentiate DLAVG.

7.4 One-Way ANOVA

Factor	**F**	**Sig.**	**Decision**
Course of Study	1.026	0.427	Not significant
Level of Study	1.065	0.347	Not significant
Locality of Residence	0.957	0.575	Not significant

The one-way ANOVA results reveal no statistically significant difference in the variable examined across course of study, level of study or locality of residence. Course of study produced F = 1.026, p = 0.427; level of study produced F = 1.065, p = 0.347; and locality produced F = 0.957, p = 0.575. All p-values exceed 0.05.

The findings suggest a relatively homogeneous pattern of digital literacy across the categories represented by these demographic and educational variables. This is useful for institutional planning because digital literacy initiatives need not necessarily be restricted to a particular course, academic level or locality. Instead, broad-based digital competency development may be appropriate.

VIII. CONCLUSION

The study demonstrates a strong and statistically significant relationship between digital literacy and academic performance among the 564 respondents from Coimbatore district of Tamilnadu. The correlation coefficient of 0.794 and regression R^2 of 0.631 indicate that digital literacy is strongly associated with academic outcomes and explains a substantial share of variation in academic performance. At the same time, group comparisons show no significant differences across the examined two-group characteristic, course of study, level of study or locality. The overall evidence therefore supports a broad institutional approach to digital literacy development. Higher education institutions can strengthen student learning by combining digital access with structured competency development, academic guidance and responsible use of digital resources.

Acknowledgement

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

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