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ifferential Influence of Demographic Factors on the Digital Intelligence of College Students

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Abstract

The study examined how gender, residential locale, academic level, and academic stream influence the digital intelligence (DI) of arts and science college students in Palakkad district, Kerala. Using a descriptive survey design, data was collected through a standardized Digital Intelligence Scale administered to students from arts, commerce, and science streams, and analyzed using suitable statistical techniques to test the hypotheses. The results showed that gender, academic level, and academic stream had a significant effect on digital intelligence, whereas residential locale did not. Male students demonstrated higher levels of digital adaptability and confidence than females, while postgraduate students outperformed undergraduates, likely due to greater academic exposure and engagement with digital tools. Science stream students also exhibited higher digital intelligence than those in arts and commerce, reflecting their increased interaction with technology-based learning environments. Conversely, the lack of difference between rural and urban students suggests that widespread internet availability and improved digital infrastructure have minimized location-based disparities. Overall, the findings highlight that academic and demographic factor, except locale, continue to shape digital intelligence and emphasize the importance of inclusive digital literacy programs across all disciplines and levels in higher education to promote equitable digital competence, enhance employability, and support effective participation in the modern digital world.

Keywords: Digital Intelligence, Gender, Residential Locale, Academic Level, Academic Stream, College Students.

Introduction

The rapid and pervasive digitization of higher education has made digital skills not merely optional but foundational for academic success, employability, and civic participation. Contemporary constructs such as digital literacy, digital competence, and the newer framing of digital intelligence (DI) capture a constellation of technical skills, information-handling abilities, ethical awareness, and adaptive use of emergent technologies (Zhou et al., 2025; Lei & Jiang, 2025). However, access to devices and connectivity — and, importantly, the capability to use them effectively — is unevenly distributed across social groups: gender, residential locale, socio-economic status (SES), level of study, and disciplinary stream all shape how students experience and benefit from digital opportunities (Jafar et al., 2023; IJCRT, 2025).

Indian evidence since the COVID-19 pivot to online learning highlights how structural inequalities magnified digital exclusion: rural students and those from lower-income households reported substantially less access to computers, reliable internet, and supportive learning environments, which in turn affected learning continuity and outcomes (Jafar et al., 2023). Kerala presents

an interesting and policy-relevant case: despite strong human-development indicators, micro-level studies reveal persistent, and sometimes counter-intuitive, gendered and rural–urban differences in internet and mobile use as well as in digital competencies (Godly & Baiju, 2022; IJCRT, 2025). Meanwhile, international work shows that differences in digital competence persist across academic disciplines, levels of study, and institutional settings — often mediated by training opportunities, institutional support, and individual motivation (Lei & Jiang, 2025; Zhou et al., 2025).

These empirical realities justify a focused, differential analysis. First, investigating gender differences matters because gendered patterns of ownership, confidence, and purpose of use can shape both access and meaningful digital participation (Godly & Baiju, 2022). Second, residential locale (rural vs. urban) remains a powerful predictor of infrastructure and service quality that can produce systematic skill gaps (Jafar et al., 2023). Third, academic level (undergraduate vs. postgraduate) and stream of study (arts, sciences, professional programmes) are likely to influence both exposure to digital tools and disciplinary expectations for digital work (Zhou et al., 2025). Finally, SES conditions the material and social resources necessary to translate access into competence (IJCRT, 2025). By examining these demographic factors together, the present study aims to clarify which groups are advantaged or disadvantaged in digital intelligence within Kerala's college population, thereby generating locally actionable evidence for curriculum design, institutional training, and policy interventions that promote digital equity.

Objective

To find out the differential effect of gender, residential locale, academic level, academic stream of study, and socio-economic status on digital intelligence of arts and science college students of Palakkad district.

Hypothesis

There is no significant difference in the digital intelligence of arts and science college students of Palakkad district with respect demographic factors like (a) Gender, (b) Residential locale, (c) Academic level, and (d) Academic stream of study.

Methodology

The descriptive cross-sectional study used normative survey method. The population of the present study is college students of Palakkad district of the Indian state of Kerala. They are students enrolled for their undergraduate and postgraduate programmes in the Arts and Science Colleges affiliated to University of Calicut, Kozhikkode (Kerala). A stratified random sample of 824 students were selected for the study. The criteria for stratification included locale (Rural and Urban), type of management (Government, Aided and Unaided), educational level (Undergraduate and Postgraduate), and academic stream of study (Arts, Commerce and Science). The digital intelligence of the sample was measured with the help of the Digital Intelligence Scale (DIS) developed by the investigators. The DIS is a 40-item, five-point (Always, Often, Sometimes, Rarely, and Never) Likert-type rating scale covering eight dimensions of digital intelligence. The dimensions identified are: Digital identity, Digital use, Digital safety, Digital security, Digital emotional intelligence, Digital communication, Digital literacy and Digital rights. Each dimension consists of five items, each of them assessing independent factors evident from a set of manifest behaviour of college students while they are in digital platform. The 40 items in the DIS were isolated from a set of 66 items based on their ability to discriminate between high DI students and low DI students. The DIS has a convergent validity of 0.56 with the Digital Literacy Scale (Amin et al., 2021), discriminant validity of 0.27 with the Multiple Intelligence Test (Arjunan & Bindu, 2018), and concurrent validity of 0.63 with the Digital Intelligence Quotient Questionnaire (Na-Nan et al., 2020). The Cronbach's alpha (α) estimated for the different dimensions of DIS are in the order of: (i) Digital identity = 0.836, (ii) Digital use = 0.805, (iii) Digital safety = 0.844, (iv) Digital security = 0.843, (v) Digital emotional intelligence = 0.877, (vi) Digital communication = 0.820; (vii) Digital literacy = 0.878; and (viii) Digital rights = 0.846. The DIS has a test re-test reliability (four weeks interval) of 0.84.

Analysis and Interpretation

The descriptive statistical analysis of digital intelligence (DI) scores of the whole sample and the sub-groups based on gender, residential locale, academic level, and academic stream of study are given in Table 1.

Table 1: Statistical Indices Pertaining to Digital Intelligence of College Students

Groups	Sample	N	M	Md	σ	Ku	Sk	SE_M
Whole	Total	824	170.47	172.0	11.83	0.81	-0.68	0.41
Gender	Male	451	171.68	174.0	12.30	0.55	-0.71	0.58
	Female	373	169.01	170.0	11.08	1.35	-0.76	0.57
Locale	Rural	702	170.25	172.0	11.88	0.70	-0.60	0.45
	Urban	122	171.70	175.0	11.50	1.78	-1.19	1.04
Academic Level	Graduate	630	169.51	171.0	11.78	0.97	-0.77	0.47
	Postgraduate	194	173.59	175.0	11.48	-0.06	-0.44	0.82
Academic Stream	Arts	267	168.64	170.0	12.12	1.45	-0.88	0.74
	Commerce	372	169.32	170.5	11.05	0.11	-0.58	0.57
	Science	185	175.42	176.0	11.63	1.35	-0.87	0.85

The range estimated for the total sample is 77, revealing that the population of college students is heterogeneous regarding their digital intelligence. The highest score estimated for the total sample is 200 out of a maximum of 200 and the lowest score obtained is 123 out of a minimum score of 40. The distribution of DI in the population is normal as the skewness estimated lies between +1 and -1. The sub-groups of college students were compared with regard to their DI, the details of the same is given below:

1. Comparison of the Digital Intelligence of male and female students

The result of the t-test performed to compare male and female students regarding their DI is given in Table 2.

Table 2: Comparison of the Digital Intelligence of Gender based Sub-groups

Sub-groups	Statistical measures				t-value	Sig.
	N	M	SD	SE_M		
Male	451	171.68	12.300	.579	3.244	.001
Female	373	169.01	11.078	.574		

The t-value estimated is significant (t = 3.244; p<.001) showing that gender exert as significant differential influence on digital intelligence of college students. Since the mean calculated for the male students (M = 171.68) is greater than that obtained for the female students (M = 169.01), the difference goes in favour of the former.

2. *Comparison of the Digital Intelligence of rural and urban students*

Students residing at rural and urban areas were compared with respect to their digital intelligence scores to find out the differential influence of residential locale on the variable. The result of the t-test is given in Table 3.

Table 3: Comparison of the Digital Intelligence of the Sub-groups based on Residential Locale

Sub-groups	Statistical measures				t-value	Sig.
	N	M	SD	SE_M		
Rural	702	170.25	11.883	702	1.244	NS
Urban	122	171.70	11.498	122		

The independent samples t-test produced an insignificant t-value (t = 1.244; p>.05), indicating that rural and urban students are do not differ significantly in their digital intelligence.

3. *Comparison of the Digital Intelligence of Undergraduate and Postgraduate Students*

Students studying for undergraduate programme and postgraduate programme were compared to examine the differential influence of academic level on digital intelligence. The result of the t-test conducted incidentally is given in Table 4.

Table 4: Comparison of Digital Intelligence of Sub-groups based on Academic Level

Sub-groups	Statistical measures				t-value	Sig.
	N	M	SD	SE_M		
Graduate	630	169.51	11.781	.469	4.245	.001
Postgraduate	194	173.59	11.479	.824		

Comparison of undergraduate and postgraduate students regarding their DI scores gave a t-value which is significant beyond 99.9% confidence interval (t = 4.245; p<.001). It indicates a true difference in digital intelligence of college students, which goes in favour of postgraduate students.

4. *Comparison of the Digital Intelligence of Students in Different Academic Streams*

Arts, Commerce and Science stream students were compared to examine the differential influence of academic stream of study on the distribution of digital intelligence of college students. The result of the ANOVA performed is given in Table 5.

Table 5: Comparison of Digital Intelligence of Students in Different Academic Stream of Study

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5914.111	2	2957.055		
Within Groups	109283.004	821	133.110	22.215	.000
Total	115197.115	823			

The F-ratio calculated is significant (F = 22.215; p<.001), showing that students in Arts, Commerce and Science streams differ significantly in their digital intelligence. Subsequently, Bonferroni post-hoc test was performed to find out the groups which differ significantly. Table 6 presents the result of the post-hoc test.

Table 6: Post-hoc Test of Comparison of Groups based on Academic Stream of Study

(I) ACS	(J) Acs	(I-J) Mean Difference	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
ARTS	Commerce	-.677	.925	1.000	-2.90	1.54
	Science	-6.776	1.104	.000	-9.42	-4.13
COMMERCE	Arts	.677	.925	1.000	-1.54	2.90
	Science	-6.099	1.038	.000	-8.59	-3.61
SCIENCE	Arts	6.776	1.104	.000	4.13	9.42
	Commerce	6.099	1.038	.000	3.61	8.59

The Bonferroni post-hoc test reveals the following:

i) There is no statistically significant difference in digital intelligence between students from the Arts and Commerce streams (Mean difference = 0.677; p > .05).

ii) A statistically significant difference is observed between students of the Arts and Science streams in their level of digital intelligence (Mean difference = 6.776; p < .001), with Science stream students demonstrating higher digital intelligence.

iii) Students from the Commerce and Science streams also show a significant difference in digital intelligence (Mean difference = 6.099; p < .001), favouring the Science stream students.

Discussion

The present investigation explored how gender, place of residence, academic level, and stream of study influence the digital intelligence (DI) of arts and science college students in Palakkad district. Findings showed that gender, academic level, and stream of study have a significant impact on students' digital intelligence, while residential locale does not. Male students recorded higher DI scores than females, reflecting stronger skills in digital adaptability and information processing. This observation is consistent with Siddiq and Scherer (2019), who noted that males often show superior performance in technology-related activities due to greater exposure and confidence. Nonetheless, Ng (2012) pointed out that the gender gap in digital competence has been shrinking as digital technologies become increasingly embedded in educational and social contexts. On the other hand, the absence of a significant difference between rural and urban students implies that geographical location no longer determines one's digital intelligence. Improved access to smartphones, affordable data services, and digital infrastructure may have bridged the rural–urban gap, providing similar opportunities for both groups (Banerjee & Dey, 2022).

The study also found that postgraduate students exhibited higher digital intelligence than undergraduates, which can be linked to their academic experience, greater research exposure, and regular use of digital platforms. This finding supports the conclusions of Hatlevik and Christophersen (2013), who emphasized that advanced education levels enhance digital competence and self-efficacy. Additionally, students pursuing science-based courses scored higher in digital intelligence compared to those in arts and commerce streams, probably because science education frequently incorporates laboratory work, data analysis, and technology-driven learning. These results are in line with previous research highlighting that STEM learners generally demonstrate superior digital skills due to consistent interaction with digital tools (Aesaert et al., 2015; Ilomäki et al., 2016). Overall, the study suggests that gender, academic level, and stream of study contribute to variations in digital

intelligence, while residential locale has little influence. Therefore, higher education institutions should implement inclusive digital literacy programs across disciplines to promote equitable development of digital competence required for lifelong learning and employability in the modern digital age (Ng, 2012).

Conclusion

The study aimed to investigate the extent to which gender, residential locale, academic level, and academic stream influence the digital intelligence (DI) of arts and science college students in Palakkad district. The results of statistical analyses showed that gender, level of study, and stream of study significantly contributed to variations in digital intelligence, whereas place of residence did not show any significant impact. Hence, the null hypotheses related to gender, academic level, and academic stream were rejected, while the one associated with residential locale was retained. The findings suggest that students' digital intelligence is shaped more by their academic experiences and subject orientation than by geographical factors. Male students exhibited higher DI scores compared to female students; postgraduates scored higher than undergraduates; and those in the science stream demonstrated superior digital competence compared to peers from arts and commerce streams. The lack of significant difference between urban and rural students implies that the digital divide has narrowed, likely due to improved technological access and widespread internet availability. To conclude, the study establishes that while certain demographic and educational variables significantly influence digital intelligence, others have lost their earlier impact in today's digitally integrated learning environment. Therefore, higher education institutions should implement inclusive and comprehensive digital literacy programs across disciplines and academic levels to ensure equal opportunities for all students to develop the digital skills necessary for success in a technology-driven society.

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