

Bridging the AI Gap: A Comparative Study on Digital Readiness and AI Literacy in High School and College Students

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Abstract— While artificial intelligence (AI) is becoming part and parcel of modern living, it is burgeoning as the new reality in teaching to prepare digitally savvy students who are AI-literate. We examine differences in digital readiness and AI literacy across high school and college students, analyzing survey measures of six dimensions: digital access, digital skills, digital mindset, AI conceptual understanding, practical AI skills, and ethical/societal awareness. Of the 192 students, descriptive statistics and Multivariate Analyses of Variance (MANOVA) were run on their responses. Higher education students show significantly stronger digital readiness scores, mostly due to their improved performance and particularly on the dimension of a digital mindset—while high school pupils did better only in AI literacy but with more inconsistent results when it comes to ethical awareness. As implemented into the model, correlational analysis reveals weak ties between these dimensions of digital readiness and AI literacy. Suggestions towards having to use different pedagogical strategies for each dimension. The significance of tailored curricular interventions is emphasized by these results, with measures aimed at bridging the AI preparedness gap required at both mainstream and tertiary education levels. The findings have implications for policy, curriculum design, and teacher training to prepare learners with the knowledge, skills, and values they need to actively participate in an AI-positive world.

Index Terms— AI Literacy, Digital Readiness, AI in Education, Digital Skills, Curriculum Development.

I. INTRODUCTION

The pressure for students to become digitally ready and AI literate has only been driven higher with the increasing digitalization of learning systems. Digital readiness includes more than just access to technology—it also needs people who have the kind of skills and attitude that enable them to interact effectively with digital tools (Hammerton et al., 2022). In education, it means to be enrolled in digital worlds, have technical abilities, and have psychological readiness to integrate with technology (Pingali et al., 2023). In higher education, the learning environment itself also influences digital readiness, as college students tend to be exposed to an inherently more technology-embedded curricula and practice more self-directed learning compared to their secondary counterparts (Yusof et al., 2025). Yet, the exposure to digital is not simply a product of environment. Digital readiness is a complex concept in that it encompasses students' digital mindset (their beliefs and openness to digital technology), which has been shown to significantly impact adoption behaviors (such as Bogdány et al., 2024.) Unequal access to digital resources and digital literacy across stages of education and socioeconomic levels is further evidence for the need for early educational interventions (Nutakor et al., 2023).

At the same time, artificial intelligence (AI) is increasingly becoming an enabling technology that changes human experience with technology, and thus all systems relating to learning at scale are changing how they prepare learners. AI literacy is also identified as a basic skill set that includes theoretical understanding, skills of AI practice, and ethical/societal awareness (Wang et al., 2022). Although even a cursory familiarity with the principles of AI in general is critical today, not only for informed participation in this data-driven society (Tenberga & Daniela, 2024), but also because it can foster open-mindedness and enhance employability. While a general consensus is being reached regarding its significance, there remains significant variation in AI literacy across levels of education. High school curricula may provide incomplete and unsystematic AI content (Chiu et al., 2021), whereas many colleges and universities merely teach how to apply AI in practice rather than reflecting on the ethical issues related to such an application (Hannan & Liu, 2021). The disparities present here show that, like digital readiness, AI literacy is sociocultural and contextually contingent learning.

As it stands, digital readiness and AI literacy could be understood as related but distinct concepts. Base-level access and competencies of digital readiness, in contrast to deeper conceptual engagement and ethical reasoning needed for AI literacy (Yusof et al., 2025). For example, Tenberga and Daniela (2024) propose that digital readiness is an essential precondition for AI literacy to be possible, as it will give the students basic knowledge and technical skills needed to engage with AI systems in more meaningful ways. But this is not a direct, straightforward linear relationship by any means; contextual and instructional variables can influence how these constructs develop additionally (Kit et al., 2022).

Educational level might be a critical moderating factor, determining these digital competencies. Although recent reforms at secondary levels have introduced AI and digital literacy content (Bellas et al., 2022), higher education institutions may have more advanced resources to allow for interdisciplinary learning, creativity, and critical reflection. That being the case, it needs to be established through empirical investigations if a significant difference in readiness and literacy is due to students' stage in education. To fill this research gap, this study investigates high school and college students' digital readiness & AI literacy under three hypotheses: 1) There are differences in digital readiness among educational levels; 2) there are differences in AI literacy among educational levels; 3) dimensions of digital readiness have significant correlation with those dimensions of AI literacy. Thus, this study seeks to provide evidence from this line of inquiry that can inform the design of targeted curricula and institutional strategies that better prepare students for a future increasingly integrated with AI.

II. REVIEW OF RELATED STUDIES AND HYPOTHESIS DEVELOPMENT

Digital Readiness in Education

Digital readiness means people having the access, ability, and attitude to use digital technologies effectively (Hammerton et al., 2022). On the educational front, digital readiness involves access to and inclusion in the digital realm; literacies with tools and processes essential for all students as part of their technological competencies; plus, psychological readiness for technology integration by teachers (Pingali et al., 2023). The social ecology of higher education—where students are exposed to more self-directed learning environments and technologically embedded curricula—plays a role in overall digital readiness (Yusof et al., 2025), for instance, noted that college students reported greater digital efficacy than high school students, as they had more exposure to online platforms and self-directed learning.

But this is not the unique characteristic of digital readiness, Students' digital mindset—their receptivity to and beliefs in, as well as their ability to use, digital technology—affects adoption behaviors (Bogdány et al., 2024). In addition, widening gaps by educational level and wealth quintile show the importance of early intervention in education (Nutakor et al., 2023).

AI Literacy: An Emerging Educational Priority

In the 21st century, AI literacy has become one of the core competencies that students need to possess in order to be able to comprehend, evaluate, and interact with artificial intelligence systems (Annapureddy et al., 2024). This literacy exists in three important aspects: the conceptual ability to grasp artificial intelligence principles, practical competency with the use of AI tools, and an understanding of ethical and societal considerations (Wang et al., 2022). Some academics say getting AI concepts in at an early stage can help people to start thinking critically and creates more prepared future workers (Tenberga & Daniela, 2024).

But newer reports point out that AI literacy levels differ at various educational levels. Even though the content of AI is starting to be incorporated into the high school curriculum, it is done in an uneven fashion in terms of its depth and consistency (Chiu et al., 2021). By contrast, students in college courses often experience AI via discipline-specific applications but may not receive systematic instruction about ethical or social implications (Hannan & Liu, 2021). The inconsistencies reflect differences in curriculum structures and learning environments, an indication that AI literacy — like digital preparedness — is socially shaped.

Digital Readiness and AI Literacy: Distinct but Related Constructs

That said, digital readiness and AI literacy are not precisely the same notion, although they do treat technology from mildly different sides. Whereas digital readiness is about foundational access and competencies, AI literacy calls for a higher-order understanding and critical reflection (Yusof et al., 2025). Previous work argues that digital readiness can be an antecedent to AI literacy in providing students the necessary technical skills and confidence to engage with AI tools (Tenberga & Daniela, 2024). The strength and nature of this relationship is, however, unclear, particularly given that context-specific and instructional factors may lead the two constructs to develop somewhat independently (Kit et al., 2022).

Educational Level as a Moderating Factor

A possibly significant moderator is educational level and influence on both digital readiness and AI literacy. While high school students may leverage the most recent curriculum reforms that focus on AI and computational thinking (Bellas et al., 2022), college students could have access to more modern tools, more interdisciplinary forms of engagement, and a deeper audience for critical thought. As the differences are comparative, investigations should be carried out on an empirical basis for differentiated instructional strategies. Based on the literature reviewed, as a result, this study has framed hypothesis grounding.:

- H1: There is a significant difference in digital readiness (DAI, DSC, DM) between high school and college students.
- H2: There is a significant difference in AI literacy (CUI, PAIS, ESA) between high school and college students.
- H3: There are significant relationships among the components of digital readiness and AI literacy.

These hypotheses direct the examination of the impact of educational attainment on students' readiness for an AI-driven future, with consequences for curriculum design and instructional methodologies.

III. METHODS

A cross-sectional study was conducted using a comparative between-group research design to examine broad differences in digital readiness levels and AI literacy comprehension among high school and college students who are currently taking IT-related courses. This was the suitable strategy to capture and compare perceptions at two different education levels in one point of the time. A total of 192 students joined the study equally divided in number, high school (n = 96) and college respondents (n = 96) from NEMSU Cantilan Campus and Gusa National Highschool, respectively. Stratified random sampling was further used to coincide with the share of respondents by stratification variable and to adjust possible biases associated with different educational levels. To be eligible, participants had to be currently in education and have some type of previous experience or exposure with any digital technologies (e.g., through formal instruction or informal experiences).

The study instrument was a structured questionnaire adapted and synthesized from a number of validated sources in the literature. Digital Readiness was operationalized through three dimensions: Digital Access and Inclusion (DAI), Digital Skills and Competency (DSC) and Digital Mindset (DM). Based primarily on subscales derived from the Digital Readiness Model of Hong and Kim (2018) and validated measures in the DigComp framework developed by the European Commission (Vuorikari et al., 2022), Items for these substales were adapted. There were three dimensions of AI Literacy construct: AI Conceptual Understanding (CUI), Practical AI Skills (PAIS) and Ethical and Societal Awareness (ESA). These had frameworks developed by Long et al. (2021), which stresses foundational understanding, practical skills, and ethical concerns. The six dimensions were measured with five items each rated on a 4-point Likert scale. The draft instrument was subjected to a review by three experts (an education technology and two psychometrics experts) and judged for content validity, and upon giving the necessary revisions to the items of measures, it was finalized. All subscales produced supported estimates of internal consistency reliability with $\alpha > .70$.

This Google Form for data collection was made available on online platforms to minimize the inconvenience of time and space. All participants provided informed consent, and our study has been conducted following the ethical principles of confidentiality and

voluntary participation. The survey was kept concise to be answered in 10–15 min so that the participants did not get bored while answering. Python was used for data analysis. First, descriptive statistics i.e. means and standard deviations were calculated for each dimension. Pearson correlation analysis was carried out to assess relationships between the six dimensions of measured writing at $p < .05$. MANOVA is used to test significant differences between high school and college groups for two constructs: AI Readiness (DAI, DSC, DM) and Absolute-Value (CUI, PAIS, ESA).

IV. RESULTS

This section details the main results obtained through descriptive statistics, correlations, and parametric tests conducted to investigate differences for measures of digital readiness and AI literacy between high school and college students. Initial descriptive analyses yielded an overview of the mean scores and variability by dimension. Pearson's correlation coefficients were computed for measuring the associations between each pair of six constructs under study. Lastly, the researcher conducted a Multivariate Analysis of Variance (MANOVA) to understand if the educational level (high school vs. college) had a significant impact on all dimensions of experience of AI readiness and AI literacy. Results are presented sequentially, from descriptive statistics through correlational findings and preplanned multivariate comparisons.

Table 1 Descriptive Statistics for Dimensions Used in the Study

Variable	Dimension	Group	Mean	SD
AI Readiness	Digital Access (DAI)	College	3.94	0.10
		High School	3.96	0.10
	Digital Skills (DSC)	College	3.91	0.12
		High School	3.93	0.12
	Digital Mindset (DM)	College	3.80	0.21
		High School	3.83	0.19
AI Literacy	AI Conceptual Understanding (CUI)	College	3.86	0.16
		High School	3.91	0.14
	Practical AI Skills (PAIS)	College	3.76	0.24
		High School	3.98	0.07
	Ethical/Societal Awareness (ESA)	College	3.87	0.18
		High School	4.01	0.61

Table 1 shows the average and standard deviation of the main parts of AI Readiness and AI Literacy for two levels of education: high school and college. In terms of AI Readiness, high school students did a little better than college students in all three areas. The mean score for Digital Access and Inclusion (DAI) was slightly higher for high school students ($M = 3.96$, $SD = 0.10$) than for college students ($M = 3.94$, $SD = 0.10$). This suggests that digital infrastructure and technology exposure in secondary education settings may have become more equitable and accessible in recent years (UNESCO, 2022). Digital Skills and Competency (DSC) exhibited similar levels in both groups, with high school students ($M = 3.93$, $SD = 0.12$) indicating marginally higher self-assessments compared to college students ($M = 3.91$, $SD = 0.12$). This finding indicates the increasing incorporation of digital literacy curricula in K–12 education, which has been demonstrated to enhance early digital proficiency (Andersen et al., 2024).

There is a clearer difference in Digital Mindset (DM), where high school students did slightly better than college students again ($M = 3.83$ vs. 3.80). This dimension indicates attitudes regarding continuous digital education, receptiveness to innovation, and flexibility. Recent studies indicate that Generation Z learners, especially those in upper secondary education, exhibit greater digital optimism and a willingness to engage with emerging technologies compared to their older counterparts (Rani & Suneja, 2025).

In terms of AI Literacy, High School students reported consistently higher scores across all three measured dimensions. The average score for high school students on AI Conceptual Understanding (CUI) was 3.91 ($SD = 0.14$), while the average score for college students was 3.86 ($SD = 0.16$). This could be because young people are learning about AI early on through, we-media sites, gamified learning apps, and coding programs (Kim & Lee, 2021). A more significant disparity was noted in Practical AI Skills (PAIS), with high school students indicating a mean score of 3.98 ($SD = 0.07$), markedly surpassing the college cohort's score of 3.76 ($SD = 0.24$). This outcome indicates that recent improvements in secondary-level STEM programs may be more congruent with practical AI applications (Xu & Fan, 2022).

Interestingly, the most significant difference is in Ethical and Societal Awareness (ESA). High school students had a higher average score ($M = 4.01$, $SD = 0.61$) than college students ($M = 3.87$, $SD = 0.18$). This could be because more and more people around the world are trying to teach ethics and how to use AI responsibly in early education (Zaatari et al., 2024). The relatively higher standard deviation among high school respondents signifies increased variability in students' perceptions of the ethical and social dimensions of AI, potentially influenced by differing exposures to digital citizenship programs or socio-cultural contexts.

These descriptive results collectively contest the prevalent assumption that older students inherently possess superior digital and AI-related competencies. Instead, they show that high school students are getting more structured exposure to digital and AI skills, which could close or even reverse the gaps between generations in terms of digital readiness.

Table 2 Pearson Correlation Matrix

Variables	2	3	4	5	6
1. DAI	0.05 ($p = .516$)	0.13* ($p = .066$)	-0.06 ($p = .414$)	-0.11 ($p = .140$)	-0.11 ($p = .133$)
2. DSC	—	-0.08 ($p = .245$)	0.02 ($p = .769$)	0.07 ($p = .368$)	0.04 ($p = .595$)
3. DM		—	0.09 ($p = .219$)	0.09 ($p = .232$)	-0.04 ($p = .595$)
4. CUI			—	0.07 ($p = .341$)	-0.08 ($p = .296$)
5. PAIS				—	0.07 ($p = .327$)
6. ESA					—

Note. Values are Pearson correlation coefficients; *p*-values are in parentheses.

* *p* < .10 (marginally significant). No values reached *p* < .05.

DAI = Digital Access and Inclusion, DSC = Digital Skills and Competency, DM = Digital Mindset,

CUI = Curriculum Integration, PAIS = Perceived AI Support, ESA = Educational Support & Accessibility.

The bivariate correlational means for the six core constructs of AI Ready and AI Literate (Digital Access and Inclusion DAI, Digital Skills Competency DSC, Digital Mindset DM, Curriculum Integration Understanding CUI, Perceived AI Support PAIS & Educational Support Accessibility ESA) are presented in Table 2. In general, the findings indicate small to moderate associations between the variables and none quite achieving traditional statistical significance ($p < .05$). However, the analysis did find one marginally significant relationship.

The strongest correlation was of digital access with digital mindset ($r = .13$, $p = .066$); however, this borderline significance ($p < 0.10$) points to a possible association between the ability to access new digital resources and a readiness to experiment with them. This would be in line with existing work that suggests digital readiness often indirectly precedes and facilitates the growing of positive digital attitudes (Höyng & Lau, 2023). Students who have much-needed regular access to digital technologies will likely be more comfortable and therefore more open to the digitization of learning environments.

Digital Access (DAI) exhibited weak and non-significant correlations with AI Conceptual Understanding (CUI) ($r = -.06$), Perceived AI Support (PAIS) ($r = -.11$), and Educational Support & Accessibility (ESA) ($r = -.11$). These findings indicate that mere access to digital resources does not inherently lead to enhanced integration of AI in education or improved perceptions of institutional support. This is in line with what Younas et al. (2025) found, which is that access without guided use or structured learning pathways may not help people learn AI in a meaningful way.

Other correlations, like those between Digital Skills (DSC) and CUI ($r = .02$), PAIS ($r = .07$), and ESA ($r = .04$), were also weak and not statistically significant. This suggests that basic digital skills may not have a direct effect on how students view or experience AI support and learning environments. This corroborates the notion that AI literacy comprises various levels of comprehension that surpass mere digital fluency (Ng et al., 2023).

Digital Mindset (DM) interestingly exhibited weak positive relationships with both CUI and PAIS (both $r = .09$), similar to what would be expected in theory, that those with an innovation-oriented mindset may better notice and interact with the AI-enhanced curricula and tools (Pan et al., 2023). However, it was not a statistically significant correlation.

The low correlations between AI Readiness and AI Literacy domains showcase the multi-dimensional, non-linear nature of digital competence development. Indeed, as Mbeau-ache et al. (2021) warn, this alignment involves not only a convergence within skills and access but also the coordination of equally strategic learning and teaching strategies with infrastructure support and cognitive readiness—reminding us of integrative models for digital education at large, or even AI in education.

Table 3 Multivariate Tests of Educational Level on AI Readiness and AI Literacy Comparing Highschool and College Respondents

Model Tested	Test Statistic	Value	F	Hypothesis df	Error df	<i>p</i> -value
AI Readiness	Wilks' Lambda	.675	14.82	6	185	< .001
	Pillai's Trace	.325	14.82	6	185	< .001
	Hotelling's Trace	.481	14.82	6	185	< .001
	Roy's Largest Root	.481	14.82	6	185	< .001
AI Literacy	Wilks' Lambda	.921	2.65	6	185	.017
	Pillai's Trace	.079	2.65	6	185	.017
	Hotelling's Trace	.086	2.65	6	185	.017
	Roy's Largest Root	.086	2.65	6	185	.017

Note.

Multivariate analysis of variance (MANOVA) was conducted to examine the effect of educational level (High School vs. College) on two sets of dependent variables: AI Readiness constructs: Digital Access and Inclusion (DAI), Digital Skills and Competency (DSC), Digital Mindset (DM) and AI Literacy constructs: Confidence in Using AI (CUI), Perceived AI Support (PAIS), Ethical and Social Awareness (ESA)

Two separate multivariate analyses of variance (MANOVA) were conducted to determine if educational level (High School vs. College) significantly affects students' digital preparedness and AI competence. The initial model concentrated on the AI Readiness constructs: Digital Access and Inclusion (DAI), Digital Skills and Competency (DSC), and Digital Mindset (DM). In contrast, the subsequent model evaluated the AI Literacy constructs: Confidence in Using AI (CUI), Perceived AI Support (PAIS), and Ethical and Social Awareness (ESA).

The MANOVA results for AI Readiness showed a statistically significant multivariate effect of educational level, with Wilks' $\Lambda = .675$, $F(6, 185) = 14.82$, $p < .001$. This means that the combined readiness dimensions were different for high school and college students. This was corroborated by Pillai's Trace (.325), Hotelling's Trace (.481), and Roy's Largest Root (.481), all producing identical F-values and significance levels. These results indicate that students' educational attainment significantly influences their foundational digital readiness, corroborating Nguyen (2025) claim that digital access, skills, and attitudes undergo considerable transformation with academic engagement and institutional development.

The MANOVA for AI Literacy, however, produced statistically significant results with a reduced effect size, Wilks' $\Lambda = .921$, $F(6, 185) = 2.65$, $p = .017$. This model posits that disparities between high school and college students regarding AI conceptual understanding and related competencies are less significant than those observed in readiness constructs. The convergence of significance across all four multivariate statistics (Pillai's Trace = .079, Hotelling's Trace = .086, Roy's Largest Root = .086) corroborates the robustness of this result. The small multivariate effect could mean that AI literacy is starting to show up earlier in the education pipeline. This could be because students are learning more about AI concepts in high school, which is supported by global trends in curriculum reform (Walter, 2024).

AI readiness, more than the other readiness indicators, highlights a sharper contrast between different educational stages in terms of foundational digital exposure, downloading infrastructure, or even getting trained in mindset. As noted by Rojas and Chiappe (2024), in the case of higher education institutions, they may rely more heavily on a well-established digital ecosystem and community, which can help students become more fluently matured digitally and open to technological innovation. In contrast, AI

literacy—containing a larger conceptual and ethical component—could be more influenced by media coverage, self-interest, and informal learning, thus more decoupled from institutional maturity (Ghani et al., 2024).

In summary, these multivariate findings highlight the differential character of digital transformation in education by suggesting that AI readiness is more closely related to institution-level precursor factors available in individual colleges, while for AI literacy diffusive sources have a larger role with smaller intergroup differences. It is critical that these findings are incorporated into education policy and program development in order to address the digital divide and prepare students with the skills needed for future AI-integrated workforces through all levels of education.

V. DISCUSSION AND IMPLICATIONS

Using these traits as the most predictive markers for digital readiness and AI literacy, we examined how educational level influences students' sophistication in interacting with the technology, highlighting differences between high school and college learners. The MANOVA results indicate that higher education students are more willing to adopt AI, specifically a digital mindset, which means maturity, academic autonomy, and institutional support are important in predicting technological readiness. This finding is fully supported by previous research investigating how academic exposure and access to structured learning environments enhance digital competences (Walter, 2024; Rojas & Chiappe, 2024).

Conversely, high school students reported slightly higher AI literacy, indicating that it may improve, especially in conceptual understanding and perceived support, possibly as a result of more recent steps involving the incorporation of AI subject matter at the lower levels of education (Nguyen, 2025). Nonetheless, given the high variability in ethical awareness among high schoolers, it is difficult to conclude that the curriculum has been implemented uniformly across districts. AI literacy seems to be seeping into education at younger levels, but this seems to be quite varied in terms of depth and spread.

The weak and mostly non-significant correlations among readiness and literacy dimensions reveal that digital competence does not suffice for AI fluency. Whereby this underpins the recommendation of a multifaceted pedagogic approach for technology skills with AI that is paired with comprehensive understanding of AI (Kit et al., 2022).

These findings have several implications. The increase in high schools delivering AI ethics and application modules ensured equitable access to digital tools. Whilst colleges should have systems to evaluate the digital capability of new students and provide bridging support when necessary. In addition, teacher training should extend beyond technical AI literacy to include pedagogical techniques to teach how AI affects society.

Overall, trying to address the AI gap in education is twofold: a focus on infrastructure and instruction. Equally important, but rarely discussed, is the process of gearing students up not just with access and skills but also a mindset and ethical literacy in order to responsibly engage with emerging technologies that drive an AI world.

VI. CONCLUSION AND RECOMMENDATIONS

This research paper adds to the emerging literature on digital and AI readiness by providing comparative measures on digitized capacity and AI information in high school and university students. They found that college students are better prepared than high school students to use social media, but most of those still tend to understand AI somewhat well—although their knowledge varies substantially with respect to ethical questions.

The findings highlight the importance of holding digital readiness and AI literacy as separate but related areas of consideration and that each may benefit from a deliberate and scaffolded approach to development. Their low correlations with each other underscore that access and technical fluency of AI can lead to clearly separate recommendations for more optimal engagement with such systems.

At the end of the day, it will take more than bringing technology into the classroom to bridge the AI gap. This includes the strategic, rubric-referenced introduction of AI ethics (as an ethical paradigm), critical thinking, and experiential learning at various educational levels. However, as AI increasingly upends economies and societies, preparing students to navigate the transformation with both competence and consciousness is essential, perhaps even more so now than ever before.

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