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AI LITERACY, SELF-EFFICACY, AND SELF-COMPETENCE AMONG COLLEGE STUDENTS: VARIANCES AND INTERRELATIONSHIPS AMONG VARIABLES

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ABSTRACT

Understanding and securely using AI systems and tools requires AI literacy. In contrast, AI self-efficacy is a person's confidence in completing an AI task. Also, AI self-competence is the ability to explain how AI technologies are used at work and how they affect society. This study examines college students' AI literacy, self-efficacy, and self-competence. Using a descriptive-correlational approach, the proponent assessed respondents' AI literacy, self-efficacy, and self-competence. The study also examined variations and connections between factors. The study participants were 1000 college students selected by purposive sampling. Before data collection, the proponent employed a modified instrument that was validated. Data was descriptively and inferentially analyzed using SPSS 23. Results suggest most pupils were "somewhat literate" in AI. They regarded themselves as "somewhat self-efficient" but "self-competent" in AI. The inferential analysis showed substantial differences in AI literacy by college, year level, and birth sex. Self-efficacy varied by college, year, age, and birth sex. The study found college and year-level differences in self-competence. Demographic traits and study variables were associated to some extent. According to the study's findings, the proponent recommended AI training programs, skill development for students and teachers, and institution-wide policy development and implementation to maximize AI's use in learning.
Keywords: *AI Literacy, AI Self-Efficacy, AI Self-Competence, College Students, Higher Education Institutions*

INTRODUCTION

In today's rapidly advancing technological landscape, artificial intelligence (AI) has emerged as a transformative factor with far-reaching implications across various sectors. Jiang and colleagues (2022) mentioned that AI penetrated our daily lives and played substantial roles in industry, healthcare, transportation, education and other areas close to the public. As AI becomes increasingly integrated with an individual's daily lives, it is crucial for individuals, particularly college students, to develop a comprehensive understanding of AI and its potential impact. AI helps the education of students in two ways: 1) the educational process and (2) the educational ambit and content (Alam, 2021). This understanding encompasses technical knowledge and AI literacy, self-efficacy, and self-competence—the ability to comprehend, evaluate, and effectively utilize AI technologies. Ahmad et al. (2021) also stated that AI applications provided solutions in many ways for modern-day challenges that create difficulties in access to education and learning. Introducing AI into education marks a significant departure from conventional teaching methods and offers personalized learning and support from diverse educational requirements (Walter, 2024).

Nevertheless, despite AI systems' advantages, they still sometimes cause direct or indirect harm to users and society (Kaur et al., 2022). Another paper by Taeihagh (2021) also emphasized that new applications of AI can generate unexpected and unintended consequences and pose new risks that need to be addressed. However, in the end, trust needs to be established to realize the full potential of AI (Thiebes et al., 2021).

AI Literacy

The concept of AI literacy goes beyond mere familiarity with AI terminology. It encompasses a more profound comprehension of AI systems, algorithms, and societal implications. AI literacy is a globally emerging research topic, especially in education. However, it needs to be more present in the context of teacher education (Sperling et al., 2024). Nevertheless, AI has brought humanity a transformative change that has exponentially increased AI users (Pinski & Benlian, 2024). That is why Ng and colleagues (2021) discussed that AI technologies and their definitions should be explored more. Almatrafi et al. (2024) also stressed the importance of AI literacy, emphasizing the need for people to learn how to use AI systems. In a recent paper by Du and colleagues (2024), they assumed that most practitioners (including teachers) do not know how AI works and cannot fully use AI in Education.

Nevertheless, Walter (2024) states that comprehension of AI technology and its broader societal effects depends on AI literacy. People possessing AI literacy can better navigate its complexities and ethical dilemmas by evaluating and making informed judgments on AI-driven technology. Nevertheless, some challenges still revolve around it, especially in pedagogy (Su et al., 2023). However, the growth and promotion of AI, especially in education, became an investment. In the paper of Southworth et al. (2023), one university in the United States sought to integrate AI across its curriculum because they believe that just like in business, industry and governments, an AI paradigm shift transforms them into a globally competitive institution because of innovation, education, and literacy. According to Heyder and Posegga's short paper (2021), AI literacy enables individuals to engage with AI effectively.

AI Self-Efficacy and Self-Competence

AI Self-efficacy and self-competence, on the other hand, focus on an individual's belief in their ability to engage with AI technologies effectively. Self-efficacy refers to one's confidence in their capacity to use AI tools and systems. At the same time, self-competence encompasses a broader set of skills, including problem-solving, decision-making, and adaptability in AI-driven environments. Wang and Chuang (2024) admitted that there is yet any scale that mainly measures the AI self-efficacy of an individual due to neglect to evaluate perceptions of specific AI characteristics. Nevertheless, Khan (2024) still revealed that attitudes to AI influence AI self-efficacy, which impacts an individual's AI engagement.

AI technology trust and AI chatbots also play a role in AI self-efficacy (Khan et al., 2024). In the study of Shao et al. (2024), they showed that the perceived AI ethics plays a role in the mediation between self-efficacy and technological factors. Another moderation analysis showcases that AI self-efficacy moderates the relationship between work overload and job stress (Kim et al., 2024). In line with this, Chou et al. (2023) established such characteristics among pre-service teachers. They indicated that AI-supported application of self-efficacy influences pre-service teachers' technology acceptance, innovation expectations, usability, and usefulness. Similar to this finding, Morales-Garcia and colleagues (2024) established that strengthening AI self-efficacy among students and professionals facilitates greater acceptance and effective use of AI technologies.

On the other hand, a study by Kurniawan and colleagues (2024) concluded that the current development of AI helps students find learning resources relevant to their learning, thus increasing their self-confidence and minimizing plagiarism in their work. Malik and company (2023) also indicated that AI enhances students' writing abilities, self-efficacy and understanding of academic integrity. In a recent paper by Massaty et al. (2024), they argued that computational thinking and self-efficacy are vital for effective problem-solving and confidence in a technology-driven world. Chen et al. (2024) also added that AI self-efficacy negatively affects AI anxiety and positively influences learners' attitudes toward AI and using AI tools. Another recent study by Kim et al. (2024) showed that AI learning self-efficacy moderates the link between organizationally prescribed perfectionism and job insecurity. From the

perspective of Shahzad and Zahid (2024), generative AI influences a student's learning performance through self-efficacy, fairness, ethics, and creativity. In their paper, Ullah and Sreedevi (2024) also found a subtle negative association between self-efficacy and AI usage. Jia and Tu (2024) also stated that AI capabilities indirectly enhance students' critical thinking by strengthening their general self-efficacy and learning motivation.

Variances and Interrelationships

Understanding the variances and interrelationships between AI literacy, self-efficacy, and self-competence among college students is paramount. As Kumar et al. (2023) declared, the development of AI led to a steady march towards widespread computing. This technology is becoming more intelligent and capable of anticipating our everyday needs. As the next generation of professionals, these students will be at the forefront of AI adoption and innovation in various fields. However, Kuleto and colleagues (2021) stated that in higher education institutions, there were issues regarding AI common knowledge of students and best practices regarding utilizing AI and machine learning. Their level of AI literacy, self-efficacy, and self-competence can significantly influence their ability to leverage AI technologies effectively, contribute to AI-driven advancements, and navigate the ethical and societal implications that arise. Xia and company (2022) implied that schools could design a fair and inclusive high-quality AI education. Celik (2022) provided a scale for measuring teachers' knowledge of AI-based instruction to make things even more convenient for AI integration in the education system, as technological and pedagogical knowledge are crucial to integrating AI-based tools. Chiu and Chai (2020) also stated that teaching AI topics in the school curriculum is an essential global strategic initiative to educate the next generation.

Ethical AI Challenges in Education

Furthermore, as mentioned in the earlier part of this section, challenges confront the integration of AI in education, especially in higher education. Kayyali (2024) stated that transformative possibilities and intricate challenges arise as AI infiltrates the learning management system. In the ideas of Familoni and Onyebuchi (2024) and Crompton et al. (2024), integrating AI in education presents challenges such as equitable access, which is crucial for ensuring students have the same opportunities, ethical concerns, and technical barriers. In addition, Al Ali and Wardat (2024), Ivanashko et al. (2024), and Onesi-Ozigagun et al. (2024) mentioned data privacy, algorithmic biases, lack of understanding, transparency, and reshaping the role of educators as challenges. Abulibdeh et al. (2024) also pointed out the ethical implications of AI on education for sustainable development. Finally, Chen (2024) explained the importance of establishing ethical education to circumvent relative ethical risks and to create a healthy environment for digital transformation in the educational landscape. To accomplish this, educational institutions must formulate or devise guidelines and policies for the ethical use of AI in education (Wang et al., 2024).

The Current Study

Even though AI will inevitably be included in the educational system, it is equally important to pay particular attention to a few global issues. There are still problems with unequal access to AI education in other nations. There is also a need for standardized curriculum development (e.g., Southworth et al., 2023; Xia et al., 2022) and a problem of inadequate teacher training and skills development (e.g., Celik, 2022). There are also issues about ethical considerations surrounding AI technologies and diverse cultural and societal perspectives on AI education (Kaur et al., 2022).

From the local perspective, some literature pertains to utilizing AI, especially in education. In the case of AI literacy, few recent studies focused on such ideas, like that of Prestoza and Banatao (2024), Asirit and Hua (2023), and Bantugan et al. (2024). On the other hand, concerning AI self-efficacy, only Obenza et al. (2024) provided a snapshot view of the topic and its relevance to college students. For AI self-competence, no particular studies still need to come out. Most local studies focused on integrating and implementing AI in education, learning, or teaching among students. With this type of understanding, the proponent decided to conduct this study. Since the gap in the knowledge regarding local literature about AI is quite apparent, the proponent steered this research.

This research explores the variances and interrelationships between AI literacy, self-efficacy, and self-competence among college students. At the same time, it provides new insights into the current status of AI literacy and students' confidence and proficiency in AI technology by examining the variables influencing these constructs and possible associations between them. Additionally, educators may give students the fundamental knowledge, abilities, and mindset they need to start a meaningful AI learning experience by including AI literacy, self-efficacy, and self-competence in the curriculum and practice. It also strengthens students in preparing for their future careers, wherein AI is already substantial in various aspects of society, including education, work and everyday life routine.

The findings of this research hold implications for educational institutions, policymakers, and practitioners involved in shaping AI education and training programs. Knowing the subtleties of AI literacy, self-efficacy, and self-competence can help create specialized training programs, curricula, and support networks that give college students the information and abilities they need to succeed in an AI-driven future.

METHODOLOGY

Research Design

The proponent determined to use descriptive-correlation research. This research aims to establish a baseline understanding of college students' ideas regarding AI. In particular, the study intends to analyze any variations in the perspectives and associations among the three AI variables involved. Thus, the research design employed in this study is appropriate and befitting.

Respondents

The population involved in this research are college students from a higher education institution located in Olongapo City, Philippines. One thousand students participated voluntarily with the help of the purposive sampling technique. Using his sound judgement and interest, the proponent selected the samples based on the characteristics or attributes that contribute to the interest and objective of the study. This selection highlights the crucial role of the researcher's judgement in the purposive sampling technique. While this method may entail bias, it is a testament to the researcher's responsibility and decision-making process. The proponent has set some inclusion and exclusion criteria for the research study to avoid potential issues.

For the inclusion criteria:

1. A bona fide student of the participating institution
2. Enrolled during the current semester and academic year
3. Willing to participate in the study
4. With gadgets and a strong internet connection to answer the online survey

On the other hand, exclusion criteria include:

1. Not a student from the participating institution,
2. Not enrolled in the current semester,
3. Not willing to participate, and
4. Having no means to participate in the online survey.

The proponent gathered data from the students during their most convenient time (e.g., during class breaks or before going home). The data-gathering process was thorough, taking two months, from January to February 2024. The table below summarizes the students' essential characteristics.

Table 1. *Demographic Characteristics of the Students*

Characteristics	Frequency	Percentage
College		
CAHS	256	25.6
CBA	49	4.9
CCS	289	28.9
CEAS	324	32.4
CHTM	82	8.2
Year Level		
First Year	383	38.3
Second Year	282	28.2
Third Year	153	15.3
Fourth Year	182	18.2
Age		
Less than 20 years old	590	59.0
21-25 years old	373	37.3
26-30 years old	19	1.9
31 years old and above	18	1.8
Sex at Birth		
Female	554	55.4
Male	429	42.9
Prefer Not to Say	17	1.7
Total	**1000**	**100.0**

Instrument

The proponent adopted and modified an instrument to achieve the purpose of the study. The first part of the instrument was to collect demographic data. The second part was the student's perceived level of AI literacy, self-efficacy, and self-competence. This section came from the research of Carolus et al. (2023) entitled "MAILS – Meta AI literacy scale: Development and testing of an AI literacy questionnaire based on well-confounded competency models and psychological change and meta-competencies." To establish the validity of the modified instrument, the proponent submitted it for content validation to a panel of experts comprised of a seasoned researcher interested in AI, a college Research Coordinator, a Mathematics instructor and data analyst practitioner, and a Publication Unit Coordinator. The modified instrument underwent minor revisions based on the panels' suggestions and recommendations. Then, the instrument underwent pilot testing for students not part of the study to determine its reliability. The modified instrument undertook reliability testing, yielding an overall Cronbach alpha coefficient of .972. The coefficient generated was highly reliable and can be used accordingly. The instrument also used a five (5) point Likert scale to elicit the students' responses from each study variable.

Statistical Analysis

After gathering enough data for the research, the proponent analyzed the data with MS Excel and Statistical Package for Social Sciences (SPSS) version 23 software. The research used a measure of central tendency to determine the general perceptions of the students, in particular, the mean for the descriptive analysis. For the inferential analysis, the research employed Analysis of Variance (ANOVA) for the test of differences and Pearson-r Moment of Correlation for the relationships between the demographic characteristics and the three variables of the study.

RESULTS

This study's primary purpose is to analyze college students' perceptions of their AI literacy, self-efficacy, and self-competence. At the same time, it ventured to analyze the variances and associations of the demographic characteristics and the three variables of the study. The succeeding tables below summarize the analysis.

Table 2. *Results of the AI Literacy, Self-Efficacy, and Self-Competence Analysis*

Variables	Overall Mean	SD	Interpretation
AI Literacy	3.22	0.741	Somewhat Literate
AI Self-Efficacy	3.05	0.787	Somewhat Self-Efficient
AI Self-Competence	3.52	0.837	Self-Competent

Legend:
1.00-1.79=Not Very Literate; Not Very Self-Efficient; Not Very Self-Competent
1.80-2.59=Not Literate; Not Self-Efficient; Not Self-Competent
2.60-3.39=Somewhat Literate; Somewhat Self-Efficient; Somewhat Self-Competent
3.40-4.19=Literate; Self-Efficient; Self-Competent
4.20-5.00=Very Literate; Very Self-Efficient; Very Self-Competent

Table 2 presents the result of the overall mean distribution for the three main variables of the study, which include AI literacy, self-efficacy, and self-competence. The table presentation showed that AI literacy produced a fair score from the student respondents. This outcome is noteworthy because it sets a standard for the student's current understanding level of AI. Furthermore, respondents gave AI self-efficacy a medium rating, suggesting that more effort and development are needed in this area. The findings showed that while there is potential for growth, the students possessed a certain level of self-competence in AI. Lastly, the study generated a higher mean score from the respondents in the case of AI self-competence, indicating a strong foundation for further development. Compared to the findings of Khan et al. (2024), their AI self-efficacy score was 3.72, which is higher than the current study. This result means their participants have a higher confidence level in AI. Krop et al. (2024) generalized that besides AI's expertise and perceived competence, other factors are relevant to a successful human-AI interaction. Carolus et al. (2023) also obtained high mean values for the three significant variables of the study, namely AI literacy, self-efficacy, and self-competence.

Table 3. *Differences in AI Literacy, Self-Efficacy, and Self-Competence When Grouped According to College*

Variable		SS	df	MS	*F*	*p*-value
AI Literacy	Between Groups	9.580	4	2.395	4.416*	.002
	Within Groups	539.693	995	0.542		
	Total	549.273	999			
AI Self-Efficacy	Between Groups	15.432	4	3.858	6.355*	.000
	Within Groups	715.162	995	0.607		
	Total	726.453	999			
AI Self-Competence	Between Groups	8.683	4	2.171	3.119*	.015
	Within Groups	692.526	995	0.696		
	Total	701.210	999			

*Note: *p < .05*

Table 3 displays the result of the ANOVA for students' AI literacy, self-efficacy, and self-competence when grouped according to their college. As the presentation shows, all three study variables generated substantial evidence to prove their variations. The table showed the following results for AI literacy $F(4, 995) = 4.416$, $p = .002$; for AI self-efficacy, $F(4, 995) = 6.355$, $p = .000$; and for AI self-competence, $F(4, 995) = 3.119$, $p = .015$. All their probability values obtained were lower than the .05 alpha significance level. Therefore, it is safe to assume that there is a significant difference in AI literacy, self-efficacy, and self-competence when grouped according to the student's college. Thus, the researcher rejects the null hypothesis. In a recent paper by Mansoor and colleagues (2024), they revealed in their transnational survey that there was a significant disparity in AI literacy levels based on academic degrees in their college. This result coincides with the study's current findings. Hornberger et al. (2023) also shared the same thoughts from their past paper; their respondents' AI literacy varied significantly when grouped according to their disciplines (college/course). These findings suggest that the level of AI literacy, self-efficacy, and self-competence among students can be influenced by the college they attend. Understanding these discrepancies can help tailor educational programs, interventions, and

resources to enhance AI-related skills and knowledge among students, ultimately preparing them for the evolving demands of the workforce in an AI-driven world.

Figure 1. *Result of the ANOVA for College/Department*

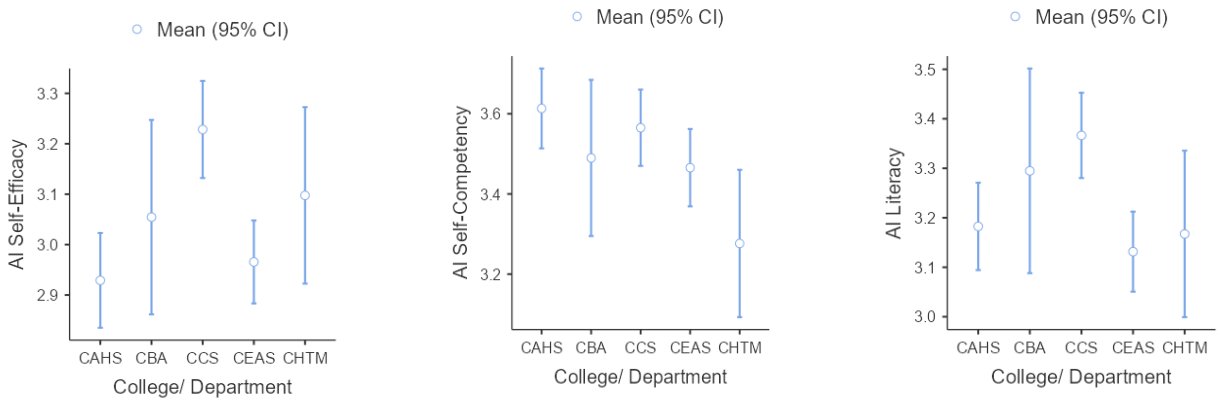

Table 4. *Differences in AI Literacy, Self-Efficacy, and Self-Competence When Grouped According to Year Level*

Variable		SS	df	MS	*F*	*p*-value
AI Literacy	Between Groups	4.910	3	1.637	2.995*	.030
	Within Groups	544.363	996	0.547		
	Total	549.273	999			
AI Self-Efficacy	Between Groups	7.835	3	2.612	4.253*	.005
	Within Groups	611.646	996	0.614		
	Total	619.482	999			
AI Self-Competence	Between Groups	5.619	3	1.873	2.682*	.046
	Within Groups	696.591	996	0.698		
	Total	701.210	999			

Table 4 shows the ANOVA results for students' AI literacy, self-efficacy, and self-competence when grouped according to year level. Again, like the previous table, there were also significant variations for the three variables of the study. The study gained the following findings: for AI literacy, $F(3, 996) = 2.995$, $p = .030$; for AI self-efficacy, $F(3, 996) = 4.253$, $p = .005$; and for AI self-competence, $F(3, 996) = 2.682$, $p = .046$. The associated p-values were significant at a .05 alpha level of significance. This result indicates a significant difference in the students' AI literacy, self-efficacy, and self-competence based on year-level grouping. Consequently, one can confidently assert that a notable disparity exists in the students' AI literacy, self-efficacy, and self-competence. Per Mittal and Mahapatra (2024), they found that the college students' self-perception appeared similar to their contentment. In Park's paper (2023), the students also revealed significant variance in their AI self-efficacy assessment. These findings carry important implications for educators and curriculum developers, emphasizing the necessity of customizing AI education initiatives to align with students' specific needs and developmental stages. By identifying and tackling these variations, educational institutions can more effectively prepare students with AI skills for achievement in both academic and professional realms within a technology-centric landscape.

Figure 2. *Result of the ANOVA for Year Level*

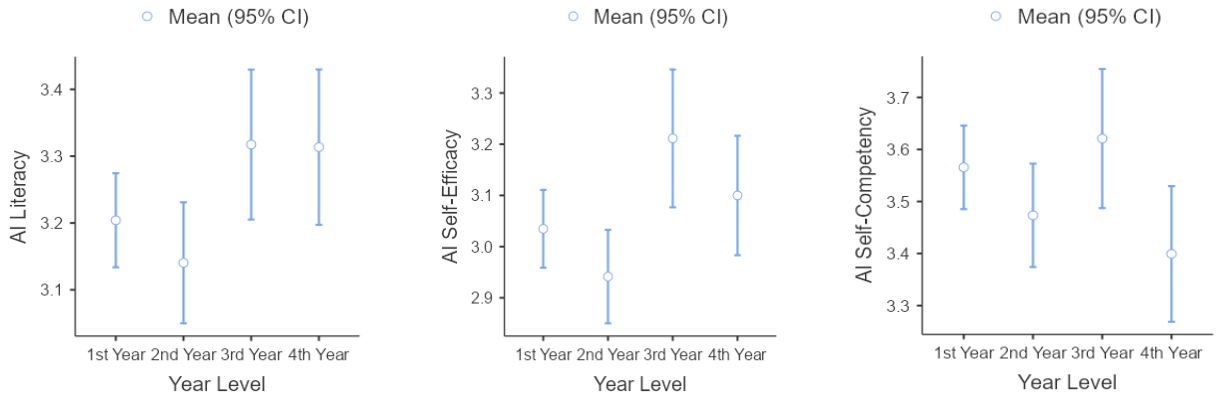

Table 5. *Differences in AI Literacy, Self-Efficacy, and Self-Competence when grouped according to Age*

Variable		SS	df	MS	*F*	*p*-value
AI Literacy	Between Groups	3.355	3	1.118	2.040	.107
	Within Groups	545.918	996	0.548		
	Total	549.273	999			
AI Self-Efficacy	Between Groups	5.041	3	1.680	2.724*	.025
	Within Groups	614.441	996	0.617		
	Total	619.482	999			
AI Self-Competence	Between Groups	1.144	3	0.381	0.542	.653
	Within Groups	700.066	996	0.703		
	Total	701.210	999			

*Note: *p < .05*

Table 5 presents the result of the ANOVA for students' AI literacy, self-efficacy, and self-competence when grouped according to Age. As seen from the table, a particular variable generated an exciting result. In particular, AI self-efficacy was generated, $F(3, 996) = 2.724$, $p = .025$. The probability value generated was significant at a .05 alpha significance level. Therefore, it is safe to assume that there is a substantial difference in the AI self-efficacy when the study grouped the students according to Age. However, in terms of AI literacy and AI self-competence, the study produced the following: $F(3, 996) = 2.040$, $p = .107$ and $F(3, 996) = 0.542$, $p = .653$, respectively. The probability value generated by the two variables was higher than the alpha significance level of .05. Thus, it is safe to conclude that there is no significant difference in AI literacy and AI self-competence when grouped according to the students' Age. Mansoor et al. (2024) revealed a substantial difference in their AI literacy study. The implications of these results underline the essence of considering age-related factors when designing AI education and training programs. Tailoring these initiatives to cater to different age groups' varying needs, preferences, and learning styles can enhance engagement, comprehension, and overall skill development in AI-related domains.

Figure 3. *Result of the ANOVA for Age*

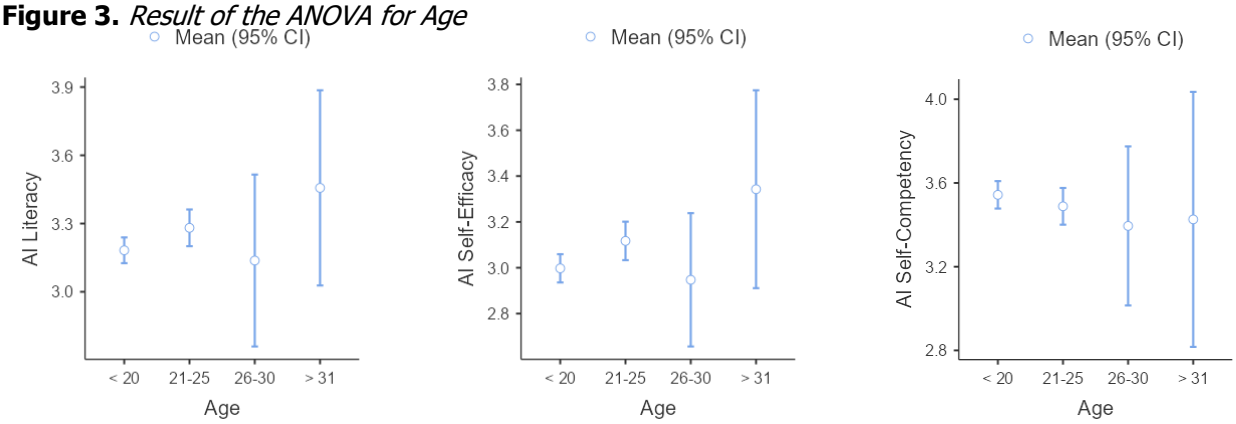

Table 6. *Differences in AI Literacy, Self-Efficacy, and Self-Competence When Grouped According to Sex at Birth*

Variable		SS	df	MS	*F*	*p*-value
AI Literacy	Between Groups	8.252	2	4.126	7.603*	.001
	Within Groups	541.022	997	0.543		
	Total	549.273	999			
AI Self-Efficacy	Between Groups	19.015	2	9.508	15.786*	.000
	Within Groups	600.467	997	0.602		
	Total	619.482	999			
AI Self-Competence	Between Groups	2.082	2	1.014	1.446	.236
	Within Groups	699.181	997	0.701		
	Total	701.210	999			

Table 6 represents the result of the ANOVA for AI literacy, self-efficacy, and self-competence. Based on the table presentation, two interesting results came out. The study produced $F(2, 997) = 7.603$, $p = .001$ for the AI literacy and $F(2, 997) = 15.786$, $p = .000$ and $F(2, 997) = 15.786$, $p = .000$. The generated *p*-values were lower than the alpha significance of .05 level. Thus, it is safe to conclude that a significant difference exists in the respondents' AI literacy and AI self-efficacy when grouped according to their sex at birth. On the other hand, AI self-competence is the only variable that did not yield a remarkable finding since $F(2, 997) = 1.446$. $p = .236$. The probability value obtained was insignificant at a .05 alpha significance level. Thus, it is safe to assume that there is no significant difference in the AI self-competence when the study grouped the respondents according to their sex at birth. Tailoring educational interventions and support mechanisms to promote gender equality in AI education and training can enhance inclusivity, diversity, and equity in the field. Ghatowar and Neog (2024) expressed in their study that there was no significant difference in their research paper, which, in contrast, disagreed with the result of the current study. However, in the paper of Laupichler et al. (2024), male students rated their overall AI literacy higher than their female counterparts. Understanding how sex at birth impacts AI competencies can lead to more targeted and effective strategies for fostering AI literacy and self-efficacy among diverse gender groups, ultimately contributing to a more inclusive and representative AI workforce.

Figure 4. *Result of the ANOVA for Sex at Birth*

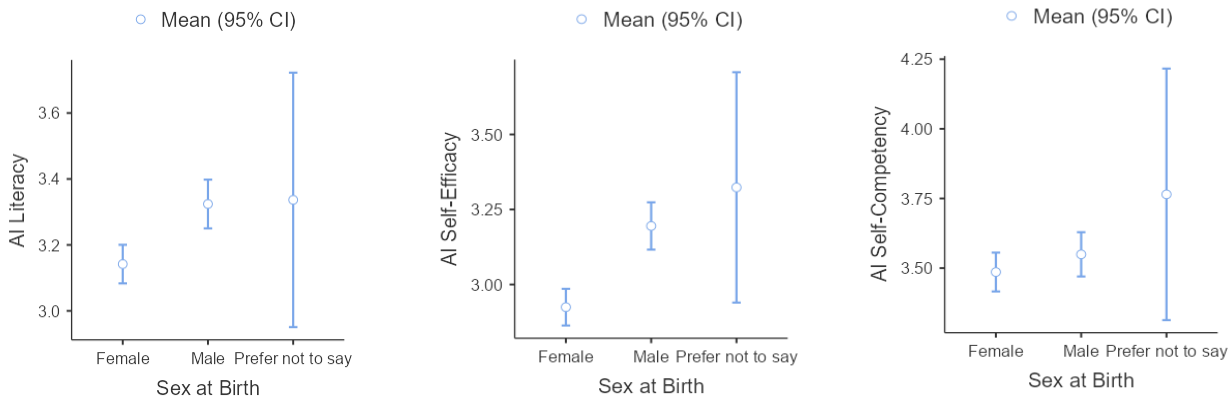

Table 7. *Correlation Matrix between AI Literacy, Self-Efficacy, and Self-Competence*

Variables	1	2	3	4	5	6	7
1. College	1	.259*	.207*	.059	-.022	.041	-.095*
		.000	.000	.064	.484	.199	.003
2. Year Level		1	.601*	-.017	.066*	.056	-.049
			.000	.593	.037	.078	.122
3. Age			1	-.013	.066*	.077*	-.039
				.685	.036	.015	.215
4. Sex at Birth				1	.119*	.174*	.049
					.000	.000	.120
5. AI Literacy					1	.697*	.450*
						.000	.000
6. AI Self-Efficacy						1	.450*
							.000
7. AI Self-Competence							1

*Note: *p < .05*

Table 7 displays the correlation computation for AI literacy, self-efficacy, self-competence, and the selected demographic characteristics in the study. As observed from the table, there were interrelationships among the demographic characteristics and the three variables of the study. For AI literacy, year level, Age and sex at birth generated significant associations. The result showed Pearson-r coefficients of .066, .066, and .119 respectively. As for the AI, self-efficacy generated relationships with Pearson-r coefficients of .077 for Age and .174 for sex at birth. All associated probability values were significant at a .05 alpha significance level. Thus, a certain degree of relationship exists between the demographic characteristics of the students with AI literacy and AI self-efficacy variables. Lastly, for AI competence, only College yielded a significant association result with a coefficient of -.095 with a corresponding probability value significant at a .05 alpha significance level.

On the other hand, there were also positive relationships between the three variables. AI literacy got Pearson coefficient results of .697 and .450 for AI self-efficacy and self-competence. As for the AI self-competence, it generated a Pearson-r coefficient result of .450 for AI literacy and .450 for AI self-efficacy. All associated probability values were significant at a .05 alpha significance level. Hence, it is safe to conclude that significant relationships exist between AI literacy, self-efficacy, and self-competence. To support this finding, Du et al. (2024) also found the same result wherein AI literacy directly impacts self-efficacy in learning AI. Ghatowar and Neog (2024) also supported the current findings of the study of AI literacy, AI self-efficacy, and AI self-competence. Also, from a past survey of Carolus et al. (2023), they found high correlations between the three constructs in their study, namely AI literacy, AU self-competency, and AI self-efficacy.

DISCUSSION

This study explored the AI literacy, self-efficacy, and self-competence of college students in one higher education institution in Olongapo City, Philippines. These research results serve as a baseline of information for future literature and reference for AI-related studies.

In the research, some interesting and insightful findings came through and revealed their worth—first, the result of the demographic characteristics of the students. The research found that most students came from the College of Education, Arts and Sciences (CEAS), comprising more than one-third of the study's total sample. For the year level, most students came from the first year, comprising almost two-fifths of the total sample. In terms of the Age of the students, more than half of them were still under 20 years old. Moreover, more than half of the students were female.

Now, on the matter at hand, for the students' perspectives on AI literacy, self-efficacy, and self-competence, the research generated a remarkable finding. It was noteworthy to know that most of the students were moderately literate on AI literacy. This finding has several factors involved. Since the institution caters to the poorest families and students, the availability of AI-related educational materials is a great challenge for students. In the article by Ahmad et al. (2021), they indicated that the education sector must accept modern teaching methods and the necessary technology AI brings.

Thus, the institution must maximize its resources to offer such an experience to its students. In addition, Jiang and colleagues (2022) imposed that AI contributes to advancing state-of-the-art technologies in many fields of study as helpful tools for groundbreaking research. The local and global implications of AI education are vast. One of the key benefits is fostering talents that will be part of the local industries and innovation. This process will drive economic growth and competitiveness. In terms of global aspects, countries can bolster their workforce readiness and resilience to technological disruption. It also nurtures collaboration and knowledge sharing across borders. Finally, AI education can contribute to a more interconnected and informed global community. It is then recommended that educational institutions plan and prepare the initiative to understand AI and its complexity and slowly integrate the technology into their curriculum. At the same time, academic institutions can offer hands-on training programs, workshops and experiential learning opportunities, with a strong emphasis on ethical and responsible AI use and practice.

Moreover, AI learning brings opportunities and fosters AI literacy regarding concepts, practices, and perspectives among students (Su et al., 2023). The study also found that there is moderate AI self-efficacy among the students. This result means that students still need to be more capable and knowledgeable in applying AI to their learning experience in higher education. However, no matter what side of the coin we look into, AI is an inevitable change that the education system slowly adapts. As Alam (2021) presumed, AI will become a reformer and facilitator that alters labour characteristics in the educational process. As for the case of AI self-competence, this is the only aspect of the study that got better results from the students. They perceived that they were self-competent to some extent.

Nevertheless, gaining enough competence in utilizing Artificial Intelligence has positive and negative aspects depending on how the students perceive and use AI technology in learning. In consonance, Southworth et al. (2023) proposed a model for an AI curriculum in a university built on an AI literacy framework. Integrating AI in education presents substantial consequences on both local and global scales. This concept influences the evolution of both the workplace and society as a whole. Integrating AI education within schools and universities will provide students with crucial skills necessary to navigate a swiftly evolving technological landscape. On a global scale, education in artificial intelligence is crucial for equipping individuals for the Fourth Industrial Revolution, where automation and AI technologies converge to transform industries and job markets. This study advocates promoting diversity and inclusion, forming partnerships with industry and other institutions, and provising professional development opportunities for educators. It is crucial that, as a result of integration, there is an ongoing process of reviewing and adapting the curricula. To accomplish this, the institution should also evaluate suitable investments in infrastructure and additional resources to enhance the effectiveness of AI

education. Higher education institutions can equip students for the AI-driven future, foster a culture of ethical AI practice, and connect academia with industry through implementing these mechanisms.

Inferential statistics also showed some interesting findings in the other aspect of the study. There were significant variations in the study. When the proponent grouped the students according to college, a significant difference occurred in AI literacy, self-efficacy, and self-competence. When the proponent grouped the students according to year level, the study revealed variation in AI literacy, self-efficacy, and self-competence. In terms of Age, however, only AI literacy and self-efficacy garnered significant findings. Lastly, when the proponent grouped the students according to their sex, only AI literacy and self-efficacy obtained substantial variations in their results. Based on the study of Hornberger and company (2023), they found a significant variance in AI literacy among students. This finding coincides with the results of the study as well. Also, Faqih (2023) implied that as students gain more experience in AI, their perceptions appear to be strongly linked to technology and its development and application as tools for learning and growth.

Lastly, the study showed thought-provoking findings on the association between demographic characteristics and the three AI variables. First, AI literacy correlated positively with year level, Age, and sex at birth. In terms of AI self-efficacy, it is associated positively with Age and sex at the birth of the students, and lastly, AI self-efficacy is correlated negatively with college. However, a study by Hong (2022) expressed that educational level and income affect the AI self-efficacy of their respondents. In the case of interrelationships among the three variables, the study revealed positive associations between them. This report only proves that when AI literacy is high, the self-efficacy and self-competence of students towards AI also increase. It entails student engagement and helps them efficiently in their learning. The result coincides with the paper of Xia et al. (2022), who suggested that when students get engaged in AI learning, they are more likely to gain more confidence and feel its relevance. In addition, Chou et al. (2022) recommended that an improved AI learning environment provide a suitable platform for using and developing educational technology and designing a seamless teaching and learning experience for students. Kong et al., 2021 also promoted AI through a literacy course. They indicated the participant's substantial progress in understanding AI concepts wherein they felt empowered to work with AI.

Finally, our study aimed to highlight ethical implications. The sensitive nature of harnessing AI in education significantly increases the likelihood of abuse and misuse. The preceding section of this paper has addressed issues related to data privacy and security, bias, transparency, equity, and other ethical considerations. Du and colleagues (2024) indicated in their article that AI literacy directly influences respondents' judgments of AI ethics. Ayanwale et al. (2024) emphasized the trade-off between the application and invention of AI, highlighting the ethical problems associated with its emotive and persuasive dimensions. Ghatowar and Neog (2024) discovered that respondents strongly comprehend AI technology and ethical considerations. Addressing these ethical considerations necessitates a thorough approach emphasizing their distinct attributes and educational value. Assume the academic institution can mitigate these issues or effects. In that scenario, they can leverage AI's capabilities to improve learning results while maintaining ethical norms and fostering the well-being of students and educators.

CONCLUSION

Based on the results of the study, the proponent at this moment concluded the following:

1. The demographic characteristics of the study comprised of students coming from the CEAS department who are still in their first-year level and less than 20 years of Age and are female.
2. In the case of AI literacy, the students are somewhat literate. For AI self-efficacy, the students responded somewhat self-efficiently, and for AI self-competence, the students were self-competent.
3. Significant differences found for AI literacy (College, year level, and sex at birth), self-efficacy (College, year level, Age, and sex at birth), and self-competence (college and year level).

4. The study also found significant relationships between demographic characteristics, AI literacy, self-efficacy, and self-competence.

Recommendations

From the results above and the conclusions of the study, the proponent at this moment recommends the following:

1. Training programs or workshops **for students and faculty** should be offered to enhance AI literacy focused on AI concepts, terminologies, and applications among students. The institution and other relevant organization can also provide relevant resources like books, articles, or online courses to help students understand AI more efficiently.
2. Design hands-on practical exercises or programs that allow **students and faculty** to apply their AI knowledge and skills to improve AI self-efficacy. Offer mentorship or guidance from AI experts who can support students in building their confidence towards the appropriate use of AI in learning.
3. To strengthen AI self-competence, provide opportunities **for students** to work on more complex AI programs that challenge their knowledge and skills. Encouraging participants to explore advanced AI topics and technologies to expand their competencies. **For the faculty**, capacity building and skills enhancement trainings are imperative.
4. **Faculty and school administration** must consider revisiting the curriculum, and with the aid of the current existing by-laws and policies, facilitate AI integration and craft an AI considerate curriculum for the future.
5. The **institution and policy makers** can also devise a policy or guidelines for proper AI utilization and ethical responsibilities among student and faculty users to maintain integrity and veracity. The institution can invest in educational and developmental initiatives to improve student AI usage.

Limitations of the Study and Future Research

Like any other research article, this study also possessed some limitations. These limitations can then allow other researchers to exploit and maximize. The first limitation is the locale of the study; the current paper only did it on one higher education institution; thus, exploring other higher education institutions is possible. Second, since the researcher did this study on higher education, other researchers can also employ similar research in senior and junior high schools. Third, the sample size can also be increased and maximized using other sampling techniques like stratified or quota sampling to generate and achieve a better representative of the population chosen by the future study. Fourth, future researchers can also use other statistical analyses like Structural Equation Modelling (SEM) or a mixed-methods type of research to enrich the context of the study further and discover new ideas and concepts. The need for alternative analyses is a challenge that can engage researchers in the research process, pushing them to think outside the box and discover new insights. Lastly, collaboration with neighboring countries can be done if the opportunity permits.

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