



RESEARCH ARTICLE

Prospective Teachers' AI Literacy and Responsible Use of AI in Assignment Writing

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ABSTRACT

Generative AI tools are breakthrough technologies used in many sectors, including education. However, using these advanced technologies requires careful and responsible use that is in line with the principles of academic integrity, ethics, and responsible use to avoid inaccurate data and bias. The AI literacy with its dimensions and the responsible use of AI, and their relationship are still under-researched. This study aims to examine the levels of AI literacy and responsible use among prospective teachers and how the relationship of AI literacy and its dimensions correlates and predicts responsible use of AI. A total of 118 respondents, 95 female and 23 male prospective teachers, took part in the survey. Data were analysed using descriptive, correlational, and inferential statistics. The results showed a positive and significant relationship between AI literacy and responsible use of AI, in which the six dimensions of AI literacy: intrinsic motivation, self-efficacy, behaviour commitment, collaboration, knowledge, and understanding of AI and ethical learning were examined. Among them, the intrinsic motivation towards AI is the most significant predictor of responsive AI usage. AI literacy among prospective teachers was high and should be promoted to a higher level of responsible use of AI in education and academic writing.

INTRODUCTION

In recent years, there have been notable breakthroughs in the field of generative artificial intelligence in education, raising concerns about its potential impact on various aspects of quality education (Mello et al., 2023). Generative AI, often known as Gen AI, is a type of neural network that utilises data to generate content, which is then processed by its algorithm. GenAI gained its popularity in 2022, after the launch of ChatGPT, an open AI that has a conversational feature that mimics the behaviour of humans and allows interaction between humans and machines (Gartner, 2023). However, ChatGPT is not the sole open AI tool for academic purposes but has gained popularity among students. Generative artificial intelligence (AI) has the potential to revolutionise assignment writing by providing students with tools to enhance their critical thinking skills, brainstorm ideas,

generate written content based on the given instructions or prompts, and structure and organise their assignments. Incorporating generative AI into assignments can foster innovative and thought-provoking tasks that challenge students' critical thinking and problem-solving skills (Kadaruddin, 2023). In the views of Chan and Hu (2023), ChatGPT has wide recognition among prospective teachers, as the Text-to-Text AI generators provide writing assistance specifically to non-native English-speaking prospective teachers.

AI literacy refers to the acquisition and comprehension of concepts, principles, and applications related to artificial intelligence while also understanding their implications and ethical aspects. According to Taboada et al. (2023), it requires having the knowledge and ability to use AI systems in an ethical and efficient manner, as well as comprehending the underlying theories, applications, and consequences of AI. AI literacy encompasses a thorough comprehension of artificial intelligence principles, methods, and implementations, along with the ability to use and engage with AI systems proficiently (Faruque et al., 2021; Figaredo & Stoyanovich, 2023) in diverse scenarios. Furthermore, it encompasses the skills that are required to act in a discerning manner, to comprehend the constraints and limitations of AI systems, and make well-informed decisions regarding their utilisation (Ng et al., 2024).

According to the findings of Okaibedi (2023), academic integrity is a commitment to six core values, including fairness, honesty, trust, courage, and responsibility. Whenever prospective teachers use ChatGPT tools to write their essays and later claim them as original work, it breaches the fundamental principles of academic honesty. The key issue is that prospective teachers are still unaware of the responsible use of AI tools and integrity policies for publishing articles. Hence, from the above discussion, it is evident that there is an emerging need to establish a responsible and standardised approach to acknowledging the use of generative AI used in writing assignments.

In today's academic setting, the skills required of prospective teachers have grown tremendously. What once began with an emphasis on basic computer skills, the ability to use computers, manage digital files and perform everyday technical tasks, has expanded into the more complex world. Digital literacy is not only limited to the use of digital tools, but also the critical thinking of collecting and creating digital content (Martinez & Abreu, 2023). As teaching and learning methods continue to incorporate more advanced technology, teachers must also learn a new form of literacy, commonly known as artificial intelligence (Chen & Yu, 2024).

The emergence of artificial intelligence tools such as ChatGPT has increased the demand for harnessing AI skills of prospective teachers (Lam and Wong, 2023). AI, which uses neural networks to process and generate human-like content, first gained widespread attention in 2022, with the launch of ChatGPT. Although not the only AI tool available, ChatGPT became popular for its conversational abilities and capacity to assist with various academic tasks (Gartner, 2023). With its increasing use in education, there is potential for AI to enhance assignment writing by enabling students to brainstorm ideas, generate structured content based on prompts, and refine their critical thinking skills (Kadaruddin, 2023; Liu et al., 2023).

Using generative AI tools, prospective teachers can improve their lesson planning and create engaging educational materials (Berg & Plessis, 2023; Pu et al., 2021). However, the challenges

related to the use of Open AI in academic writing are the lack of cohesive writing that combines subjective perspectives or author opinions and the current source of knowledge, evidence, and sources to present persuasive arguments and justifications in academic writing. In addition, concerns about plagiarism, bias, and inaccuracy stemming from the data and training of Open AI models and issues related to validity and originality of the generated content are major concerns in academic writing. Therefore, it is essential that students critically evaluate the content generated by AI and leverage the use of AI to tap their higher-order thinking skills that stimulate creativity and innovation. Moreover, it is essential that students understand the underlying algorithmic processes of Gen AI tools and their possibilities and limitations. Therefore, it is crucial that prospective teachers are AI-literate to benefit from Gen AI tools while still maintaining academic integrity. Additionally, in an effort to enhance the ethical practices in teaching practices, it is imperative that prospective teachers are mindful of the responsive application of AI in the classroom.

However, along with these benefits, AI also presents new challenges. There are concerns about plagiarism, bias, and the inaccuracy of AI-generated content, which is often derived from vast datasets without critical perspectives typically expected in academic writing (Mehta and Sharif, 2024). Additionally, AI models like ChatGPT struggle to include subjective views and evidence-based arguments, key components of scholarly work (Xu & Tran, 2023). This makes it crucial for prospective teachers to critically evaluate the output from AI tools to ensure they uphold academic integrity. In light of this, AI literacy is becoming an essential competency for educators (Jones & Rivera, 2024).

By understanding the advantages and limitations of AI, prospective teachers can responsibly integrate these tools into their teaching practices while promoting creativity and critical thinking among their students (Lee, 2023). Moreover, ethical considerations, such as understanding the algorithmic processes behind AI tools and ensuring their responsible use in the classroom, are fundamental in maintaining integrity and originality in assignment writing (Kim & Hoang, 2024). Therefore, promoting the responsible use of AI in education is not about using technology for good, but about giving future teachers the opportunity to use it ethically.

The use of Gen AI technology in writing is becoming popular, but there is a lack of clear understanding among prospective teachers regarding its responsible use. However, despite the panic related to the violation of academic integrity, prospective teachers still prefer AI to prepare themselves for the growing demands of quality teaching. Farrelly and Baker (2023) highlighted that the increase in the usage of AI tools has led to the emergence of AI literacy skills that would aid prospective teachers with necessary skills and thrive amid the rise of this innovative technology.

Previous studies have focused on studying the benefits of using Gen AI, and few have discussed concerns related to the use of AI. Therefore, prospective teachers must be aware of ethical considerations when using generative AI tools in assignment creation. As future educators, prospective teachers should educate students on the appropriate and responsible use of generative AI, highlighting the importance of originality and proper citing of sources. However, limited studies have focused on investigating the responsive use of AI and AI literacy among prospective teachers.

Therefore, the current study is aimed at the following research questions.

1. What is the level of AI literacy achievement among prospective teachers?
2. What is the level of responsible use of AI for assignment writing among prospective teachers?
3. Are there any significant relationships between AI literacy and its dimensions and responsible use of AI in assignment writing?
4. Is there a significant influence of AI literacy on the responsible use of AI in assignment writing?
5. Which of the dimensions of AI, namely intrinsic motivation, self-efficacy, behaviour commitment, collaboration, knowledge and understanding of AI and ethical learning of AI, significantly predict the responsive use of AI among prospective teachers in assignment writing?

LITERATURE REVIEW

AI literacy

As the use of AI has shown a phenomenal rise in every sphere of human life, AI literacy has become a core aspect in education for the future. According to the study by Malik et al. (2023), in a pedagogical setting, the integration of AI enhances engagement and thus fosters a self-regulated tutoring system. The teachers utilize machine-learning and artificial intelligence-based tools to address problem solving and facilitate learning. These systems can adapt to unique learning trajectories in accordance with prospective teachers' learning requirements. AI-based systems greatly assist prospective teachers in improving their writing abilities. On the other hand, Dergunova et al. (2022) assessed the awareness level of AI among prospective teachers and found that the awareness level regarding AI usage among individuals is inadequate. Dergunova et al. (2022) found inconsistent opinions about the notion of mind and intelligence among 98 prospective teachers. This shows that prospective teachers do not have sufficient understanding of concepts in the two fields. In contrast, Ghotbi and Ho (2021) revealed data from the survey carried out on Japanese and non-Japanese prospective teachers studying in university. According to the results of this survey, moral literacy regarding the use of AI technology is limited, emphasizing the need to include AI ethics in the curriculum of prospective teachers. The discussion reveals that prospective teachers and candidates pursuing teacher training courses lack a comprehensive understanding of the concepts of intelligence.

Reference and acknowledgement of the authors when information is taken from their work is an integral part of academic writing. According to Malik et al. (2023), Turnitin is a widely used plagiarism detector tool with 85% usage rate throughout the world in the writing setting, highlighting the importance of ethical writing practice in academic settings. On the other hand, Allea (2023) highlighted that good practice includes important principles such as reliability, respect, honesty, and accountability. For example, the presence of the European Code of Conduct and General Data Protection (GDPR) has established guidelines for ethical research in academics. Research institutions have instituted training programmes to provide adequate training in research integrity and ethics to ensure that scholars are aware of all relevant regulations. On the contrary, Ayanwale et al. (2024) mentioned that there is still a need to address the limitations in AI literacy among the prospective tutors. This is because prospective teachers using AI tools are still lacking proper AI usage education, which has become a barrier in the evolving demands considering the educational

landscape. The findings suggest that the AI knowledge of educators is nothing more than their ability to use AI tools efficiently to enhance their productivity.

Prospective educators who have an interest in AI are indispensable, as individuals with an interest in AI have the potential to outperform prospective teachers who do not have access to AI related tools. On the contrary, Shi (2024) reviewed that the construction of offline and online research and teaching activities improves the professional literacy of teachers. However, there are issues regarding moral issue, ethical AI and safety. However, the findings also suggest that organisations need to adjust their course offerings and make investments in integrating more AI-equipped systems to provide diversified training to prospective teachers. Lindahl and Grace (2018) mentioned that proper citation and referencing of other work in research papers help alleviate plagiarism concerns. As stated by Elali and Rachid (2023), AI texts have the potential to easily bypass plagiarism. However, the use of AI-generated content in research papers without acknowledgement undermines the original paperwork and corrupts the scientific research process. The study by Forrester (2023) outlined that not citing Gen AI could raise ethical concerns for researchers. Ignoring the contribution of AI in academic writing undermines the authenticity of the research work. According to the views of Barrett (2022), the use of AI-generated content spreads misinformation and raises fear about responsibility and authority. Thus, it is implied that authority, plagiarism, unethical conduct such as AI usage is not acknowledged, and lack of accountability are the outcomes involved with the use of open AI in academic writing without acknowledgement.

Responsible Use of AI

The promotion of responsible use of AI in writing involves several considerations, such as compliance accuracy and transparent practices. To promote AI literacy among researchers, prospective teachers at universities are not sure to provide comprehensive training and education on the ethical rules of AI technologies, and these training topics, such as proper citation understanding of the limitations of AI tools, and the adherence to transparencies, are emphasised. As per the findings of Sperling et al. (2024), the literacy on AI for prospective teaching educators is influenced by inadequate backgrounds in AI engineering, mathematics, and computer science. It has been found that though AI is introduced into curriculums, there is still a scarcity of teacher education programs and its incorporation into the education sector. On the other hand, Khalifa and Albadawy (2024) highlighted that the balance between the use of AI, human rights research design, and idea generation is vital to ensure the authenticity of AI in academic writing. This is because researchers or educators have understood that AI has the ability to assess complex biological data, pharmacology, bioinformatics, AI-driven tools, and genetics. In a similar position, the European Commission (2024) claimed that researchers must keep up to date with the latest trends in OpenAI and share them with stakeholders and their colleagues to comply with research ethics. On the other hand, universities must explain to their prospective teachers the rules regarding citation of gen AI and explain how acknowledging the use of Open AI in research papers enhances the authenticity of their study. Additionally, educators are also motivating prospective teachers to include transcripts of the chats with Open AI in the appendix section of their assignments (Duke Community, 2024). Thus, training on the ethical use of AI and policy implementation and AI literacy are some of the possible strategies to responsibly integrate Open AI usage in assignment writing by prospective teachers. Furthermore, limited articles have assessed the possible ways of motivating prospective teachers to practice responsible use of AI.

The present study has used the information described in the articles of Foltynnek et al. (2023) and Elali and Rachid (2023) to fill the recognised knowledge gap compared to the work of the existing literature.

From the above analysis, it is inferred that existing work has focused on understanding the concerns related to the use of AI in different sectors, such as inaccurate data and bias. However, insufficient studies have been found that have focused on understanding the impact of ignoring AI credit in academic writing and the awareness of prospective teachers about the same. Therefore, investigating the responsible ways of using a Generative AI tool in assignment writing is the key motivation behind the conduct of the study.

METHODOLOGY

This study used correlational research methodology to provide empirical evidence for the impact of AI literacy on the responsive use of AI in assignment writing among prospective teachers. In this study, the responsive use of AI is the dependent variable, while AI literacy and its dimensions are independent variables. The study utilised Google form as an online survey instrument to collect data from prospective teachers.

Sample and Respondents Profile

The samples for the study are prospective teachers who are currently in their second or third year of the bachelor or diploma programmes at teacher training institutions from 2 public and 3 private institutions in Malaysia. The study employed a purposeful sampling technique to select the respondents for its research. The samples were selected based on the second and third year students, as well as students who had used various AI tools such as ChatGPT, Jenni AI, SciSpace, etc. for writing their assignments. Table 1 presents the demographic profile of the respondents.

Table 1. Demographic distribution of prospective teachers (N = 118)

Sample Demography	Sub-sample	Frequency (Percentage)
Gender	Male	23 (19.5%)
	Female	95 (80.5%)
Age	Below 20	60 (50.8 %)
	Above 20	58 (49.2%)
Programme of study	Diploma	20 (16.9%)
	Undergraduate	98 (80.3%)

Table 1 presents an analysis of the demographic distribution of prospective teachers, revealing that females make up 80.5% of the total, while males make up only 19.5%. The respondents' ages indicated that the proportion of respondents below 20 and above 20 years is about the same. With reference to the programme of study, most of the participants are in the bachelor's teacher training programme, accounting for 80.3% of the sample. In contrast, fewer participants are pursuing a diploma, representing 16.9% of the sample.

Instrument, Data Collection and Data Analysis

The questionnaire used for data collection consisted of three sections. The first section assessed the demographic profile of the participants, which includes gender, age, and programme of study. The second section of the questionnaire contained survey items related to responsive use of AI in assignment writing, while the last section contained items related to the independent variable, namely AI literacy.

To investigate AI literacy in prospective teachers, the study adopted the instrument 'AI literacy questionnaire' developed and validated by Ng et al. (2024), which measures AI literacy under four dimensions as ABCE: Affective, Behavioural, Cognitive, and Ethical, and consists of a total of 32 items. The current study conducted a pilot test by administering the questionnaire to 55 samples of prospective teachers. We conducted reliability tests and exploratory factor analysis (EFA). We found the instrument's reliability to be 0.870. The EFA resolved six factors, and therefore the final survey used in the questionnaire has 27 valid items, which include the dimensions: intrinsic motivation (4 items), self-efficacy (4 items), behaviour commitment (5 items), collaboration (3 items), knowledge and understanding (3 items), and ethical learning (8 items).

Based on the guidelines provided by the European Commission (2024) on the responsible use of generative AI in research, the study developed a survey instrument, the "Responsive Use of AI in Assignment Writing Scale," to assess the responsive use of AI in writing assignments. A panel of experts initially validated a pool of 26 items. The scale used a 5-point Likert scale, with the options ranging from strongly disagree (1) to strongly agree (5). Following the review by experts, we conducted a pilot study to assess the reliability and validity of the newly developed scale. The EFA results revealed that the scale is unidimensional, containing 17 valid items. We discarded nine items, however, because their cross-loadings and factor loadings were less than 0.3. We found the reliability coefficient, Cronbach alpha, to be 0.886. The final instrument has 14 positive and 3 negative items. The scale includes items such as "I'm cautious about the limitations of the content generated by AI tools, such as bias and inaccuracies," "I openly declare the AI tools I've used for my research," "I take full responsibility for the content generated from the generative AI I use," "I avoid uploading my work as input to AI tools in order to protect my work," "I'm no longer worried about writing assignments as AI can handle it effectively," etc.

We collected data using an online survey, and participants provided their consent to participate in the study. The responses were collected anonymously to safeguard the respondents' identities. We used the statistical software SPSS version 25.0, to analyse the data. The study used descriptive, correlational, and inferential statistics to answer the research questions.

FINDINGS

To find out the level of AI literacy and responsive use of AI in writing assignments, descriptive analysis was carried out. The results are presented in Table 2.

Table 2. Descriptive statistics of the study variables (N = 118)

Dimensions of AI Literacy	Mean		SD
Intrinsic motivation (IM)	3.85		0.65
Self-efficacy (SE)	3.44		0.45

Behaviour commitment (BC)	3.46		0.62
Collaboration (Co)	3.18		0.60
AI Knowledge & understanding (AIKU)	3.39		0.74
AI ethical Learning (AIEL)	3.98		0.50
Overall, AI Literacy (AIL)	3.55		
Responsive use of AI (RUAI)	3.06		0.97

5- Strongly agree; 4-Agree; 3- neutral; 2- disagree and 1- strongly disagree

Table 2 presents descriptive statistics on AI literacy among prospective teachers, including measurements such as the mean and standard deviation for the dimensions of AI literacy, AI literacy, and responsive use of AI by prospective teachers demonstrating a deep grasp of ethical considerations related to AI, which is evident from their comparatively high mean scores for AI ethical learning (Mean = 3.98; SD=0.50) and intrinsic motivation (Mean = 3.85; SD=0.65).

However, the dimensions of collaboration (Mean = 3.18; SD=0.60), behaviour commitment (Mean =3.46; SD=0.62), and self-efficacy (Mean = 3.44; SD=0.45) have slightly lower mean scores, suggesting that there is room for progress in terms of improving collaborative abilities and improving confidence in efficiently utilising AI tools.

To investigate the relationships between AI literacy dimensions and responsible AI use, Pearson's correlational analysis was performed, and the results are shown in Table 3.

Table 3. Inter-correlation analysis between the variables

Variables	IM	SE	BC	Co	AIKU	AIEL	AIL	RUAI
IM	1							
SE	.739**	1						
BC	.735**	.816**	1					
Co	.550**	.664**	.797**	1				
AIKU	.543**	.709**	.725**	.697**	1			
AIEL	.667**	.633**	.692**	.497**	.622**	1		
AIL	.810**	.881**	.929**	.798**	.832**	.846**	1	
RUAI	.622**	.539**	.529**	.473**	.484**	.655**	.653**	1

** Correlation is significant at the 0.01 level (2-tailed).

IM-Intrinsic motivation; SE- self-efficacy; BC-Behavioural commitment; Co- collaboration; AIKU- AI knowledge and understanding; AIEL- AI Ethical learning; AI L- Overall AI literacy; RUAI- Responsible use of AI.

The relationships between the study variables were analysed using the Pearson correlation coefficient. The results indicated that the dependent variable, RUAI, has a positive and significant relationships with AI literacy and its dimensions. The findings showed that RUAI has a moderate, positive and significant relationship with overall AI literacy ($r = 0.653, p < .001$) and its intrinsic motivation dimensions in acquiring AI literacy ($r = 0.622, p < .001$) and ethical learning ($r = 0.655, p$

< .001). Furthermore, the relationships coefficients with the other dimensions of AI literacy are low, positive, and significant, with self-efficacy being ($r = 0.539, p < .001$), behaviour commitment ($r = 0.529, p < .001$), collaboration ($r = 0.473, p < .001$), and knowledge and understanding ($r = 0.484, p < .001$).

To answer research question 4 which investigated whether AI literacy significantly influences the responsible use of AI in writing assignments among prospective teachers, a simple linear regression was carried out and the results are discussed in the following tables.

Table 4. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.637 ^a	.406	.401	7.1218
<i>a. Predictors: (Constant), AIL</i>				

A simple regression analysis was performed to study the impact of AI literacy on responsible use of AI in assignment writing. In general, the results showed that AI literacy as a predictor is significant, $F(1,116) = 79.178, R^2 = .406, p < .001$. The knowledge of AI literacy explains a large amount of variance between variables (40.6%). The results showed that AI literacy was a significant positive predictor of responsible use of AI ($\beta = .637, t = 8.898, p < .001$). The test for ANOVA and coefficients is presented in Tables 5 and 6 respectively.

Table 5. ANOVA: Influence of AI Literacy on Responsive Use of AI

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	4015.974	1	4015.974	79.178	.000 ^b
	Residual	5883.594	116	50.721		
	Total	9899.568	117			
<i>a. Dependent Variable: Responsive Use of AI</i>						
<i>b. Predictors: (Constant), AI Literacy</i>						

Table 6. Coefficients: Influence of AI Literacy on Responsive Use of AI

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	50.455	3.152		16.007	.000
	AI L	.281	.032	.637	8.898	.000

A stepwise multiple regression analysis was performed to determine the dimensions that contribute significantly to the impact of AI literacy on the responsible use of AI.

Table 7 shows the results of the stepwise regression analysis used to forecast the dependent variable, which is the extent to which AI is used in assignment writing, based on the six dimensions of AI literacy.

Table 7. Stepwise Regression Models Predicting Responsible Use of AI.

Model	R	R ²	Adjusted R ²	Std. Error	Change Statistics				
					R ² Change	F Change	df1	df2	Sig. F Change
1	.616 ^a	.380	.374	7.2755	.380	71.021	1	116	.000**
2	.625 ^b	.391	.380	7.2409	.011	2.110	1	115	.149
3	.626 ^c	.392	.376	7.2641	.001	.268	1	114	.605
4	.635 ^d	.404	.382	7.2284	.011	2.129	1	113	.147
5	.643 ^e	.414	.387	7.1995	.010	1.909	1	112	.170
6	.700 ^f	.490	.463	6.7427	.077	16.690	1	111	.000**

* $p < 0.05$ ** $p < 0.001$

a. Predictors: (Constant), IM

b. Predictors: (Constant), IM, SE

c. Predictors: (Constant), IM, SE, BC

d. Predictors: (Constant), IM, SE, BC, Co

e. Predictors: (Constant), IM, SE, BC, Co, AIKU

f. Predictors: (Constant), IM, SE, BC, Co, AIKU, AIEL

A six-step regression analysis was performed to determine the most influential predictor among the six independent dimensions in the dependent variable in this study. Table 8 shows the results of the six-step regression analysis. The findings indicated that 49.0% of the observed utilisation of AI could be accounted for by the predictor variables, specifically intrinsic motivation, self-efficacy, behavioural commitment, collaboration, knowledge and comprehension of AI and ethical learning of AI. Based on the variance analysis, the results of Models 1 and 6 were statistically significant. In the first stage of the stepwise multiple regression analysis, the inclusion of intrinsic motivation as a predictor variable was shown to be a significant factor in predicting RUIAI. The regression coefficient (β) for intrinsic motivation was 0.616, indicating a strong positive relationship. The t-value for this coefficient was 8.427, which was highly significant ($p < 0.001$). Inclusion of intrinsic motivation in the model represented 38.0% of the variance in predicting RUIAI, as shown in Table 7. Furthermore, the F statistic ($F(1, 116) = 52.933, p < 0.001$) provided evidence that model 1 was statistically significant. When the concept of self-efficacy was included in the second stage, the model accounted for approximately 39.1% of the variation in RUIAI, however the model is not significant. In the third stage of the regression analysis, the inclusion of commitment behaviour in the model confirmed that it was not a statistically significant predictor of RUIAI. The third model explained 39.2% of the variability in the dependent variable, despite the minimal and statistically insignificant increase in R^2 (R^2 change = .001). During the fourth step of the regression analysis, the inclusion of collaboration in the model showed that it was not a statistically significant predictor (R^2 change = .011) of RUIAI. Subsequently, the integration of AI knowledge and comprehension as a predictor of RUIAI was implemented in Model 5. The results indicated that the level of knowledge and comprehension of AI had a negligible impact on RUIAI, with a very small R^2 change (0.010) accounting for an overall variance of 38.7%.

In the last stage of the stepwise regression analysis, the model incorporated AI ethical learning and identified it as a significant predictor of RUIAI. The change in R^2 was 0.077, and the F statistic was

45.464 with a p -value less than 0.001. The results confirmed that the beta value was statistically significant ($\beta = .426$; $t = 4.085$, $p < 0.001$). The final model of the stepwise regression analysis identified intrinsic motivation ($\beta = .406$; $t = 3.243$, $p < 0.001$) as the most significant predictor of responsive AI usage among the six predictor variables in AI literacy. The AI ethical learning variable had a significant impact on AI literacy, with a beta coefficient of .426, a t -value of 4.085, and a p -value less than 0.001.

Table 8. Stepwise Regression Models Predicting Responsive Use of AI in Assignment Writing

Model		Unstandardised Coefficients		Standardised Coefficients	t	p
		B	S. E	Beta (β)		
Step 1	(Constant)	52.419	3.096		16.933	.000
	IM	2.213	.263	.616	8.427	.000
Step 2	(Constant)	52.157	3.086		16.900	.000
	IM	1.796	.388	.500	4.628	.000
	SE	.368	.253	.157	1.452	.149
Step 3	(Constant)	52.022	3.107		16.743	.000
	IM	1.724	.414	.480	4.169	.000
	SE	.269	.317	.115	.851	.397
	BC	.134	.258	.070	.518	.605
Step 4	(Constant)	51.619	3.104		16.629	.000
	IM	1.789	.414	.498	4.323	.000
	SE	.235	.316	.101	.745	.458
	BC	-.140	.318	-.073	-.439	.661
	Co	.509	.349	.177	1.459	.147
Step 5	(Constant)	50.030	3.299		15.166	.000
	IM	1.825	.413	.508	4.418	.000
	SE	.100	.330	.043	.302	.763
	BC	-.210	.321	-.109	-.653	.515
	Co	.368	.362	.128	1.017	.311
	AIKU	.412	.298	.159	1.382	.170
Step 6	(Constant)	43.794	3.446		12.709	.000
	IM	1.318	.406	.367	3.243	.002
	SE	.135	.309	.057	.436	.664
	BC	-.561	.313	-.292	-1.795	.075
	Co	.636	.345	.221	1.842	.068
	AIKU	.072	.292	.028	.246	.806
	AIEL	.621	.152	.426	4.085	.000

IM-Intrinsic motivation; *SE*- self-efficacy; *BC*-Behavioural commitment; *Co* - collaboration; *AIKU*- AI knowledge and understanding; *AI L*- Overall AI literacy; *RUAI*- Responsible use of AI.

DISCUSSIONS

This study examined the relationships between AI literacy and its dimensions, and responsible use of AI in assignment writing of prospective teachers. The results indicated that the AI literacy level of prospective teachers is moderate. The finding is in line with the recent findings that emphasize the need to incorporate AI literacy into teacher training programmes, and to develop AI literacy skills of prospective teachers. The findings are aligned with several recent studies that highlight the importance of improving AI literacy of teacher trainees. According to Dede et al. (2016), teacher education programmes should include AI literacy to prepare teachers for the digital age. Furthermore, the findings underscore the need for comprehensive AI literacy education in teacher training programmes. Holmes et al. (2019) suggested including AI literacy into teacher education curriculum is crucial in order to leverage the use of AI technologies in teaching and learning practices. Selwyn (2020) emphasises that educators need to have a comprehensive understanding of AI concepts, applications, and implications to make well-informed decisions regarding the integration of AI technologies into teaching and learning processes. In the same line, the UNESCO's AI in Education framework emphasises the importance of cultivating AI literacy among educators to encourage responsible and ethical use of AI in education (Chen et al., 2020). Educators with AI literate teachers possess the essential knowledge and ability to navigate the intricacies of AI technology in educational settings.

The findings pertaining to the level of responsive use of AI in assignment writing were found to be at a moderate level. The findings revealed that prospective teachers are aware of the advantages, concerns, and limitations of AI technologies for assignment writing, but they are unsure of the using AI tools responsibly. Furthermore, the study revealed that students are keen on using AI tools effectively rather than responsibly. This finding emphasises the importance of advocating for the responsible use of AI among students to ensure the effective and ethical implementation of AI technology in academic writing. Nguyen (2023) found that the use of AI technologies in writing can boost students' originality and efficiency. The findings also stressed the importance of appropriate use of AI to reduce plagiarism and ethical issues in writing. This emphasises the need for educators to help students utilise AI tools ethically and responsibly in academic writing. A recent study suggests that educators should carefully assess the ethical implications of using AI in education. Tahiru (2021) recommends including AI ethics and appropriate application in teacher training. By encouraging ethical reflection and decision-making, educators can reduce the risks of the use of uncritical generative AI in education.

Recent advances in AI ethics frameworks and recommendations help educators encourage safe AI use. The UNESCO Recommendation on the Ethics of Artificial Intelligence (2021) establishes ethical standards for AI technology research and use in education and other fields. Educators may create a more inclusive and equitable AI-driven educational landscape by following these ethical guidelines. While prospective instructors show moderate receptivity to using AI for assignment writing, there is a need to promote appropriate AI use in education. By including AI ethics and responsible usage in teacher training programs and using emerging AI ethics frameworks and guidelines, educators may equip prospective teachers to utilize AI technologies ethically.

The correlational analysis aimed to investigate the relationships between prospective teachers' AI literacy and its dimensions, as well as their responsible use of AI in assignment writing. The analysis revealed several notable findings which include significant positive correlations between AI literacy

dimensions (intrinsic motivation, self-efficacy, behavioral commitment, collaboration, AI knowledge and understanding, and AI ethical learning) and the responsible use of AI in assignment writing. These correlations indicate that as prospective teachers' levels of AI literacy increase across these dimensions, their propensity to use AI responsibly in assignment writing also tends to increase. The strong positive correlation coefficients between intrinsic motivation, self-efficacy, behavioural commitment, collaboration, AI knowledge and understanding, AI ethical learning, and responsible use of AI (RUAI) suggests that prospective teachers who are more motivated, confident, committed, collaborative, knowledgeable, and ethically aware regarding AI are more likely to use AI responsibly in their assignment writing practices.

The moderate, positive, and significant correlation coefficient between overall AI literacy and responsive use of AI adds to the evidence that there is a link between prospective teachers' AI literacy and how they use AI responsibly. This finding underscores the importance of AI literacy as a foundational skill for promoting responsible AI use in educational contexts. These findings align with existing literature emphasizing the importance of AI literacy for educators in fostering responsible AI use (Tondeur et al., 2017; Voogt et al., 2015; Seo et al., 2021). For instance, Tondeur et al. (2017) argue that educators need to develop a comprehensive understanding of AI concepts, applications, and ethical considerations to effectively integrate AI technologies into teaching and learning practices. Similarly, Voogt et al. (2015) emphasizes the need for teacher education programs to prioritize the development of AI literacy skills to prepare educators for the ethical and responsible use of AI in education. By equipping prospective teachers with the knowledge, skills, and dispositions necessary for responsible AI use, teacher education programs can empower educators to leverage AI technologies effectively while upholding ethical principles and values.

The current study findings showed that AI literacy significantly predicts the responsible use of generative AI in assignment writing among prospective teachers, explaining 40.1% of the variance in responsible AI use. The significant results show that prospective teachers with a higher level of AI literacy utilize AI more responsibly in writing assignments. According to prior studies, AI literacy is crucial to responsible AI use in education (Ding et al., 2024; Rütli-Joy et al., 2023; Zhang et al., 2023). Ding et al. (2024) note that AI literacy programs boost instructors' skills and confidence in using AI tools responsibly. Rütli-Joy et al. (2023) stress the importance of AI literacy training for prospective teachers to ensure responsible AI integration in education. Zhang et al. (2023) emphasize ethical aspects in AI literacy instruction to help educators make educated AI use decisions. Teachers and teacher training programs should highlight AI literacy competencies to promote ethical and effective AI inclusion in education.

Stepwise multiple -analysis was used to determine which AI literacy variables affect prospective instructors' assignment writing AI utilization. The findings revealed how intrinsic desire, self-efficacy, behavioral commitment, teamwork, AI knowledge and understanding, and AI ethical learning influence responsible AI use. The final model had an adjusted R square of 0.463, showing that the predictor variables explain 46.3% of responsible AI use. Intrinsic motivation and AI ethical learning predicted responsible AI use among prospective instructors. A high-positive link was found between intrinsic motivation and AI ethical learning, indicating a considerable impact on responsible AI use. These findings support prior studies on intrinsic motivation and ethics in technology adoption and use (Deci & Ryan, 1985; Johnson et al., 2016). Intrinsic motivation—people's drive and interest

in AI technologies—can promote appropriate AI use in education (Ryan & Deci, 1985). Understanding AI ethics and guidelines is crucial for promoting responsible and ethical AI actions among educators (Floridi et al., 2018).

The findings also demonstrate the complexity of AI literacy, as well as the role of motivation and ethical awareness in forecasting AI technology use. Instructors can better prepare prospective teachers for responsible AI use and ethical educational practices by incorporating intrinsic motivation and AI ethical learning into AI literacy education programs. In conclusion, stepwise regression analysis shows that intrinsic desire and AI ethical learning influence prospective instructors' assignment writing using AI. In AI literacy education, teacher preparation programs can promote responsible AI use and ethical decision-making among future educators.

LIMITATIONS, IMPLICATIONS AND CONCLUSION

While this study provides intriguing perspectives on the use of assignment writing, it is crucial to acknowledge the limitations of the study. The small sample size chosen for the study is small, hence it limits the generalizability of the findings to a larger population. Additionally, the study employed self-reported surveys, which has the potential to biases or errors in the responses provided by participants. Besides, Furthermore, the study's focus on AI literacy and responsible deployment in assignment writing may not fully reflect the broader scope of AI applications in education. Future research could address these limitations by utilizing larger and more varied samples, adopting objective assessments of AI literacy, establishing longitudinal study designs, and exploring additional settings of AI integration in education. The study's findings have significant implications for both educational practice and research. The study highlights the importance of integrating AI education into teacher training programs through an assessment of the levels of AI literacy and responsible AI usage among prospective teachers. The observed relationships between different aspects of AI literacy and the responsible use of AI highlight the need for targeted interventions to enhance certain elements of AI literacy, such as intrinsic motivation, self-assurance, and ethical understanding. The results of this study provide useful insights for developing educational programs and teaching strategies that promote the safe use of AI in academic environments. In the end, this will aid in the cultivation of educators who possess both digital literacy and ethical awareness, enabling them to proficiently navigate the advantages and difficulties presented by AI technology in educational settings.

AUTHORS' CONTRIBUTION

PM - Conceptualization, instrument development, data collection, pilot study, data analysis, draft and final manuscript writing. ACK - Conceptualization, instrument development and validation, data collection, writing methodology and review of the final manuscript. RK - Introduction, and final review of the manuscript. R - SPSS data cleaning and analysis, writing the report, reference checking, formatting and editing. ABR – draft on the discussion section, check on references and editing the manuscript. VB – Literature review.

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