Comunicar, n. 82, v. XXXIII, 2025 | Media Education Research Journal | ISSN: 1134-3478; e-ISSN: 1988-3478
www.comunicarjournal.com

AI Literacy Profile of Education Faculty Students: Sample of Dicle University

Perfil de Alfabetización en IA de la Facultad de Educación: Muestra de la Universidad de Dicle1

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ABSTRACT
This study examines AI literacy among undergraduate students at a public Turkish university. It describes current AI literacy of pre-service teachers and emphasizes the need for AI literacy inclusion in teacher training to enhance professional knowledge and skills. The survey research method was used with a quantitative approach, with a sample of 375 participants, identified through cluster sampling method. The AI Literacy Scale comprising 31 items was the data collection tool, with a 7-point Likert structure. For data analysis, normal distribution and homogeneity were checked with SPSS, the significance value was determined as 0.05, and descriptive statistics, *t*-test, Man Whitney U, ANOVA, Welch's ANOVA, Kruskal Wallis, Scheffe, and Dunn tests were also measured. The findings reveal that 95% of the participants had no AI course; 79% were female; 38% studied Turkish & Social Sciences; 23% Mathematics & Science, and 16% Foreign Languages; and 23% studied only upto Primary Education. The results also reveal that participants had approximately medium AI literacy, the subject studied had a small impact on AI literacy but gender did not. Foreign Language departments showed the lowest AI literacy, possibly due to individual differences like interest and motivation. The AI literacy levels can be increased by adding AI courses to the curriculum and improving instructors' knowledge and skills in integrating AI tools into courses.

RESUMEN
Este estudio examina la alfabetización en IA entre los estudiantes de pregrado de una universidad pública turca. En él se describe la alfabetización actual en materia de IA de los docentes en formación y se hace hincapié en la necesidad de incluir la alfabetización en IA en la formación de los docentes para mejorar los conocimientos y las competencias profesionales. Se utilizó el método de investigación por encuesta con enfoque cuantitativo, con una muestra de 375 participantes, identificados mediante el método de muestreo por conglomerados. La Escala de Alfabetización de IA, compuesta por 31 ítems, fue la herramienta de recopilación de datos, con una estructura Likert de 7 puntos. Para el análisis de los datos se verificó la distribución normal y homogeneidad con el programa SPSS, se determinó el valor de significancia como 0,05 y se midió estadística descriptiva, *t*-test, U de Man Whitney, ANOVA, ANOVA de Welch, Kruskal Wallis, Scheffe y Dunn. Los resultados revelan que el 95% de los participantes no tenía ningún curso de IA; el 79% eran mujeres; El 38% estudió Ciencias Turcas y Sociales; 23% Matemáticas y Ciencias, y 16% Lenguas Extranjeras; y el 23% estudió solo hasta la Educación Primaria. Los resultados también revelan que los participantes tenían aproximadamente un nivel medio de alfabetización en IA, el tema estudiado tuvo un pequeño impacto en la alfabetización en IA pero el género no. Los departamentos de lenguas extranjeras mostraron la alfabetización en IA más baja, posiblemente debido a diferencias individuales como el interés y la motivación. Los hallazgos implican que los niveles de alfabetización en IA pueden aumentarse agregando cursos de IA al plan de estudios y mejorando el conocimiento y las habilidades de los instructores para integrar herramientas de IA en los cursos.

KEYWORDS / PALABRAS CLAVE
Artificial Intelligence, Educational Technology, Literacy, Teacher Training, Teacher Professional Competence, Use of AI in Education.
Inteligencia artificial, tecnología educativa, alfabetización, formación docente, competencia profesional docente, uso de IA en educación.

Received: 2024-12-10 | Reviewed: 2025-03-23 | Accepted: 2025-03-30 | Online First: 2025-07-21 | Published: 2025-07-24
DOI: https://doi.org/10.5281/zenodo.15993731 | Pages: 01-11

1. Introduction

Artificial intelligence (AI) technologies advance rapidly, finding applications in diverse domains and offering significant potential benefits. In the context of education, AI technologies promise to revolutionize teaching and learning processes through personalized content, improved classroom management, and optimized assessment strategies. There are many examples of courses and classes in the literature that aim to increase the artificial intelligence literacy of individuals at different educational levels, such as kindergarten (Su, Ng, & Chu, 2023), high school (Ng et al., 2022) or university (Laupichler et al., 2022). However, the integration of AI also raises critical risks and challenges, such as ethical concerns, data privacy vulnerabilities, and the potential to exacerbate existing inequalities in education (Li, 2024). The World Economic Forum (2024) emphasizes that AI literacy is vital for equipping individuals with the skill sets necessary to use these technologies responsibly, both as citizens and professionals. Similarly, the 2030 Education Compass (OECD, n.d.) underscores the urgency of skill development to adapt to the AI-driven era.

As the role of AI in reshaping labour markets and redefining skill requirements becomes evident, teacher education systems face increasing pressure to adapt. Teachers play a crucial role as leaders in creating meaningful learning environments for influencing student achievement and capacities (Ng et al., 2023) and this leading can influence social and economic expectations (OECD, 2005), so the lack of sufficient skills for AI integration remains a major barrier. Cukurova et al. (2024) highlight the importance of restructuring teacher education to address emerging demands, advocating for a curriculum that integrates ethics, digital pedagogy, and a technical understanding of AI.

Given the scope of this need for restructuring, the integration of AI in educational settings is not without its challenges. Significant concerns regarding data privacy and security arise, particularly as AI systems often rely on large datasets that may include sensitive information about students and educators (Ma & Jiang, 2023; Sabharwal, Kabha, & Srivastava, 2023). Ethical considerations are paramount, as the use of AI can lead to issues such as algorithmic bias and the potential for exacerbating existing inequalities in education (Akgun & Greenhow, 2021; Ma & Jiang, 2023; Seo et al., 2021). Therefore, while AI has the potential to revolutionize educational practices, it is crucial to address these ethical and security challenges (Ng et al., 2021a) to ensure that the benefits of AI are realized without compromising the integrity and privacy of educational stakeholders (Ma & Jiang, 2023).

As a core component for teacher education, AI literacy with technical understanding, critical appraisal, and practical application sub-dimensions (Mills et al., 2024; Ng et al., 2021b), enable educators to integrate AI tools into educational settings, offering tailored learning opportunities, enhancing classroom management, providing feedback to students, creating lesson plans, and analyzing student performance, thereby fostering a more inclusive and effective learning environment (Akgun & Greenhow, 2021; Li, 2023; Mahligawati et al., 2023; Ng et al., 2021a). At the same time, the ethical challenges posed by AI, such as algorithmic bias (Lee et al., 2021) and data privacy concerns, necessitate a careful and informed approach to its adoption in schools (Ma & Jiang, 2023; Ng et al., 2021a). However, teachers may not be digitally ready to use AI-enabled educational applications, may face challenges such as misunderstanding, misleading, limitations, and hidden ethical issues, and may not have the technological experience to conduct data analysis (Akgun & Greenhow, 2021; Seo et al., 2021).

Professionals and students are (or soon will be) exposed to AI applications in both their personal and professional lives, so they must be able to work together and cooperate with AI to stay current and prevent falling behind in a workplace that is changing quickly (Laupichler et al., 2023). Du et al. (2024) revealed that AI literacy has a direct impact on perceptions of the use of AI, self-efficacy in learning AI and awareness of ethics, and an indirect impact on learning intentions. AI literacy is increasingly recognized as essential in the modern educational landscape, where AI tools are being integrated into various educational practices to enhance learning outcomes and teaching methodologies (Harry, 2023). Teachers, as facilitators of learning, must develop the adaptability and skills necessary to harness AI tools effectively in their classrooms. This requires not only redesigning pedagogical approaches but also fostering a sustained commitment to professional development in the age of AI (Cukurova et al., 2024). Despite its transformative potential, AI in education remains underutilized due to limited AI literacy among educators. Teacher candidates, as future practitioners, are particularly vulnerable to this gap, as many lack prior exposure to AI-focused courses in their training (Karaoğlan Yılmaz & Yılmaz, 2023). Addressing this deficiency is critical to ensuring that educators can navigate the complexities of AI while fostering inclusive and effective learning environments. Hence, this study seeks to address the following research questions (RQ):

1. RQ-1: What is the distribution of having attended an AI-related course before? This question aims to assess the sample's current interest in AI. Analyzing this interest provides concrete data for designing AI-related courses at the faculty. Students answering "Yes" show high intrinsic motivation and awareness, warranting advanced instructional design. For those answering "No," basic training and awareness courses should be included in the curriculum.
2. RQ-2: What is the current level of AI literacy of sample? This question assesses the sample's readiness, describing their AI literacy across three dimensions: technical understanding, critical evaluation, and practical application. This provides data for needs analysis in designing an AI course, guiding key aspects like learning outcomes, topics, time allocation, and assessment activities.
3. RQ-3: How do genders of students influence their proficiency in AI literacy? This question examines the impact of gender on AI literacy, motivated by studies suggesting either no gender effect (Moosa et al., 2024) or higher AI literacy in males (Yüreğilli Göksu & Göksu, 2024). Despite an increase in female participation in AI since 2016, the gender gap remains (Pal et al., 2024), with societal roles often expecting higher AI literacy in men. This question aims to identify gender differences in AI literacy, guiding future efforts to address any gap and inform curriculum development.
4. RQ-4: How do departments of students affect their proficiency in AI literacy? This question examines the impact of department on AI literacy, helping identify which departments should be prioritized in designing AI courses. Kong, Cheung and Zhang (2022) noted that disciplinary backgrounds affect exposure to AI, and Kong, Cheung and Zhang (2023) found that focusing on conceptual teaching over technical details can reduce barriers and promote AI literacy across diverse backgrounds. As a pilot, AI integration can begin with awareness and basic knowledge courses in departments with lower literacy.
5. RQ-5: What strategies can be recommended to integrate AI literacy into teacher education curricula effectively? This question summarizes the findings from the first four questions, aiming to draw general inferences and provide suggestions based on these results and the literature. By characterizing the AI literacy among undergraduate students at a public university in Türkiye, this study aims to guide a need analysis for the instructional design of an AI course and curriculum interventions. Its findings will inform policymakers and educators on preparing future teachers to use AI responsibly and improve their professional knowledge and skills.

2. Definition of AI Literacy

AI literacy and access may be considered part of basic rights in the AI era and AI competency is becoming one of the prerequisites for the teaching profession (UNESCO, 2024). There are many definitions for AI literacy and there is no common definition yet. Here are some definitions: The information and abilities necessary for individuals to comprehend, apply, and assess AI technology are collectively referred to as AI literacy (Long & Magerko, 2020; Ng et al., 2021a). While Mills et al. (2024) explained AI literacy as consisting of interaction modes of three types of knowledge and skills: understanding, evaluating, and using, Ng et al. (2021b) addressed AI literacy under four headings: knowing and understanding artificial intelligence, using and applying artificial intelligence, evaluating and creating artificial intelligence, and artificial intelligence ethics. Almatrafi, Johri and Lee (2024) stated AI literacy has six key constructs as recognizing, knowing and understanding, using and applying, evaluating, creating, and navigating ethically. Bozkurt (2024) defines AI literacy as the comprehensive set of competencies, skills, and fluency required to understand, apply, and critically evaluate AI technologies. Wang, Rau and Yuan (2023) defined AI literacy as understanding and using AI technologies in practical applications, analyzing and critically evaluating the data provided by AI, and respecting personal responsibility and rights.

Although AI literacy and AI competence are used interchangeably in the literature, Chiu et al. (2024) defined the two concepts differently. Chiu et al. (2024) define AI literacy as the ability to explain how AI works, understand its societal impacts, use it ethically, and communicate effectively. AI competence, on the other hand, refers to the confidence and ability to use AI technologies, along with a willingness to learn and apply AI for positive outcomes. The skills or competencies that constitute AI literacy can be broadly divided into two domains: technical abilities, such as developing and maintaining AI systems (e.g., machine learning, data visualization), and practical skills, including problem-solving, critical thinking, and teamwork (OECD, 2023). AI literacy has also relation to other competencies such as digital literacy, statistical literacy, and data literacy (**Černý, 2024**) or initiatives such as digital citizenship, media literacy, computational thinking,

data literacy (Mills et al., 2024). Collectively referred to as AI literacy, these skills and competencies are indispensable for leveraging AI's potential while mitigating associated risks and threats (Long & Magerko, 2020; Ng et al., 2021a). Olari and Romeike (2021) postulates that "AI cannot be appropriately grasped without data literacy", and that competencies related to AI are intertwined with knowledge and skills related to data. On the other hand, Liu and Xie (2021) postulates that AI literacy consists of three main aspects as digital literacy, computational thinking, programming abilities.

Among the many definitions in the literature, AI literacy, which encompasses the technical understanding, critical appraisal, and practical application of AI, is increasingly recognized as a core component for teacher education (Mills et al., 2024; Ng et al., 2021b). *The technical understanding* measures an individual's technical knowledge of AI technologies, including mathematical and statistical concepts, algorithms, and techniques used. Also it includes knowledge of linear algebra, probability theory, statistical analysis, model creation, training, verification, and testing, and tests awareness of different AI technologies like deep learning and image processing (Karaoğlan Yılmaz & Yılmaz, 2023; Laupichler et al., 2023). *The critical appraisal* measures individuals' awareness of AI technologies, their use of critical thinking skills, ethical and social evaluation, and understanding of risks, particularly regarding data privacy, data collection, personal privacy, and justice (Karaoğlan Yılmaz & Yılmaz, 2023; Laupichler et al., 2023). *The practical application* evaluates an individual's understanding and skills in utilizing AI technologies in daily life, including real-world problem-solving, business, health, education, security, and personal projects, and how to integrate these technologies into their lives (Karaoğlan Yılmaz & Yılmaz, 2023; Laupichler et al., 2023).

3. Methodology

3.1. Research Design

This scientific research has been designed with the survey method from a quantitative perspective. The survey method is a scientific research method used to describe the current situation (N., 2014). So the survey method has been preferred in the research to describe the AI literacy status of pre-service teachers.

3.2. Limitations

The research was limited to data collected during the spring semester of the 2023-2024 academic year, specifically within a two-week period preceding the final exams. While the study aimed to include all departments within the education faculty, a significant limitation was the exclusion of students from the Fine Arts Education department. Although the faculty comprises five active departments with students across all four years of study, cluster sampling resulted in the participation of students from only four departments. Only four students from the Fine Arts Education department participated voluntarily. Due to the small sample size, their data were excluded from the final analysis to maintain statistical reliability. This exclusion represents the primary limitation of the study, as it restricts the generalizability of findings to all teaching departments within the faculty.

3.3. Sampling Method and Participants

The college faculty has eight departments for the undergraduate teacher education as follows: Educational Sciences, Fine Arts Education, Foreign Language Education, Mathematics and Science Education, Physical Education and Sports, Primary Education, Special Education, Turkish and Social Sciences Education. However, only five deaprtments actively have students in grades 1-4: Fine Arts, Foreign Language, Mathematics and Science, Primary Education, and Turkish and Social Science. Hence, there were only five clusters to get samples, but it is not possible to get data from the Fine Arts Education department. Therefore, only the other four departments are included in the study. Cluster sampling method was used to determine the sample of the research, and departments with active students at the 1st, 2nd, 3rd and 4th grade levels in the teacher training departments of education faculty in a public university were considered as a natural cluster. Random assignment has been used to include students in the sample. A total of 410 participants were reached, and only 375 participants were included in the study. The age range of the participants varied between 18 – 48, and the average age was 25. Approximately 79% of participants are female (N=295). The participants' rates for departments as 16% Foreign Language (N=62), %23 Mathematics and Science (n =87), 23% Primary Education (N=85), 38% Turkish and Social Science (N=141).

3.4. Data Collection Tools and Methods

The AI Literacy Scale, adapted to Turkish by Karaoğlan Yılmaz and Yılmaz (2023), was utilized as the primary data collection instrument. This scale, originally developed by Laupichler et al. (2023), provides a comprehensive framework for assessing AI literacy across three distinct sub-dimensions: technical understanding (TU) (14 items), critical appraisal (CA) (10 items), and practical application (PA) (7 items). For explanations of the sub-dimensions, please look for the *Definition of AI Literacy* title in this research. The instrument employs a 7-point Likert response format, enabling respondents to indicate their level of agreement with each item. Higher aggregate scores on the scale reflect greater AI literacy, with no items requiring reverse coding. The Cronbach's alpha for the overall scale in the original scale is .99 while it is .98 for CA, .97 for PA, and .98 for TU. The scale was deployed using a dual-mode strategy via Google Forms and through paper-based questionnaires to maximize accessibility and participation. The scale demonstrated excellent internal reliability, with a Cronbach's alpha of .97 for the overall scale. Sub-dimension reliability coefficients were similarly robust: .95 for CA, .93 for PA, and .96 for TU. These values indicate high internal consistency, underscoring the scale's suitability for evaluating AI literacy in the given context.

3.5. Data Analysis

The collected data[2] for this study were analyzed using the SPSS. Initially, 410 responses were obtained. During the preliminary analysis, 34 cases were discarded due to duplicate entries, missing values, or inconsistencies, such as outlier responses that deviated significantly from plausible patterns. A box plot analysis identified one additional outlier, which was subsequently excluded. The final dataset comprised 375 valid cases for analysis. To assess the distribution characteristics of the data, histograms and the Kolmogorov-Smirnov test were conducted. The results indicated that the data followed a normal distribution for the Critical Appraisal (CA) (*Statistic* (375) = .04, p = .20) and Practical Application (PA) (*Statistic* (375) = .03, p = .20) but deviated from normality for the Technical Understanding (TU) (*Statistic* (375) = .07, $p < .001$). When analyzed by department, data from the Foreign Languages group in the TU also exhibited non-normality (*Statistic* (63) = .17, $p < .001$). Gender-specific analysis revealed non-normal distribution for female participants in the TU (*Statistic* (295) = .07, p = .002).

Homogeneity of variances was assessed using Levene's statistic. The data demonstrated homogeneity for CA based on mean (F (3, 371) = 2.40, p = .07) and TU based on median (F (3, 371) = 1.08, p = .36) but lacked homogeneity for PA based on mean (F (3, 371) = 4.308, p = .005) especially in department variable. Conversely, gender comparisons showed homogeneity across all sub-dimensions (F_{CA} (1, 373) = 2.53, p = .11; F_{PA} (1, 373) = .17, p = .68; F_{TU} (1, 373) = .38, p = .54).

The analysis employed a combination of parametric and non-parametric tests as follows:

- **Gender:** Independent sample *t*-tests were used for the CA and PA, while the Mann-Whitney U test was applied to the non-normally distributed TU.
- **Department:** For the CA, ANOVA with Scheffe's post-hoc test was used to identify group differences. Welch's ANOVA tests were applied to the PA due to non-homogeneous variances. The Kruskal-Wallis H test with Dunn's post-hoc test was employed for the TU due to its non-normal distribution.

Effect sizes as eta squared were calculated to provide additional insights into the significance of observed differences.

4. Findings

This part presents the statistical findings of the research.

4.1. Distribution of Having Attended an AI-related Course before

Approximately 95% of participants (N=356) had not attended any AI course. Other participants (N=19) indicated that they had attended an AI course at a university or nonprofit organization through an online or face-to-face class.

4.2. The Current Level of AI Literacy

The group averages of 375 participants for all sub-dimensions (M_{CA} = 3.70, SD = 1.44; M_{PA} = 3.85,

SD = 1.45; M_{TU} = 3.11, *SD* = 1.40) were found to be lower than the scale average (M= 4). So it was discovered the participants' levels of AI literacy were near to but below the average.

4.3. Gender Influence on AI Literacy

Descriptive statistics and independent sample *t*-test analysis for CA and PA of AI literacy regarding gender can be seen in Table 1.

Table 1: Descriptive Statistics and Independent Sample *t*-test for CA and PA Regarding Gender.

Sub-dimension	Gender	n	M	SD	t	df	p
Critical Appraisal (CA)	Female	295	3.67	1.48	-.67	373	.50
	Male	80	3.80	1.30			
Practical Application (PA)	Female	295	3.80	1.46	-1.20	373	.23
	Male	80	4.02	1.42			

Table 1 shows the mean score of men in critical appraisal (*M* = 3.80, *SD* = 1.30) and practical application (*M* = 4.02, *SD* = 1.42) are higher than the women's CA scores (*M* = 3.67, *SD* = 1.48) and PA scores (*M* = 3.80, *SD* = 1.46). However, the independent sample *t*-test for both CA (*t* (373) = -.67, *p* = .50) and PA (*t* (373) = -1.20, *p* = .23) shows that this differences between the groups are not statistically significant. Therefore, gender has no effect on CA and PA of AI.

Table 2 presents descriptive statistics and Mann Whitney U test for TU of AI literacy regarding gender.

Table 2: Descriptive Statistics and Mann Whitney U for TU Regarding Gender.

Sub-dimension	Gender	n	Median	SD	MR	SR	U	p
Technical Understanding (TU)	Female	295	3.07	1.42	188.59	55635.00	11.63	.84
	Male	80	3	1.33	185.81	14865.00		

Table 2 shows the median and mean rank score of women (*MdN*=3.07, *MR* = 188.59, *SD* = 1.42) is higher than the men (*MdN*=3, *MR* = 185.81, *SD* = 1.33). However, Man Whitney U test for TU shows that this differences between the groups are not statistically significant (*U* = 11.63, *z* = -0.20, *p* = .84). Therefore, gender has no effect on TU of AI.

4.4. Department Affect on AI Literacy

Descriptive statistics by department are presented in Table 3.

Table 3: Descriptive Statistics by Department.

Department	n	Sub-dimension					
		CA		PA		TU	
		Mean	SD	Mean	SD	Median	SD
Foreign Languages	62	3.15	1.16	3.57	1.21	1.89	1.22
Mathematics & Science	87	3.86	1.43	4.02	1.37	3.29	1.34
Primary Education	85	3.98	1.63	4.09	1.70	3.36	1.54
Turkish & Social Science	141	3.67	1.38	3.72	1.41	3	1.30

Table 3 shows each department has different mean values for the CA and PA of AI literacy. Also, the median values are all different in the TU. The analyses conducted to investigate the significance of the difference between these means or medians, presented in tables 4 to 6.

Table 4: One-Way ANOVA for CA Regarding Department.

Critical Appraisal (CA)	SS	df	MS	F	p
Between Groups	28.220	3	9.407	4.67	.003
Within Groups	746.780	371	2.013		
Total	775	374			

Table 4 shows there is a significant difference between departments for CA of the AI literacy (*F* (3, 371)

= 4.67, p = .003, η^2 = .04). The eta squared as effect size is approximately .04, indicating a small effect. The Scheffe post hoc test findings showed that there was a significant difference between the Foreign Languages and Mathematics & Science departments, and the difference is in favor of the Mathematics & Science (*MD* = -.72, *SE* = .24, p = .03, *95% CI* [-1.38, -.06]). There is also a significant difference between the Foreign Languages and Primary Education, and the difference is in favor of the Primary Education (*MD* = -.83, *SE* = .24, p = .007, *95% CI* [-1.5, -.17]).

Therefore, the department variable has small effect on CA. According to the findings, Mathematics & Science (*M* = 3.86, *SD* = 1.43), and Primary Education (*M* = 3.98, *SD* = 1.63) has higher CA than Foreign Language (*M* = 3.15, *SD* = 1.16).

Table 5: Welch's ANOVA for PA between Groups Regarding Department.

Welch's ANOVA							
Practical Application (PA)	**SS**	**df**	**MS**	**F**	**df1**	**df2**	**p**
Between Groups	14.96	3	4.99	2.50	3	180.11	.06
Within Groups	772.20	371	2.08				
Total	787.16	374					

Table 5 shows there is no significant difference between departments for PA of AI literacy (*F* (3, 371) = 2.50, p = .06). Therefore, it can be said that department has no effect on the PA and that the levels of AI literacy are similar across departments in terms of PA.

Table 6: Kruskal Wallis H for TU between Groups Regarding Department.

Department	**n**	**MR**	**df**	χ^2	**p**
Foreign Language	62	129.31	3	24.3	.000
Mathematics & Science	87	202.96			
Primary Education	85	212.71			
Turkish & Social Sciences	141	189.68			
Total	375				

Table 6 shows there are differences between the mean rank scores of the departments, and the Kruskal Wallis H test findings point that there is a significant difference between departments for TU of AI literacy (χ^2 (3, N=375) = 24.3, p<.001, η^2 = .07). The eta squared as effect size is .07, indicating a medium effect (Tomczak & Tomczak, 2014). Dunn's statistic post hoc test findings showed that there was a significant difference between Foreign Languages and all other departments in favor of other departments (Mathematic & Science: *MD* = -.94, *SE* = .21, p < .001, *95% CI* [-1.5, -.37]; Primary Education: *MD* = -1.14, *SE* = .23, p < .001, *95% CI* [-1.74, -.53]; Turkish & Social Sciences: *MD* = -.78, *SE* = .19, p < .001, *95% CI* [-1.28, -.27]).

Therefore, the department has medium effect on TU of AI. According to the findings, Mathematics & Science education department (*MdN*=3.29, *SD* = 1.34), Primary Education department (*MdN*=3.36, *SD* = 1.54), and Turkish & Social Science education department (*MdN*=3, *SD* = 1.30) has higher TU of AI than Foreign Language (*MdN*=1.89, *SD* = 1.22).

4.5. Recommended Strategies to Integrate AI Literacy into Teacher Education Curricula

This research highlights the need for AI literacy in teacher training, as most participants reported no prior AI-related coursework. The results obtained form the study, can guide curriculum design, including course content, learning outcomes, schedules, and evaluation for AI literacy. Integrating AI literacy courses can improve students' TU, CA, and PA of AI. Prioritizing departments with low AI literacy for basic-level training is recommended. Faculty members should receive basic and awareness training, with collaboration from academic staff, to better incorporate AI into teaching and serve as role models for pre-service teachers.

5. Conclusion and Discussion

This study examined AI literacy levels among undergraduate students in the education faculty at a public university in Türkiye, focusing on critical appraisal (CA), practical application (PA), and technical understanding (TU). It aimed to assess current AI literacy, identify course design needs, and guide a needs

analysis for AI-related courses. The findings will be a roadmap for integrating AI courses into curriculum. Results show that 95% of students had no prior AI coursework, with overall literacy slightly below average. So the study highlights the need for AI literacy course in teacher training to enhance professional knowledge and skills in the AI-driven era. Gender had no impact on AI literacy, while department effects varied: small impact on CA, medium on TU, and no effect on PA.

According to results of RQ-1 and RQ-2, 95% of students had no prior exposure to AI courses, suggesting their AI literacy is mostly shaped by indirect experiences. As a result, their literacy levels, though slightly below average, are as expected. This lack of experience may hinder their future professional practice. Developing AI literacy in future teachers is crucial to prepare them for the AI-driven era. Studies by Du et al. (2024) and Ayanwale et al. (2022) emphasize the role of AI literacy and experience in teaching readiness and intent. This gap can be addressed by adding AI-related courses to the curriculum, supported by Karaoğlan Yılmaz and Yılmaz (2023) and Tenberga and Daniela (2024), who highlight the importance of AI literacy and professional development for educators.

Based on the results of RQ-3, gender has no effect on AI literacy. This is likely due to the lack of structured AI training, limited experience, and similar interest levels among students. This result contrasts with literature suggesting gender bias in AI literacy and advocating for women's empowerment in the field (Manasi, Panchanadeswaran, & Sours, 2023; UN Women, 2024; UNICEF, 2021). Some studies (Demirel & Banaz, 2024; Nyaaba et al., 2024; Ofosu-Ampong, 2023; Yüreğilli Göksu & Göksu, 2024) highlight gender differences in AI use, while others, like Kong et al. (2022) and Moosa et al. (2024), support this finding that gender does not affect AI literacy. Therefore, depending on this research, gender differences need not be considered in AI course design, as both male and female teacher candidates have similar AI knowledge and experience.

Depending on the results of RQ-4, department influences AI literacy sub-dimensions differently: small effect on CA, medium effect on TU, and no effect on PA. The lack of effect on PA is likely due to similar knowledge and experience among participants, supported by RQ-1. The Foreign Languages department had disadvantages in CA and TU compared to others, which aligns with previous studies suggesting disciplinary backgrounds impact AI exposure and competence (Kong et al., 2022). Kong et al. (2023) emphasized that AI literacy programs should focus on conceptual teaching, not just formulas or coding, to reduce barriers and ensure equal access for all backgrounds. The disparities may stem from differences in faculty expertise, AI resources, and faculty role models in AI integration. Therefore, the Foreign Languages department should be prioritized for AI-related courses, awareness training, and basic knowledge courses due to lower AI literacy.

Based on the first four RQs, RQ-5 outlines strategies for developing AI literacy in teacher candidates. Since gender had no significant impact, it is not a factor in the strategies. First, AI literacy results can serve as a roadmap. Basic knowledge and awareness training should target students with low AI literacy, followed by instructional programs to improve all sub-dimensions of AI literacy. It's also crucial to design training for faculty, as they need to serve as role models. Providing faculty with the necessary tools and knowledge will create a supportive environment for students to develop AI literacy. These conclusions and inferences are supported by Eniş-Erdoğan and Ekşioğlu (2024), Luan et al. (2020), Mikeladze, Meijer and Verhoeff (2024), Ng et al. (2023), and Zawacki-Richter et al. (2019).

6. Suggestions

AI literacy can be enhanced by incorporating AI courses into the curriculum. Lecturers can model AI integration by improving their own knowledge and skills. Larger studies across different regions of Türkiye are recommended. Future research should explore the long-term effects, scalability across institutions, and the role of demographic factors like age and socioeconomic status in shaping AI literacy. Additionally, different sampling methods such as stratified sampling can be chosen to include departments such as Fine Arts in future studies, providing a broader representation.

Acknowledgements

We would like to thank the reviewers and the editors of this journal for their help in strengthening this article.

Ethical Consideration

The ethical permissions required to conduct the study were obtained from the Dicle University Ethics Committee. The ethics committee decision meeting date and number is 24/05/2024-14.

Author Conflicts

The authors have no conflicts on the study.

Author Contributions

Ulku Ulker* is the corresponding author. She had a role for designing paper, literature review, method, data collection and analysis, results, discussion, writing the manuscript, submitting the article. Kubra Cevik had a role for literature review and data collection. Elzbieta Perzycka-Borowska had a role for literature review, discussion and final review before submission.

Notes

This study was presented orally as an abstract proceeding paper at the X. International TURKCESS Education and Social Science Congress held in Kosovo on July 11-13, 2024. To access the dataset please use the link by figshare: https://doi.org/10.6084/m9.figshare.27986948

Funding Agency

There is no funding agency for this research.

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