JUTLP
Journal of University Teaching & Learning Practice

Between Promise and Practice: Bridging Ethical Artificial Intelligence Literacy Gaps Across Students, Educators, and Policy

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Abstract

Generative artificial intelligence has become part of everyday academic work despite many questions centring around its ethical, pedagogical, and institutional aspects. This paper synthesises the results of two questionnaire studies from the European higher educational context, one administered with students (*n* = 226) and another with instructors (*n* = 256). Parallel five-point scales measured AI literacy, motivation, ethics, intention, and support. Independent-samples t-tests revealed significant group differences: students rated their ethical awareness higher than instructors, while instructors reported stronger willingness to experiment with AI tools and reported higher behavioural intention, which might be because students tend to view ethics through their immediate coursework practices, whereas teachers interpret it through the lack of institutional clarity and treat is as a question of integrity. Cluster analysis of instructors identified three user groups that differed in several literacy dimensions, with the scale of ethics providing a clear distinction. Correlation analyses indicated that instructors' moral awareness and intention grow parallel with institutional and social support, while students' confidence and readiness correlate mostly with self-efficacy and collaboration rather than with formal instruction.

Editors

Section: Special Issues
Editor-in-Chief: Dr Joseph Crawford
Senior Editor: Dr Cassandra Colvin

Publication

Submission: 3 June 2025
Revised: 10 December 2025
Accepted: 11 February 2026
Online First: 24 February 2026

Practitioner Notes

1. Students' ethical approach to AI mostly concerns immediate coursework, while instructors also consider academic integrity and human oversight and view ethics as a much broader concept.
2. Instructors reported strong willingness and intention to use AI yet they perceived their ethical confidence as low.
3. Both instructors and students reported weak institutional support; universities should strengthen internal communication and provide clear and context-sensitive points of contact for questions about AI use.
4. The cluster analysis of instructors confirmed that ethical awareness rises with available support and autonomy as well as an understanding the benefits of pedagogically driven AI use in the classroom.
5. Institutional frameworks are lacking or non-existent, while contextually distant guidelines (such as national or regional policies) offer little remedy for actual application.

Keywords

AI literacy; higher education; questionnaire study; institutional readiness; teacher and student perspectives

Citation:
Fekete, I. (2026). Between promise and practice: Bridging ethical artificial intelligence literacy gaps across students, educators, and policy. *Journal of University Teaching and Learning Practice, 23*(5). https://doi.org/10.53761/9fr5vw20

Introduction

In recent years, the rapid popularisation of generative artificial intelligence (AI) tools has raised questions about how higher education systems can and/or should respond to certain ethical, pedagogical, and institutional challenges their overarching ubiquity has created. While the presence of AI in learning and teaching is not new, nor do AI tools only include generative chatbots, the emergence and surge of various large language models have brought the technology inside the walls of the higher education classroom. From writing support to data analysis, AI systems now perform functions that once required distinctively human skills and leave mark on academic knowledge sharing (Botes et al., 2025; Crawford et al., 2023, 2026) and instructors' and students' ethical awareness and reasoning (Fajt & Schiller, 2025a, 2025b; Fekete, 2025). As these systems become more embedded, educators and learners must consider not only how to use them in a goal-oriented manner but also how to do so responsibly from an ethical aspect (Council of Europe, 2022).

Artificial intelligence literacy has become a key topic in higher education as generative systems have appeared in everyday academic practice. AI literacy is often described as a set of abilities that allow people to understand how AI works, to apply it in study or teaching, and to evaluate its effects on knowledge production and society (Council of Europe, 2022; Ng et al., 2023). It includes technical awareness as well as the capacity to judge reliability and ethical impact. The idea that technology use in education also involves moral choice is central to recent research findings (Celik, 2025; Council of Europe, 2022; Walter, 2024). Studies have also confirmed that higher education students mostly learn to use generative AI informally through online communities or peer advice rather than institutional training (Fajt & Schiller, 2025a, 2025b; Rajki et al., 2025). When teachers provide little direction, learners experiment without knowing whether their use is fair or acceptable. This can produce inconsistent levels of literacy and uncertainty whether to or how to use e.g., generative AI tools in learning and teaching in an ethically acceptable manner.

In response to the surge of AI technologies around us the Artificial Intelligence Act of the European Union (Madiega, 2024) emerges as one of the first comprehensive attempts to regulate AI from a meso perspective in order to maintain human oversight for reasons of safety, fairness, and accountability. The regulation places education among the key areas where risk and opportunity coexist. It recognises that institutions play a decisive role in affecting how AI is adopted into classroom practices, yet it leaves open how ethical responsibility should be shared between teachers, students, and the systems that support them in a contextually sensitive manner. This meso-macro ambiguity has direct implications for higher education, where the balance between innovation and ethical conduct is still being sought (Botes et al., 2025; Crawford et al., 2023, 2026; Eurobarometer, 2017).

Research in the educational field has begun to explore these tensions resulting from mainly exploratory and unguided use (Folmeg et al., 2024; Rajki et al., 2025). Studies of students and teachers show that both groups are experimenting with AI, but often without clear institutional or ethical guidance (Fajt & Schiller, 2025a, 2025b; Rajki et al., 2025). Students tend to use AI for short assignments or idea generation, while teachers are interested yet uncertain about how to integrate such tools into learning design (Fekete, 2024; Celik, 2023). This gap between practice and policy creates uneven literacy levels and fragmented understandings of what constitutes as responsible AI use.

Despite growing attention to AI literacy, many studies so far (for understandable practical and feasibility reasons) treat learners, educators, and policymaking as separate entities rather than as parts of a shared system. Less is known about how student and instructor experiences align, how responsibility for ethical AI use is shared, and what forms of institutional support are needed to ensure and sustain ethically grounded use. Therefore, the aim of this study is to address this gap by synthesising the findings from two empirical projects on students' and teachers' AI literacy in the European higher educational context. By comparing the two perspectives, the paper sets out to examine how ethical awareness and institutional readiness shape the use of AI in higher education. This paper also intends to respond to a wider international need to interpret AI use in education through social and ethical frameworks rather than through purely technical or motivational ones. This study addresses the following research questions:

> **Research Question 1.** How do students and instructors engage with AI technologies in learning and teaching contexts?
>
> **Research Question 2.** What similarities and differences appear in the dimensions of AI literacy among students and instructors, with special attention to ethics, willingness, and institutional support?
>
> **Research Question 3.** How do students' and instructors' perceptions of institutional and ethical readiness illustrate the conditions required for responsible AI use in higher education?

First, the literature review addresses the conceptualisations of AI literacy and its pedagogical and ethical dimensions. The Methods section then describes the two questionnaire studies and the analytical procedures applied to address each research question. The Results section presents descriptive findings related to reported AI use (RQ1), inferential comparisons of literacy dimensions (RQ2), and cluster and correlational analyses of institutional and ethical readiness (RQ3). The Discussion interprets these findings in light of current debates on responsible AI integration in higher education.

This study aims to contribute to the ongoing professional discourse on AI literacy by involving both student and instructor perspectives within a shared analytical framework. The alignment of AI literacy constructs with AI-TPACK dimensions and perceived institutional readiness, the study contributed to the understanding of how ethical awareness, autonomy, and organisational support interact in higher education contexts.

Literature

AI literacy in higher education

Studies on motivational forces behind generative AI use show that students value AI for quick idea generation and task support, yet they remain unsure about the credibility of the results or the ethics of relying on such output (Folmeg et al., 2024; Ng et al., 2023; Yurt & Kasarci, 2024). However, awareness alone does not create informed behaviour: guidance and reflection are required to form competence. Institutions, therefore, need to start discussion of ethics, accountability, and authorship in digital literacy (Gering et al., 2025).

Research on educational uses of artificial intelligence has found evidence that motivation and learning outcomes depend on human guidance rather than on the technology itself. Earlier empirical studies of educational technology inclusion in the classrooms showed that digital tools can increase short-term motivation, yet their effect fades once learners adjust to the novelty of the format (Tóth-Mózer & Kárpáti, 2016). Similar patterns appear in AI-supported settings, where students initially enjoy the novelty of any experience but need structured feedback and teacher presence to maintain engagement (Folmeg et al., 2024; Folgieri et al., 2024; Hmoud et al., 2024). In AI-inclusive classrooms, teachers play a central role in connecting technical use with learning goals, i.e., in managing to subordinate AI technology use to the pedagogical content goals of classes. Folgieri et al. (2024) found that when teachers co-designed learning activities with AI tools, students reported greater confidence and higher course completion rates. Yurt and Kasarci (2024) has found evidence that motivation toward AI use depends on expectancy and perceived utility. Learners who believe that AI helps them develop employable skills show stronger commitment to using it. Yet, to sustain such motivation, teachers must provide opportunities for exploration and dialogue.

To ensure teacher to learner transfer, teacher preparation is also essential. Studies after the COVID-19 pandemic drew attention to the need for maintaining human interaction and peer contact in technology-rich environments (Fűzi et al., 2022). When learners can rely on teacher feedback and community support, they are more likely to evaluate AI output critically and apply it responsibly. This evidence supports the argument that motivation in AI use is relational: it grows through guidance, discussion, and trust rather than through exposure.

Teachers' knowledge systems: from TPACK to AI-TPACK

The ability of teachers to integrate artificial intelligence in education depends on how they connect technological, pedagogical, and content (disciplinary) knowledge. Mishra & Koehler's (2006) Technological Pedagogical Content Knowledge (TPACK) framework describes this intersection and has been widely used to study how teachers apply educational technologies in their practices (Chai et al., 2011; Schmidt et al., 2009; Schmid et al., 2020). Research has confirmed that pedagogically grounded technology use occurs when teachers understand both the potential of a tool and how it supports learning goals. However, the appearance of AI systems has introduced new layers of responsibility that the original TPACK model could not then fully address. Recent extensions of the model include the concept of AI-TPACK (aka. intelligent TPACK), which specifically includes that teachers must also understand the ethical and social implications of AI tools when using them in their classroom practices in a context-sensitive manner (Celik, 2023). Celik (2023) therefore extended the TPACK model to include an ethical dimension, too.

Previous empirical studies into the AI use of university instructors has found evidence that confidence with digital tools does not automatically lead to active AI use. Even though teachers report general familiarity with standard educational technologies such as learning management systems, only a small proportion of them actively integrate AI tools into their courses. In fact, instructors who feel supported by their institutions and who have access to professional development opportunities tend to show stronger behavioural intention to adopt AI (An et al., 2022; Zhou et al., 2017). A recent scoping review examining Global South higher education has also found that ethical AI integration depends heavily on institutional capacity, governance, and equity considerations (Nguyen & Perkins, 2026). Willingness to experiment with AI also varies according to perceived autonomy. Teachers who view AI use as a personal choice rather than an obligation are more likely to explore its potential in teaching, and conversely, when use is driven by external expectations, motivation tends to decrease, confirming a link between voluntary engagement and a sense of ownership and professional identity (Redecker, 2017a, 2017b).

Ethical and institutional perspectives on AI integration

The ethical use of artificial intelligence in higher education has become a shared concern for students, teachers, and policymakers. The AI Act of the European Union (Madiega, 2024) and the Council of Europe's (2022) guidance both recognise education as a place where innovation and social responsibility must co-exist in a balanced manner. Empirical research shows that ethical awareness among teachers and students often develops in the absence of structured support. Learners experiment with generative systems to complete academic tasks yet receive limited instruction on citation, authorship, or data privacy (Folmeg et al., 2024). sometimes because these regulations are still underway in their given educational contexts (Gering et al., 2025). Walter (2024) argues that banning AI tools entirely conflicts with the goals of modern education, which include preparing learners for a digital world of work. Instead of restriction, institutions are encouraged to teach about critical reflection and ethical reasoning through guided practice. The development of AI literacy should therefore include discussion of social bias, reliability, and the limits of algorithmic judgement, or as the Council of Europe (2022) puts it, "preparing for AI" should be a process that combines technical understanding with personal responsibility.

Institutional readiness also affects ethical behaviour (Gering et al., 2025). Without clear procedures and support, teachers and students have no other alternative but to resort to individual decisions about AI use, which can lead to inconsistency, tension, and mis- or unuse. Similarly, policy frameworks that integrate AI into curriculum design should better align institutional expectations with classroom realities, serving as grounds for ethical AI use mitigation both at macro and meso levels.

Method

This paper synthesises the comparable results of two related empirical studies conducted in 2024 in the European higher educational context. Both studies involved non-representative, convenience samples and explored the dimensions of artificial intelligence literacy among students and instructors, using parallel questionnaire instruments designed and validated following the procedures outlined in Fekete (2025). The present study applies a comparative and interpretive design (Yanow, 2014). The study builds on integrate descriptive and correlational findings from the two datasets to examine points of alignment and differences in ethical awareness, institutional readiness, and self-reported competence from both perspectives.

Participants

A total of 226 university students participated in the student questionnaire study. The average age was 24.96 years (SD = 4.83). 146 identified as female (64.6%), 72 as male (31.9%), and eight as other (3.5%). Most participants were enrolled in bachelor's programs (61.9%), followed by master's (33.6%) and doctoral (3.5%) levels, with two respondents (0.9%) in higher vocational training. Participants studied in multiple European countries, with the largest cohorts from Hungary (56.6%) and Austria (25.5%), followed by Germany, the Netherlands, and the United Kingdom. The majority (69.9%) studied in traditional face-to-face programs, while 30.1% were enrolled in blended or hybrid formats. Regarding fields of study, the most represented areas were Business, Economics, and Tourism (36.3%), Humanities (36.3%), and Education (14.3%).

The instructor dataset included 256 higher education teachers from various European countries. Participants' average age was 47.14 years (SD = 10.69), with an average teaching experience of 18.60 years (SD = 9.84) and 15.81 years (SD = 9.60) specifically in higher education teaching. Among them, 174 identified as female (68.0%), 80 as male (31.3%), and two preferred not to answer (0.8%). The participants worked mainly in Hungary (34.4%), followed by the United Kingdom and Austria (10.9% each), Finland (6.3%), Germany (5.5%), and the Netherlands (4.7%). Regarding academic rank, the largest groups were associate or assistant professors (35.9%), senior lecturers or postdoctoral researchers (25.8%), and professors (16.4%). Most participants were full-time employees (79.7%). Participants represented a range of disciplines: Humanities (44.5%), Business and Economics (18.8%), Education (11.1%), and STEM or IT-related fields (9.4%).

Measures

Two instruments (questionnaires) were developed in English and reviewed by multiple experts before data collection. The student instrument contained 15 scales based on established models of technology use and AI literacy (Fekete, 2023; Ng et al., 2023). Each scale measured a component of literacy or attitude toward AI in academic settings. All constructs consisted of three to six items rated on a five-point Likert scale. Reliability analyses confirmed that all multi-item scales met accepted quality standards (Cronbach's α ≥ .70), and the detailed validation processes of both instruments (pilot and final validation) are presented in Fekete (2025). The scales, including brief construct descriptions, item numbers, and reliability coefficients (Cronbach's alpha), are presented in Table 1 below.

Table 1. *Student scale*

Scale	Example item	Reliability
Influence of teachers in encouraging AI use	I learn about AI because my teachers demonstrate its practical applications.	Four item scale on a 5-point Likert (α = .83).
General attitude	I enjoy trying out new AI tools in my free time.	Four item scale on a 5-point Likert (α = .89).
Experience with AI technologies	Using AI tools is a regular part of my study routine.	Five item scale on a 5-point Likert (α = .92).
Study-use attitude	I like to choose AI tools over traditional methods to complete school-related tasks.	Four item scale on a 5-point Likert (α = .91).
Effectiveness	I find the AI tools I use to be easy to navigate.	Five item scale on a 5-point Likert (α = .83).
Reliability	I rely on AI tools to provide accurate results.	Six item scale on a 5-point Likert (α = .85).

Scale	Example item	Reliability
Judging output	I'm good at deciding if the outcome of an AI tool is okay or not.	Four item scale on a 5-point Likert (α = .74).
Taking responsibility	I know I'm the one who should decide if any AI-generated content is okay for me to use.	Five item scale on a 5-point Likert (α = .90).
Willingness	It is important for me to learn about new AI tools.	Three item scale on a 5-point Likert (α = .89).
Self-efficacy	I'm confident that I can use AI tools in a way that they produce the outcome I want.	Five item scale on a 5-point Likert (α = .87).
Career benefits	Continuing to learn about AI is important for my future job prospects.	Four item scale on a 5-point Likert (α = .90).
Confidence	Using AI systems comes naturally to me.	Five item scale on a 5-point Likert (α = .89).
Collaboration	I'm happy to explain AI tools to my classmates/project partners when needed.	Five item scale on a 5-point Likert (α = .91).
Conceptual knowledge	I understand what AI is, and I can explain its main ideas well.	Four item scale on a 5-point Likert (α = .87).
Ethics	Following ethical rules is vital for using AI responsibly.	Four item scale on a 5-point Likert (α = .87).

Internal consistency was satisfactory for all scales (α = .74–.92). Construct validity was examined using principal component and confirmatory factor analyses. The instructor instrument consisted of 18 multi-item scales organised into three conceptual blocks: (1) the seven original TPACK domains, (2) four AI-specific extensions of TPACK (AI-TPACK), and (3) seven AI literacy and behavioural constructs. Part 1 was based on validated TPACK scales (Schmidt et al., 2009; Schmid et al., 2020). Part 2 employed AI-TPACK extensions that adapt the TPACK logic to artificial intelligence contexts (Celik, 2023). Part 3 included AI literacy and behavioural constructs based on prior technology acceptance and AI education research, including Ethics (Celik, 2023), Willingness (Fekete, 2023), Facilitating Conditions and Social Influence (An et al., 2022, based on Venkatesh et al., 2003), Behavioural Intention (An et al., 2022; Zhou et al., 2017), Expectancy Pressure (based on Kohnke et al., 2024; Venkatesh et al., 2003), and Voluntariness (based on Venkatesh et al., 2003). All scales used a five-point Likert format. Reliability coefficients (Cronbach's alpha) and item counts are reported in Table 2 below.

Table 2. *Instructor scale*

Scale	Example item	Reliability
Pedagogical Knowledge	I can adapt my teaching style to different learners.	Four item scale on a 5-point Likert (α = .80).
Content Knowledge	I know the basic theories and concepts of my teaching subject.	Four item scale on a 5-point Likert (α = .82).
Technological Knowledge	I have the technical skills I need to use technology.	Six item scale on a 5-point Likert (α = .93).
Pedagogical Content Knowledge	I know how to select effective teaching approaches to guide student thinking and learning in my teaching subject.	Four item scale on a 5-point Likert (α = .85).
Technological Pedagogical Knowledge	I can choose technologies that enhance students' learning for a lesson.	Five item scale on a 5-point Likert (α = .88).
Technological Content Knowledge	I can explain which technologies have been used in research in my field.	Four item scale on a 5-point Likert (α = .82).
Technological Pedagogical Content Knowledge	I can select technologies to use in my classroom that enhance what I teach, how I teach, and what students learn.	Four item scale on a 5-point Likert (α = .88).
Intelligent Technological Knowledge	I know how to execute some tasks with AI-based tools.	Five item scale on a 5-point Likert (α = .93).
Intelligent Technological Pedagogical Knowledge	I can understand the pedagogical contribution of AI-based tools to my teaching field.	Seven item scale on a 5-point Likert (α = .93).
Intelligent Technological Content Knowledge	I can use AI-based tools to search for educational material in my teaching field.	Four item scale on a 5-point Likert (α = .87).
Intelligent Technological Pedagogical Content Knowledge	I can teach lessons that appropriately combine my teaching content, AI-based tools, and teaching strategies.	Seven item scale on a 5-point Likert (α = .94).
Ethics	I can evaluate to what extent AI-based tools behave fair to all students in my teaching.	Four item scale on a 5-point Likert (α = .85).
Willingness	It is important for me to develop my knowledge about AI tools.	Three item scale on a 5-point Likert (α = .94).

Scale	Example item	Reliability
Facilitating Conditions	When using AI in teaching, I know where to get technical support.	Four item scale on a 5-point Likert (α = .81).
Social Influence	Teachers who can use AI in teaching will be admired by colleagues.	Five item scale on a 5-point Likert (α = .84).
Behavioural Intention	I am willing to learn about how to use AI for education from others.	Six item scale on a 5-point Likert (α = .92).
Expectancy Pressure	I feel that there is an expectation within my professional environment to use AI in teaching.	Five item scale on a 5-point Likert (α = .84).
Voluntariness	Using AI in my teaching feels like a personal choice rather than something imposed on me.	Four item scale on a 5-point Likert (α = .85).

Data collection

Participation was voluntary and anonymous, and ethical approval was obtained from the university research ethics board (Refs: #2024/02/3 for the student study and #2024/02/4 for the instructor study). Participants were recruited through institutional and professional networks. Students were invited to participate through their instructors, whose questionnaire featured a call for student participation in the end. Involving their students happened at their discretion. Instructors were contacted via professional mailing lists and directly through publicly available university email addresses. Participation in both studies was voluntary and anonymous. No incentives were offered for participation.

Analysis

Both datasets were analysed using SPSS version 22. Descriptive and inferential statistics were run to examine relationships among literacy dimensions. The student data were tested with independent-samples t-tests, while the instructor data also made it possible to apply cluster analysis to identify three distinct groups of instructors based on their perceived AI literacy levels (Csizér & Jamieson, 2012). Statistical significance was always accepted at $p<.05$. Prior to inferential analyses, assumptions of normality were examined. Skewness and kurtosis values for all scales in both datasets fell within the ±2.0 range, indicating acceptable univariate normality for parametric testing. Homogeneity of variances was assessed using Levene's tests in independent-samples t-tests and one-way ANOVAs.

Results

Student and instructor engagement with AI technologies

In the respective questionnaire studies, students and instructors reported that they have already begun experimenting with artificial intelligence tools in higher education. The student questionnaire asked participants to rate how effectively they could use AI for a range of purposes, while the instructor questionnaire measured the proportion of classes in which teachers used educational or AI-related technologies. Among the 226 student participants, AI use was most common for simple study-related tasks. As shown in Table 3, brainstorming (38.1%), short homework (36.3%), and information search (32.7%) were the activities where students felt completely capable. Far fewer student participants felt able to use AI for more advanced academic or career-related purposes such as job applications (9.7%) or data visualisation (14.2%). Approximately one-third of learners reported that they had never used AI for leisure or creative writing.

Table 3. *Students' self-reported capability using AI for selected purposes (N = 226)*

Purpose	Completely capable	Somewhat capable	Not very capable / not capable	Not used / unknown
Brainstorming	38.1%	33.6%	14.1%	14.2%
Short homework	36.3%	34.5%	11.5%	17.7%
Information search	32.7%	40.7%	17.7%	8.8%
Translation	31.9%	33.6%	15.9%	18.6%
Longer assignments	23.0%	34.5%	20.4%	22.1%
Job search (CV, cover letters)	9.7%	14.2%	25.6%	50.4%
Data visualisation	14.2%	21.2%	27.4%	37.2%

The instructor dataset of 256 teachers provides a complementary picture. As summarised in Table 4, most instructors made extensive use of learning management systems (71.1% in nearly all classes) and using presentation software (65.6%). The use of AI-based tools was substantially lower. Only 10.9% reported that they mentioned AI technologies in teaching, and fewer than 6% used them in a way that the use of an AI tool was demonstrated. Over half reported that they did not expect students to use AI for assignments or classroom tasks.

Table 4. *Instructors' reported use of technology and AI in classes (N = 256)*

Activity	Almost all classes	More than half	About half	Less than half	None
Use of LMS (Moodle, Teams)	71.1%	11.7%	7.8%	5.5%	3.9%
Passive technology use (slides, handouts)	65.6%	17.2%	10.2%	7.0%	0%
Expect students to use tech for assignments	43.8%	25.0%	10.2%	12.5%	8.6%
Talk about AI (mentioning only)	10.9%	14.1%	18.8%	39.1%	17.2%

Activity	Almost all classes	More than half	About half	Less than half	None
Teach about AI (demonstrating)	5.5%	12.5%	14.1%	28.9%	39.1%
Expect AI use in assignments	4.7%	6.3%	14.1%	21.9%	53.1%

Dimensions of AI literacy

The student and instructor datasets provide rich insights into how students and instructors perceive certain aspects of their artificial intelligence literacy. To allow for statistically grounded implications, the comparable literacy dimensions from both studies are summarised in Table 3, which also presents the mean values of student and instructor responses as well as the results of independent samples t-tests run on the scales.

Table 5. *Comparison of selected AI literacy dimensions in student and instructor datasets*

Construct	Students M (SD)	Instructors M (SD)	Difference	Original scales (students – instructors)	Cohen's d
Ethical awareness	4.03 (0.93)	2.44 (0.99)	t = 18.143 p < .001	Ethics – Ethics	1.66
Willingness	3.62 (1.14)	4.03 (1.15)	t = −3.879 p < .001	Willingness – Willingness	0.35
Intention	2.94 (1.18)	3.91 (1.01)	t = −9.643 p < .001	Study-use attitude – Behavioural intention	0.88
Technological self-efficacy	3.23 (0.88)	3.71 (0.92)	t = −5.578 p < .001	Self-efficacy – Technological knowledge	0.54
External support	2.19 (0.88)	2.79 (0.97)	t = −7.039 p < .001	Influence of teachers – Facilitating conditions	0.64
Social aspects of AI use	2.99 (1.10)	2.71 (0.94)	t = 3.001 p = .003	Collaboration – Social influence	0.27

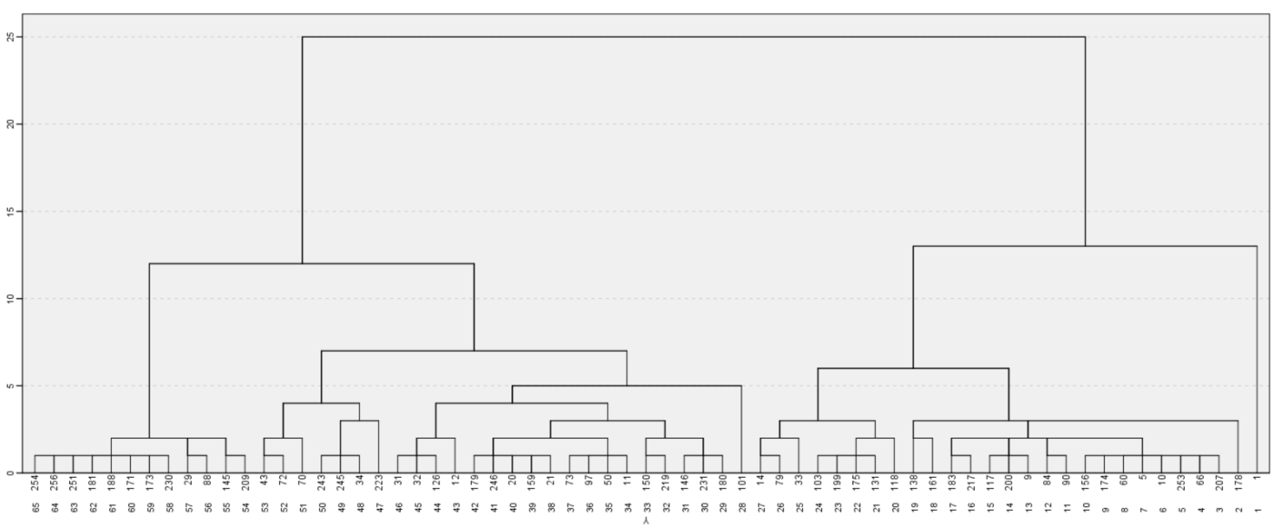
The results in Table 5 summarise statistically significant differences between the two groups across six comparable dimensions. The largest gap appears in Ethical awareness, where students reported considerably higher mean scores than instructors ($t(480) = 18.143$, $p < .001$). Another contrast concerns Willingness, where instructors expressed greater readiness to explore AI ($t(480) = -3.879$, $p < .001$). A similar pattern appears in Intention to use AI, with instructors reporting stronger behavioural intention ($t(480) = -9.643$, $p < .001$) than students. Perceptions of technological self-efficacy show moderate to high confidence for both groups, though instructors' reported higher scores ($t(480) = -5.578$, $p < .001$) than learners. Alongside self-efficacy, the difference in External support is also significant ($t(480) = -7.039$, $p < .001$). Finally, the Social aspects of AI use dimension shows a modest but significant difference ($t(480) = 3.001$, $p = .003$), with students reporting slightly higher scores.

Perceived institutional and ethical readiness

To address the question of institutional and ethical readiness for responsible artificial intelligence integration, the two datasets were examined not only for statistically significant scale differences but also for internal relationships and teacher profile patterns.

Instructor clusters were identified in the dataset through a k-means clustering, with the cluster-forming scales being the technology-related AI-TPACK scales: AI Technological Knowledge (AI-TK), AI Technological Pedagogical Knowledge (AI-TPK), AI Technological Content Knowledge (AI-TCK), and AI Technological Pedagogical Content Knowledge (AI-TPACK). Figure 1 shows that initially three clusters were found by means of hierarchical clustering on a random 20% subsample of the dataset. Then the latent clusters were then confirmed by ANOVAs and Post-hoc Duncan tests (Csizér & Jamieson, 2012), and it turned out that the instructors in the sample could be assigned to the three clusters that differed significantly from each other in all AI-TPACK scales.

Figure 1. *Initial hierarchical clustering on a random 20% subsample*



The clustering yielded three significantly distinct instructor groups: (1) Beginner users (n = 62; 24%), who rated lowest across all AI-TPACK dimensions; (2) Intermediate users (n = 144; 56%), representing the largest group, with moderate levels of AI integration; and (3) Advanced users (n = 50; 20%), who reported of having the highest skills in all AI-TPACK components. The cluster differences were also tested across all seventeen scales of the questionnaire, including the seven AI literacy scales: Ethics, Willingness, Facilitating conditions, Social influence, Behavioural intention, and Voluntariness. Table 6 summarises the key descriptive values of each cluster.

Table 6. *Instructor clusters (k = 3) with ANOVA results for selected AI literacy constructs (N = 256)*

Construct	1. Beginner users (n = 62) M	2. Intermediate users (n = 144) M	3. Advanced users (n = 50) M	*F*	*p*	Post-hoc order (Duncan)
Ethics	1.56	2.40	3.67	124.073	< .001	3 > 2 > 1
Willingness	3.04	4.22	4.69	44.059	< .001	3 > 2 > 1
Facilitating conditions	2.31	2.76	3.47	23.888	< .001	3 > 2 > 1
Behavioural intention	2.95	4.08	4.59	60.435	< .001	3 > 2 > 1
Voluntariness	3.10	3.74	4.54	37.373	< .001	3 > 2 > 1
Social influence	2.33	2.77	3.00	8.189	< .001	3 = 2 > 1
Expectancy pressure	2.26	2.56	2.81	4.729	= .010	3 = 2 > 1

The clusters differed significantly on all AI-TPACK scales. Beginner users reported lower mean scores across constructs, while Advanced users reported higher mean scores. Intermediate users reported of moderate skills levels, while Advanced users perceived of having consistently high means, including in Ethics (M = 3.67), Willingness (M = 4.69), and Behavioural intention (M = 4.59). To provide an even more detailed overview of institutional and ethical readiness, Pearson correlation analyses were conducted in both instructor and student datasets. This step aimed to identify how ethical awareness, institutional conditions, willingness, and behavioural intention interact within each group. Table 5 features the correlations between selected individual scales from the instructor and the student questionnaires.

Table 7. *Pearson correlation results among selected AI literacy variables in instructor (N = 256) and student (N = 226) datasets*

Dataset	Scales correlated	*r*	*p*
Instructors	Willingness – Behavioural intention	.854	< .001
	Ethics – Facilitating conditions	.322	< .001
	Ethics – Behavioural intention	.353	< .001
	Ethics – Willingness	.300	< .001
	Facilitating conditions – Behavioural intention	.269	< .001
	Social influence – Behavioural intention	.336	< .001

Dataset	Scales correlated	*r*	*p*
	Voluntariness – Behavioural intention	.607	< .001
	Voluntariness – Willingness	.483	< .001
Students	Self-efficacy – Willingness	.730	< .001
	Self-efficacy – Collaboration	.653	< .001
	Ethics – Taking responsibility	–.137	< .050

The correlations in Table 7 detail the mechanisms of AI readiness. A strong positive correlation was observed between Willingness and Behavioural intention in the instructor dataset ($r = .854$, $p < .001$). Moderate positive correlations were found between Ethics and Facilitating conditions ($r = .322$, $p < .001$), Ethics and Behavioural intention ($r = .353$, $p < .001$), and Voluntariness and Behavioural intention ($r = .607$, $p < .001$). In the student dataset, strong positive correlations were observed between Self-efficacy and Willingness ($r = .730$, $p < .001$) and between Self-efficacy and Collaboration ($r = .653$, $p < .001$). A weak negative correlation was identified between Ethics and Taking responsibility ($r = -.137$, $p < .05$).

Discussion

Student and instructor engagement with AI technologies

Participating students reported being capable of using AI primarily as a surface-level aid for generating ideas or improving wording. The data align with earlier findings that learners initially approach digital tools through modality-oriented motivation, valuing novelty and convenience more than depth of learning (Tóth-Mózer & Kárpáti, 2016), and this short-term motivation can fade once AI becomes a routine element of coursework (Hmoud et al., 2024). The results also point to a gap between technical access and pedagogical guidance: while most students felt able to use AI independently, few had received encouragement or explicit instruction from teachers, and their choices were largely self-directed, suggesting that AI literacy developed informally rather than through curriculum-based learning.

The results also confirm that while educators are generally familiar with digital tools, active AI integration into teaching remains limited for the time being, mirroring earlier observations that teacher motivation and institutional context influence adoption more than individual technical ability (Redecker, 2017a, 2017b; Wozney et al., 2006). Many instructors may be waiting for clearer policy direction before deciding to include AI actively in coursework. When viewed together, the two datasets reveal a consistent introductory phase of AI adoption: students engage with AI frequently but for basic functions, while instructors rely on conventional technologies and rarely turn to active AI use or thematise AI in their classrooms. It seems that students expect guidance that teachers have not yet developed, and teachers seek institutional standards that are still evolving, leaving responsibility for ethical and effective AI use unclear and feeding the current responsibility gap traceable in some formulating macro policy debates (Council of Europe, 2022; Madiega, 2024).

Dimensions of AI literacy

According to the data collected, it might be the case that students tend to frame ethics as a matter of fairness and consider it applicable in given coursework at hand rather than as an institutional or philosophical issue questioning oversight and integrity (Bu, 2022; Nguyen et al., 2023; OECD, 2024). Instructors in the dataset rated their ethical competence as lower than students, reflecting the observation that teachers often struggle to translate abstract notions of accountability and transparency into day-to-day pedagogy. The difference may therefore boil down to two levels of reflection: students view ethics through the lens of their immediate study practices, whereas instructors consider the absence of institutional clarity regarding AI oversight and assessment.

In the present context, instructors' higher willingness may stem from exposure to AI tools in administrative or research work, which fosters interest even without pedagogical integration. Students' slightly lower scores suggest that enthusiasm is tempered by limited awareness of acceptable academic uses, a pattern also mentioned in the literature in relation to generative AI and plagiarism anxiety (Fajt & Schiller, 2025a, 2025b; Fekete, 2025). This supports the interpretation that educators recognise the inevitability of AI in teaching yet lack the resources to include it in their courses, and institutional hesitation constrains otherwise positive professional attitudes, while students' weaker intention reflects that self-directed engagement occurs without formal encouragement (Folmeg et al., 2024).

Perceptions of technological self-efficacy may show that the digital gap between teachers and learners is narrowing, yet the confidence of each group concerns different domains: instructors prefer conventional platforms, while students experiment with new AI interfaces without deeper conceptual understanding, and as Ng et al. (2023) argued, genuine AI literacy demands critical evaluation rather than operational comfort. Collaboration among learners may reflect contextually limited and task-oriented informal peer sharing rather than organised discussion, while professional exchange about AI may remain sporadic and depend on personal initiative (Redecker, 2017b; Sekhar Veluru, 2024). Instructors perceive some institutional assistance through training or informal peer exchange, but students report very limited encouragement from teachers.

The systematic comparison of the two datasets should be interpreted with care as they outline a pattern of asymmetry rather than opposition. Instructors appear inclined to adopt AI but report low ethical confidence, while students perceive higher ethical awareness yet operate without systemic guidance and their interpretation of ethical AI use mainly centres around using AI for given coursework. Differences in AI literacy seem to arise from contextual and structural conditions rather than individual attitudes. Both groups show willingness and emerging competence, but without coherent policy and pedagogical coordination, literacy development remains fragmented.

Perceived institutional and ethical readiness

The cluster results outline a hierarchical pattern of institutional and ethical maturity: ethical awareness, intention, and support rise with AI-related proficiency, signalling that instructors' moral and practical readiness to use AI develops concurrently, and ethics displayed the strongest discrimination among clusters, suggesting that moral awareness differentiates between novice and advanced readiness stages. These findings support Celik's (2023) model, which links AI-TPACK growth to contextual factors. The strong correlation between Voluntariness and

Behavioural intention ($r = .607$) and the moderate correlation between Voluntariness and Willingness ($r = .483$) suggest that teachers who experience freedom in their professional judgement are more inclined to explore AI tools, and Redecker (2017b) found that empowerment and agency are essential for sustained digital competence.

Correlation patterns also suggest different readiness dynamics for instructors and students. Among instructors, the strong link between Willingness and Behavioural intention ($r = .854$, $p < .001$) shows that motivation aligns with plans to apply AI in teaching, while the more moderate correlation between Facilitating conditions and Behavioural intention ($r = .269$, $p < .001$) suggests that intention relates to support conditions. The positive relationships between Ethics, Facilitating conditions, and Behavioural intention suggest that moral awareness develops alongside professional and organisational readiness. In the student dataset, the strong correlations between Self-efficacy and Willingness ($r = .730$) and between Self-efficacy and Collaboration ($r = .653$) suggest that readiness arises from confidence and peer interaction, and learning communities rather than formal instruction may drive engagement with AI. The weak negative correlation between Ethics and Taking responsibility ($r = -.137$, $p < .05$) could mean that moral reflection and procedural accountability have not yet converged, which parallels Redecker's (2017a) observation that ethical reasoning often precedes the formation of responsible behavioural norms in educational technology use.

Based on the two studies conducted, evidence suggests that instructors rely on institutional frameworks for ethical and professional readiness, while students' preparedness is developed through peer learning and confidence. These complementary dynamics align with the recommendation of the Council of Europe (2022), according to which ethical AI use in education should integrate organisational culture with personal competence. Additionally, rather than framing generative AI solely as a threat to integrity, ongoing professional discourse suggests that it may serve as a catalyst for rethinking assessment structures that have long privileged narrow forms of performance (Dollinger & Nieminen, 2026).

Conclusion

This study compared students' and instructors' experiences of using artificial intelligence ethically in higher education to identify how awareness and institutional readiness shape responsible use. The findings revealed clear yet complementary patterns. Students reported stronger ethical awareness but limited external guidance. This suggests that students' moral reflection develops in self-directed ways. On the other hand, instructors showed higher willingness and behavioural intention to use AI but reported lower ethical confidence, a result that aligns with earlier findings that teachers often lack institutional clarity regarding ethical guidance in technology adoption (Celik, 2023; Redecker, 2017b). The cluster analysis of instructors based on the AI-TPACK scales revealed that ethical awareness and support seem to increase as professional readiness advances. Correlation analyses confirmed that moral awareness strengthens when institutional support and autonomy are present for teachers, while students' confidence and collaboration foster engagement in the absence of such frameworks.

The results provide empirical evidence that individual initiative and institutional support remains one of the main challenges for ethical AI integration. Students' ethical awareness could most effectively be shaped by instructors who are supported by their institutions with clear guidelines and contextually relevant development opportunities. Such alignment may also require reimagining assessment practices so that ethical AI use is evaluated through process, reflection, and judgment rather than detection alone (Dollinger & Nieminen, 2026).

It has to be acknowledged that the studies' non-representative sample prevents putting forward generalisable results, and the use of self-report measures may not capture the full complexity of practice, nevertheless, combining descriptive and correlational designs can provide empirically sound foundations for institutional recommendations. Future research could include longitudinal and mixed-method designs to map closely how ethical literacy develops through instruction, mentorship, and institutional reform. Collaborative projects and comparative international studies could be launched with the aim to find out how the regulatory environments of given contexts influence the 'tightrope walk' between autonomy, criticality, human oversight, and questions of professional integrity in ethical AI use.

Acknowledgements

The author discloses that they have no actual or perceived conflicts of interest. The author discloses that they have not received any funding for this manuscript beyond resourcing for academic time at their respective university. The author has used ChatGPT (5.2) to check manuscript adherence and to support stylistic editing and linguistic clarity. AI was not used in the ideation, design, or write-up of this research as per Crawford et al. (2026). The author confirms that they have met the ethical standards expected as per Purvis & Crawford (2024). The author lists that all CRediT contributions were made by Fekete.

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