

Artificial Intelligence in Teaching and Learning: Opportunities, Tensions, and Transformation in Higher Education

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Abstract: The growth of Artificial Intelligence (AI) is reshaping higher education globally, with increasing relevance for institutions such as the University of Fort Hare (UFH), which are navigating digital transformation within resource constrained contexts. At UFH, the emergence of AI tools presents both exciting opportunities to enhance teaching and learning, and complex challenges related to ethics, academic integrity, and digital readiness. While AI has the potential to support more flexible and personalized learning, there remains uncertainty about how it is being used and experienced by both students and lecturers. This study explores the use and implications of AI in teaching and learning at UFH, with a specific focus on students. It aims to examine the extent of AI adoption among students, how they engage with these tools in their everyday academic practices, and the implications of this engagement for the future of teaching, learning, and assessment within the institution. A mixed methods case study design was employed. Quantitative data was collected through survey questionnaires administered to students to identify patterns of AI use, perceived benefits, and levels of digital competence. This was complemented by qualitative data from semi-structured interviews and focus group discussions, which provided deeper insights into participants' experiences, concerns, and expectations. The study is informed by the Community of Inquiry (Col) framework. The findings reveal that while students are increasingly turning to AI tools for academic support such as idea generation, summarization, and content clarification. Participants expressed optimism about AI's potential to enhance learning and concern about issues such as over reliance, plagiarism, and the erosion of critical thinking. The study also highlights gaps in institutional policy and development related to AI. The study concludes that AI can play a meaningful role in advancing learning at UFH, but its successful integration depends on fostering a shared understanding of ethical use, strengthening digital literacy, and providing ongoing support for both staff and students.

Keywords: Artificial Intelligence, Higher Education, Digital Literacy, Teaching and Learning, Academic Integrity

1. Introduction and Background

Artificial Intelligence (AI) has become an increasingly important part of teaching and learning in higher education. The growing availability of generative AI tools has changed the ways in which students access information, engage with learning content, develop ideas, and complete academic tasks. Students can now use AI tools to clarify difficult concepts, generate ideas, summarise information and obtain additional academic support outside the classroom. Valtonen et al (2021) argue that these developments present opportunities for universities to enhance learning and provide students with more flexible forms of academic support. At the same time, the growing use of AI raises important questions about how students use these technologies and what that use means for teaching, learning, and assessment. According to Yu (2024), the increasing accessibility of AI is particularly significant because students can independently incorporate these tools into their everyday academic practices. Unlike institutional learning technologies, which are generally introduced and supported through formal university structures, many AI tools are accessed directly by students through personal devices. This makes it important for higher education institutions to understand students' experiences with AI rather than to make assumptions about how these technologies are used. Kim et al. (2022) state that the focus should not only be on whether students use AI, but also on how they use it, what they use it for, and whether such use contributes to meaningful learning. These developments need to be considered within the broader South African higher education context, where students have different levels of digital access, digital literacy, and technological experience. Previous research at the University of Fort Hare (UFH) has highlighted the challenges that students experience when engaging with digital learning environments, including differences in digital literacy, access to reliable connectivity, and technological proficiency. These challenges remain relevant in the context of AI. Access to an AI tool does not necessarily mean that students have the skills to evaluate the information it produces, identify inaccuracies, or use the technology appropriately within academic contexts (Huang, 2023).

At UFH, AI therefore presents both an opportunity and a challenge for teaching and learning. According to Mohebbi (2025), AI tools have the potential to provide students with additional academic support and promote independent learning. However, concerns relating to over-reliance, plagiarism, academic integrity and the possible weakening of critical thinking need to be considered. The important issue is to understand how AI can

be positioned as a learning support rather than as a replacement for students' engagement with academic content and the development of their own knowledge and skills. Against this background, this study explores the use and implications of AI in teaching and learning at UFH, with a particular focus on students. It examines the extent of AI adoption among students, how they use AI tools in their everyday academic practices, the benefits and challenges they experience, and the implications of AI use for teaching, learning, and assessment. The study seeks to provide practical insights that can support the development of responsible AI practices, strengthen digital literacy, and inform academic development and institutional approaches to AI integration in higher education.

2. Literature Review

2.1 Artificial Intelligence and the Transformation of Pedagogical Practice

The emergence of AI has prompted renewed debate about the nature and purpose of teaching and learning in higher education. Bearman et al. (2023) argue that AI should not be viewed merely as another educational technology but rather as a development with significant implications for pedagogical practice and for the relationship between students, knowledge, and technology. This perspective is particularly relevant in the context of AI, which can produce explanations, arguments, and other forms of academic content. Jose et al. (2025) similarly highlight the capacity of AI to influence how students access, engage with, and construct knowledge. However, while AI's capabilities may expand students' access to academic support and information, they also challenge conventional understandings of learning, particularly when students rely on AI to generate content rather than engaging directly in inquiry and knowledge construction. The debate, therefore, is not simply about whether AI should be incorporated into higher education, but about how its integration can support meaningful learning without weakening the intellectual processes that underpin higher education. In this regard, the increasing use of AI requires lecturers to reconsider pedagogical approaches that emphasize inquiry, interpretation, critical reflection, and the application of knowledge, rather than the mere production of academic outputs.

This debate is further complicated by questions concerning human agency in the learning process. Cukurova (2025) argues that the interaction between students and AI systems requires greater attention to the distribution of agency between humans and technology. From this perspective, AI does not simply provide students with an additional source of information; it can increasingly participate in activities traditionally associated with the student, such as generating ideas, explaining concepts, and producing academic responses. This creates a tension between the potential of AI to enhance learning and the possibility that excessive reliance on AI may reduce students' engagement with independent thinking and academic judgment. While Bearman et al. (2023) emphasize the broader pedagogical transformation associated with AI, and Jose et al. (2025) draw attention to its capacity to reshape knowledge access and construction, Cukurova (2025) brings the debate towards the question of who retains responsibility for learning and knowledge construction when AI becomes an active participant in the learning process. Taken together, these perspectives suggest that effective AI integration cannot be based solely on providing students with access to AI tools. Instead, pedagogical designs should deliberately position students as active and critical participants who interrogate, evaluate, verify, and extend AI-generated outputs. AI should consequently function as a resource that supports human learning and judgment rather than a substitute for them. The literature therefore suggests a shift towards pedagogies that balance the affordances of AI with the preservation of learner agency, critical thinking, and meaningful knowledge construction.

2.2 AI-Mediated Knowledge Construction

The discussion of student agency and AI-supported pedagogy provides a foundation for understanding AI-mediated knowledge construction. Boretti (2026) identifies the reliability and nature of AI-generated knowledge as important concerns, noting that AI can produce responses that appear authoritative while containing factual inaccuracies, incomplete explanations or contextual limitations. This raises questions about how students evaluate and validate knowledge obtained through AI. However, rather than viewing these limitations solely as risks, Rana et al. (2025) argue that AI can create opportunities for deeper learning when students are required to verify, critique, and improve AI-generated outputs. Their position suggests that the challenge of unreliable AI-generated information can itself become a pedagogical opportunity for developing students' critical thinking and information-evaluation skills.

These perspectives therefore suggest that AI-mediated knowledge construction should involve active engagement rather than passive acceptance of AI-generated information. While Boretti (2026) emphasises the potential weaknesses of AI-generated knowledge, Rana et al. (2025) demonstrate how these weaknesses can encourage students to compare AI outputs with disciplinary knowledge, question assumptions and develop their own interpretations. This also reinforces the importance of human agency discussed in the previous section, as students remain responsible for evaluating information and making academic judgments. Consequently, the lecturer's role increasingly involves designing learning experiences that encourage students to interrogate, verify and contextualise AI-generated content. The educational value of AI, therefore, depends not simply on its ability to generate information but on the quality of the critical intellectual engagement surrounding its use.

2.3 Theoretical Framework

The Community of Inquiry (Col) framework developed by Garrison, Anderson and Archer (2000) provides a useful theoretical perspective for examining learning in technology-mediated environments. The framework conceptualizes meaningful learning through the interaction of cognitive presence, social presence, and teaching presence. Its value for the study lies in its ability to shift attention from the technology itself to the quality of the learning experience created around it.

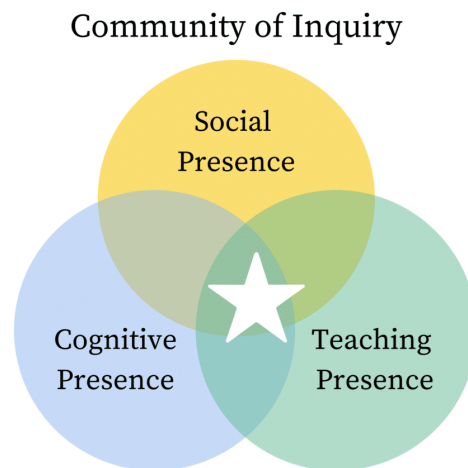


Figure 1: Community of Inquiry Framework

Cognitive presence is concerned with students' engagement in processes of inquiry, reflection and the construction of meaning. This dimension is particularly relevant to AI-supported learning because students may use AI as part of processes through which they explore and develop ideas. Social presence draws attention to communication and participation within a learning community, reminding us that technology-mediated learning remains relational. Teaching presence focuses on the design, facilitation and direction of learning and is therefore important for understanding how lectures establish purposeful boundaries and learning activities around AI use. The Col framework consequently provides an appropriate lens for examining AI not as an isolated technological intervention but as part of a broader educational environment. It enables attention to be given to the interaction between students, lectures, knowledge and technology.

3. Methodology

3.1 Research Design

A parallel mixed-methods design was employed in the study to examine undergraduate students' experiences, perceptions, and challenges related to AI use. In this approach, quantitative data was collected through structured surveys, enabling statistical analysis of students' patterns of AI use, perceived usefulness, engagement, and challenges encountered when using AI tools for learning. At the same time, qualitative data were collected through open-ended survey questions, providing deeper insight into students' experiences, motivations, concerns, and contextual factors influencing their use of AI. The quantitative and qualitative data were collected concurrently but analysed separately before being integrated during interpretation to provide a more comprehensive understanding of students' engagement with AI-mediated learning. This concurrent design

ensured that both measurable trends and students' individual perspectives were considered in understanding the educational implications of generative AI. The combination of closed- and open-ended survey items further strengthened the study by providing both breadth and depth of evidence, allowing the findings to capture not only how students use AI but also why they engage with these technologies and under what circumstances. According to Clark (2019), such a mixed-methods approach is particularly appropriate for educational research involving emerging technologies, as it enables researchers to integrate numerical evidence with contextual accounts of students' experiences and perceptions.

3.2 Sampling

In this study, an academic bootcamp was conducted for first-year students from the Faculties of Science and Agriculture, and of Law, at the University of Fort Hare. The bootcamp was designed to support students' transition into university learning by addressing key academic and digital competencies, including a dedicated session on the effective and responsible use of AI in learning. Attendance at the bootcamp was mandatory for first-year students from the participating faculties. Following the bootcamp, a questionnaire was distributed to students through Google Forms to collect their perceptions, experiences, and engagement with AI in their academic learning. Of the approximately 600 students who attended the bootcamp, 347 completed and submitted the questionnaire, resulting in a response rate of approximately 57.8%. The responses provided the empirical data for examining students' perceptions and experiences of AI and its role in supporting teaching and learning in higher education.

3.3 Data Collection

In this study, data was collected using both quantitative and qualitative approaches to obtain a comprehensive understanding of students' perceptions and experiences of AI. Quantitative data were gathered through closed-ended questions and rating scales in the questionnaire administered via Google Forms. These responses generated numerical data that enabled the identification of patterns and trends relating to students' use of AI, perceived usefulness, engagement, and challenges associated with its use for academic purposes. In addition, qualitative data was collected through open-ended questions that provided students with opportunities to describe their experiences, views, and reflections on the use of AI in learning. These narrative responses provided contextual insights that extended beyond the numerical findings and helped capture students' motivations, concerns, benefits, and challenges associated with AI use. The integration of quantitative and qualitative responses, therefore, provided both breadth and depth in understanding how students engage with generative AI within the university learning environment.

3.4 Data Analysis

The data were analysed using both quantitative and qualitative approaches and interpreted through the Community of Inquiry (CoI) framework. Quantitative responses were analysed using descriptive statistics to identify patterns in students' use of AI, including the purposes for which AI tools were used and students' perceptions of their academic value. Qualitative responses were analysed thematically to identify recurring experiences, concerns and perspectives relating to the use of AI in learning. The interpretation of the findings was organised around the three CoI presences: cognitive, social and teaching presence. Cognitive presence was used to examine how students used AI to support understanding, knowledge construction, and critical engagement with academic content. Social presence is considered the extent to which AI influences students' interaction and engagement within the learning environment, while teaching presence focuses on the role of lecturer guidance and institutional support in shaping responsible and meaningful AI use. Using these three dimensions enabled the study to identify both the educational value and emerging challenges of AI use and to consider areas where further student support, academic development and institutional guidance may be required.

4. Results and Discussion

The findings were interpreted through the Community of Inquiry (CoI) framework, which conceptualises meaningful learning through the interaction of cognitive presence, teaching presence and social presence. In the context of this study, the framework was applied to understand how first-year students engage intellectually with AI, the extent to which they require structured academic guidance in using AI, and how AI may support interaction and participation within the broader learning environment.

4.1 Students' Exposure to and Use of Generative AI

The findings demonstrate that AI was already well established within students' academic practices prior to the AI presentation. Of the 347 respondents, 300 (86.5%) reported having used AI tools such as ChatGPT, Gemini, and Copilot for their academic studies, while only 47 (13.5%) reported not having done so. This suggests that first-year students are entering higher education with considerable prior exposure to AI. However, exposure to AI should not necessarily be taken as evidence that students possess the academic and digital literacy required to use these technologies appropriately.

Students also differed in the frequency with which they used AI. "Sometimes" was the most frequently selected response, appearing in 61.1% of responses, followed by "occasionally" (21.0%), "often" (12.7%) and "always" (5.5%). "Never" was selected by only 2.9%. Because a small number of students selected more than one frequency category, these percentages should be treated as multiple-response frequencies rather than mutually exclusive categories. Nevertheless, the overall pattern reinforces the finding that AI use was already part of the academic practices of most participating students.

4.2 Cognitive Presence: AI as a Tool for Knowledge Construction

The strongest evidence in the dataset relates to cognitive presence, which concerns students' construction and confirmation of meaning through reflection, exploration, and application of knowledge. Students predominantly reported using AI to support learning activities that involve understanding and processing academic information.

Table 1:

Purpose for Using AI	Number Selecting	Percentage of Respondents
Understanding concepts	256	73.8%
Summarising information	142	40.9%
Brainstorming ideas	123	35.4%
Editing grammar and language	74	21.3%
Writing assignments	36	10.4%

The finding that 73.8% of respondents use AI to understand concepts is particularly significant from a Col perspective. It suggests that students primarily perceive AI as a cognitive support mechanism rather than simply a tool for producing assignments. Similarly, the use of AI for summarising information (40.9%) and brainstorming (35.4%) indicates that students are incorporating AI into processes of exploring, organising and making sense of academic knowledge.

These findings support the current study's emphasis on AI-mediated knowledge construction. AI appears to provide students with an additional space in which they can interrogate concepts, generate ideas and simplify complex information. However, cognitive presence requires more than obtaining information from AI. Meaningful learning depends on students being able to critically evaluate, verify, and integrate AI-generated information into their existing knowledge. The relatively smaller proportion using AI for writing assignments (10.4%) is also noteworthy, as it challenges an assumption that students primarily engage with AI to produce assessed work. Instead, the data suggest that its dominant function among these students is related to understanding and supporting learning.

4.3 Teaching Presence: The Need for Guidance and Responsible AI Use

The findings also reveal a strong relationship between students' experiences and teaching presence. Within the Col framework, teaching presence involves the design, facilitation and direction of learning experiences. In an AI-mediated learning environment, this extends to lecturers and institutions providing students with guidance on how, when and why AI should be used. Students demonstrated varying levels of prior understanding of academic integrity and responsible AI use. "Fair" was selected in 45.2% of responses and "good" in 38.9%, while "excellent" was selected in only 13.0%. Poor and very poor understanding were selected in 6.6% and 1.4% respectively. Again, because some students selected multiple categories, these figures represent multiple-response frequencies.

More importantly, students' open-ended responses repeatedly expressed a desire to learn how to use AI correctly, effectively and ethically. Students expressed a desire to understand responsible AI use, plagiarism,

academic integrity, appropriate use of AI in research, the advantages and disadvantages of AI, and how to use AI without becoming overly dependent on it. Responses included concerns about using AI “responsibly,” “ethically,” “correctly,” and in ways that would avoid plagiarism or disciplinary consequences. This finding highlights an important tension in students’ engagement with AI, students are already using the technology extensively, but many remain uncertain about the academic rules and practices that should govern its use. Teaching presence therefore becomes increasingly important in AI-mediated learning. Rather than merely restricting AI use, lecturers may need to explicitly facilitate students’ development of AI literacy by demonstrating appropriate prompting, verification of AI-generated information, acknowledgement of AI use, academic integrity and critical evaluation of AI outputs. The bootcamp can therefore be understood as an institutional form of teaching presence intended to bridge the gap between students’ existing AI practices and responsible academic engagement.

4.4 Social Presence

The findings provide some indication of how students’ engagement with AI relates to their broader learning environment. Students’ responses suggest that AI was predominantly used as an individual academic support tool, particularly for understanding concepts, summarising information, brainstorming ideas and improving academic work, with limited evidence of its use for peer interaction or collaborative learning. However, students’ expressed interest in learning how to use AI responsibly, ethically and appropriately within the university context reflects an awareness that AI use takes place within a wider academic community governed by shared expectations and practices. The academic bootcamp also provided a collective learning environment in which students were introduced to common understandings of responsible AI use. From a Community of Inquiry perspective, these findings suggest that social presence was less visible than cognitive and teaching presence, particularly in relation to peer interaction and collaborative knowledge construction. This highlights an opportunity for lecturers to incorporate collaborative AI-supported activities, such as students jointly evaluating AI-generated responses, discussing inaccuracies and biases, and comparing AI outputs with academic sources, thereby strengthening dialogue, peer learning and social presence within AI-mediated learning environments.

4.5 Integration of the Community of Inquiry Dimensions

Viewed collectively, the findings suggest that cognitive presence is currently the most visible dimension of students’ engagement with AI, particularly through concept clarification, summarisation and brainstorming. Teaching presence emerges as an important enabling condition because students require structured guidance to transform frequent AI use into academically responsible and meaningful learning. Social presence is comparatively less evident and represents an area that could be deliberately strengthened through collaborative AI-supported learning activities. The findings therefore indicate that access to AI alone does not necessarily produce meaningful AI-mediated learning. Students may already be comfortable using AI, but effective educational integration requires lecturers and institutions to create learning environments in which students are encouraged to question, verify, discuss and critically evaluate AI-generated knowledge. From a Col perspective, the educational value of AI is therefore likely to emerge not from the technology itself, but from the interaction between students’ cognitive engagement, appropriate teaching guidance and opportunities for social and collaborative learning.

5. Conclusion

The study examined first-year students’ perceptions and experiences of AI in higher education through the lens of the Community of Inquiry framework. The findings demonstrate that AI is already embedded in students’ learning practices, with 86.5% of respondents having used AI tools for academic purposes prior to the bootcamp. Cognitive presence emerged most strongly, as students primarily used AI to understand concepts, summarise information and brainstorm ideas, suggesting that AI is increasingly functioning as a learning support tool for knowledge construction. Teaching presence was equally important, as students expressed a need for guidance on responsible, ethical and academically appropriate AI use, highlighting a distinction between being able to use AI and possessing the AI literacy necessary to use it critically. Social presence was less visible, with students predominantly engaging with AI individually rather than through collaborative learning activities. Overall, the findings indicate that meaningful AI-mediated learning requires an appropriate interaction between cognitive, teaching and social presence, consistent with the Col understanding that these three dimensions are interdependent in creating meaningful educational experiences.

6. Recommendations

The study recommends that universities move beyond simply providing access to AI and adopt a structured approach to developing AI literacy among students from the beginning of their university studies. Academic orientation and first-year programmes should include practical training on effective prompting, critical evaluation and verification of AI-generated information, ethical AI use, academic integrity, acknowledgement of AI assistance, and the limitations and potential biases of generative AI. Lecturers should also intentionally integrate AI into learning activities that promote critical thinking rather than passive dependence, for example by requiring students to compare AI-generated responses with scholarly sources, identify inaccuracies and justify whether AI-generated information is credible. Furthermore, collaborative AI-supported activities should be introduced to strengthen social presence through peer discussion, group problem-solving and collective evaluation of AI outputs. Institutions should simultaneously provide lecturers with professional development on the pedagogically appropriate integration of AI so that teaching presence remains central to AI-mediated learning. Such an approach would position generative AI as a tool that supports, rather than replaces, human interaction, critical reflection and collaborative knowledge construction in higher education.

Ethics Declaration

The study was conducted in accordance with the ethical principles and institutional requirements applicable to research involving human participants. Ethical clearance was obtained from the Inter-Faculty Human Research Ethics Committee (Reference Number: IFHREC-26/08-0679). Prior to participation, students were informed about the purpose of the study, the research process, and their right to participate voluntarily or withdraw without consequence. Informed consent was obtained from all participants. Appropriate measures were also implemented to protect participants' anonymity, privacy, and confidentiality throughout the research process, while the collected data were handled and stored in accordance with applicable data protection requirements.

AI Declaration

Generative Artificial Intelligence, specifically ChatGPT (OpenAI), was used during the preparation of this paper as a supporting tool for language refinement, improving clarity of expression, and assisting with the organisation and development of ideas. Its use did not replace the authors' academic judgement, interpretation of the findings, or responsibility for the scholarly content of the paper. All arguments, interpretations, and final decisions regarding the study's content and structure remained the responsibility of the authors. The use of AI was undertaken in accordance with relevant institutional and ethical requirements.

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