

AI Teaching Assistant and Student Engagement in Business Subjects: A Community of Inquiry Perspective

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Abstract: *The integration of AI-powered tutoring in higher education presents a transformative opportunity to enhance student engagement and learning outcomes. AI-generated data provides insights into student interaction patterns and learning preferences; however, studies on optimising AI tools for improved educational outcomes remain limited. This study addresses this gap by analysing student engagement with an AI Teaching Assistant in accounting (ACC), economics (ECO), and law (LAW) subjects. Using the Community of Inquiry (CoI) Framework, which highlights cognitive, teaching, and social presence in learning, this study examines how AI tutors support student engagement and self-directed learning. Student interaction logs from the AI Tutoring dashboard in the university's Canvas LMS were analysed through frequency distribution and content analysis. Findings indicate that ACC students primarily use the AI Tutor for practical applications, concept reinforcement, and exam preparation, reflecting the applied nature of accounting. In ECO, engagement focuses on problem-solving, while LAW students predominantly seek conceptual clarification, highlighting the AI Tutor's role in supporting legal education. These results highlighted AI tutors' potential to provide personalised learning, facilitate on-demand explanations, and enhance academic support. By offering empirical evidence on AI engagement patterns across disciplines, this study fills a critical research gap and provides recommendations for improving AI-powered tutoring, ensuring its adaptability to different disciplines and learning needs. Grounded in the CoI framework, these insights contribute to the growing discourse on AI integration in education, promoting effective and engaging digital learning environments.*

Keywords: AI tutoring, student engagement, personalised learning, the Community of Inquiry (CoI) Framework

1. Introduction

Background

The rapid advancement of artificial intelligence (AI) has revolutionised multiple industries, including education, by improving efficiency, personalisation, and accessibility (Ali et al., 2024; Milberg, 2024). In higher education, AI-powered tools are increasingly integrated into teaching and learning, offering students tailored learning experiences that adapt to their individual needs and progress (Wang et al., 2024). These technologies facilitate the automation of administrative tasks, intelligent tutoring, and data-driven insights, allowing educators to focus on more interactive and strategic teaching methods. Business education, encompassing accounting (ACC), economics (ECO), and law (LAW), has particularly benefited from AI

innovations, as these fields require a strong foundation in both theoretical knowledge and practical application. AI-powered simulations, data analytics tools, and case-based learning platforms help students bridge the gap between classroom concepts and real-world scenarios, fostering critical thinking and problem-solving skills (Rashid & Kausik, 2024). As AI continues to evolve, its role in business education is expected to expand further, enhancing student engagement and learning outcomes. AI-powered educational platforms exemplify the transformative impact of artificial intelligence on learning by offering personalised learning paths, interactive problem-solving exercises, and real-time feedback (Zainuddin, 2024). These features allow students to engage more deeply with complex subjects, facilitating active learning rather than passive absorption of information. In accounting, AI-driven simulations enable students to practise financial transactions, reinforcing their understanding of theoretical principles (Xu et al., 2021). Similarly, in economics, AI can model market behaviours, helping students explore cause-and-effect relationships through dynamic simulations. In law, interactive case analysis tools encourage students to develop critical thinking and legal reasoning skills by working through hypothetical legal scenarios (Murphy et al., 2024). By making learning more interactive and tailored to individual needs, AI not only enhances student engagement but also provides educators with data-driven insights, enabling targeted interventions and more effective teaching strategies (Al Shloul et al., 2024; Collins et al., 2021). Despite the growing adoption of AI in business education, research on how students in specific disciplines engage with these technologies remains limited. While studies highlight AI's general benefits, few have examined its application in ACC, ECO, and LAW classrooms. Understanding how students interact with AI tools, their preferred engagement methods, and the challenges they face is crucial for optimising AI-driven learning experiences. Furthermore, analysing AI usage data can provide actionable insights to refine both the technology and its integration into education, ensuring it meets the specific needs of students and educators alike.

Problem Statement

AI Tutoring solutions have the potential to transform business education, but their effectiveness depends on how well they align with the specific learning needs of students in different disciplines. Extant research often focuses on AI's general applications rather than the unique challenges and opportunities in specific disciplines such as accounting (ACC), economics (ECO), and law (LAW) (Wang et al., 2024). The lack of knowledge about disciplinary applications hinders the effective utilisation of AI. Different academic disciplines require distinct approaches to learning, and AI tools must be tailored accordingly to maximise their effectiveness. Xu et al. (2021) emphasised that accounting students benefit most from AI-driven tools that focus on hands-on applications, such as financial transaction simulations and financial statement preparation. These features help bridge the gap between theoretical concepts and their real-world implementation, reinforcing students' practical skills. On the other hand, Murphy et al. (2024) noted that law students require engagement with problem-solving exercises, such as analysing hypothetical legal cases. This method fosters critical thinking, enhances legal reasoning, and prepares students for real-world legal challenges. If AI tools fail to consider these disciplinary differences, their impact on student learning may be limited. Al Shloul et al. (2024) argue that without a clear understanding of specific educational needs, AI-driven platforms risk falling short of their potential, reducing their ability to provide meaningful academic support.

Despite AI's growing adoption in business education, there is a lack of empirical research on how students engage with these tools across different learning activities, such as application, practice, and problem-solving. Collins et al. (2021) noted that AI-driven exercises reinforce foundational economic concepts like supply and demand through repetitive practice.

Meanwhile, Murphy et al. (2024) and Xu et al. (2021) emphasised the importance of real-world applications in law and accounting. AI Shloul et al. (2024) further pointed out that accounting students often struggle to apply theoretical principles to practical scenarios, highlighting the need for AI tools that prioritise hands-on learning. Without a clear understanding of student engagement patterns, educators and developers may struggle to design AI interventions that effectively support diverse learning needs (Zainuddin, 2024). Additionally, while AI usage data offers valuable insights into student behaviour, research on how this data can be leveraged to improve educational outcomes remains limited. Chen et al. (2020) suggested that analysing AI usage patterns can help identify gaps in student understanding, pinpoint underutilised features, and enhance the overall learning experience. For example, Collins et al. (2021) found that when data reveals a significant number of economics students struggling with a specific concept, targeted interventions can be developed to address the issue. Similarly, Naseer et al. (2024) argued that tracking engagement patterns allows developers to refine AI tools to better align with student preferences and learning styles. However, without a systematic approach to analysing and applying this data, its potential remains untapped. This gap highlights the need for a more structured, data-driven approach to optimising AI tools in education, ensuring they deliver maximum value to both students and educators (Zainuddin, 2024).

Research Questions

To address these gaps, this study focuses on the following research questions:

- 1) How are students engaging with the AI Teaching Assistant in business subjects (ACC, ECO, LAW)?
- 2) What is the primary type of engagement with the AI Tutor (application, practice-based, or problem-solving) in ACC, ECO, and LAW?
- 3) What can be improved based on the reflection on the AI usage data?

The first research question seeks to explore the level of student engagement with the AI Tutoring solution across three different disciplines. By examining usage patterns, this study aims to identify how students in ACC, ECO, and LAW interact with the AI Tutor. The second research question investigates the dominant types of engagement within each discipline. Understanding whether students prefer application-based exercises, repetitive practice, or problem-solving scenarios can help tailor AI Tutoring to meet the specific needs of each field. Meanwhile, the third research question focuses on the practical implications of AI usage data. By analysing patterns in the data, this study aims to identify areas for improvement in both the tool and its implementation, with the goal of enhancing student learning outcomes.

Significance of Study

This study makes several important contributions to the literature on AI in education and business education. First, it provides a better understanding of how students in ACC, ECO, and LAW engage with AI Tutoring. By focusing on specific disciplines, this study addresses a gap in the literature and offers insights that are directly applicable to educators and developers. Second, it identifies the dominant types of engagement in each discipline, highlighting the unique needs and preferences of students in ACC, ECO, and LAW. This information can inform the design of the AI tools and set up of the knowledge base, ensuring that they are tailored to the specific requirements of each field. Third, the study demonstrates the value of reflecting on AI usage data to identify areas for improvement. By analysing patterns in the data, it provides actionable recommendations for optimising the design and delivery of AI-powered tutoring. These insights can also be applied to other AI-powered educational tools, making the study relevant to a broader audience. The remainder of this paper is organised as follows. Section 2 provides a literature review, synthesising existing research on AI in education and its

application in business-related disciplines. Section 3 outlines the methodology, detailing the data collection and analysis processes. Section 4 presents the results and findings, addressing each of the research questions. Section 5 discusses the implications of the findings and offers recommendations for educators and developers. Finally, Section 6 concludes the paper by summarising the key findings and suggesting directions for future research.

2. Literature Review

AI has revolutionised learning in business disciplines like accounting (ACC), economics (ECO), and law (LAW). AI Tutors offer new opportunities for practice and problem-solving. This review analyses student engagement with AI Tutors, exploring interaction types and usage patterns, while establishing a theoretical basis for understanding their educational impact.

Theoretical Framework: Community of Inquiry (CoI) Framework

The Community of Inquiry (CoI) Framework (Garrison et al., 2000) provides a valuable theoretical lens for understanding student engagement with AI tutoring in business-related disciplines. The CoI framework emphasises three interconnected elements—cognitive presence, teaching presence, and social presence—which collectively foster meaningful learning experiences in digital environments. Cognitive presence refers to the extent to which students engage in critical thinking, problem-solving, and knowledge construction. Teaching presence involves the design, facilitation, and direction of learning by an instructor or an AI tutor, ensuring structured guidance and instructional support. Social presence, while traditionally linked to human interactions, can also be explored in the context of AI, as adaptive learning systems foster interactive and personalised learning experiences. Applying the CoI framework to AI tutoring enables researchers to examine how students interact with AI-powered educational tools, and how these interactions align with discipline-specific learning needs. For instance, in accounting (ACC), cognitive presence is reflected in students' ability to apply theoretical knowledge to financial transactions and problem-solving exercises. In economics (ECO), AI tutors support conceptual understanding by facilitating real-time problem-solving and active scenario analyses. Meanwhile, in law (LAW), AI-powered tutors assist in developing legal reasoning skills by providing case-based learning and conceptual clarification. Teaching presence is evident in AI-generated guidance, explanations, and feedback, helping students route complex subjects at their own pace. Despite its established relevance, however, the CoI framework was not adopted as the theoretical foundation in prior studies (see, for example, Li, 2025; Vasarhelyi et al., 2023; Wang & Yang, 2024). This omission from earlier research may lead to conceptual ambiguity, compromising clarity in interpreting findings (Grzeda, 2005). To address these limitations, this study applies the CoI framework to strengthen theoretical grounding, refine interpretive clarity, and extend the generalisability of findings

Student Engagement with AI-driven Tools in Business Education

Student engagement is a key driver of academic success (Al Shloul et al., 2024), and AI Tutor has the potential to enhance engagement by offering personalised and interactive learning experiences. In business education, where complex concepts such as financial accounting, economic modelling, and legal reasoning require both theoretical understanding and practical application, AI Tutor can serve as a bridge between abstract theories and real-world scenarios (Sollosy & McInerney, 2022). Wang et al. (2024) highlighted that AI-driven platforms allow students to engage with course material at their own pace, fostering a deeper understanding of challenging topics. This adaptability is particularly beneficial in disciplines such as accounting (ACC), economics (ECO), and law (LAW), where students often struggle to translate concepts

into practical use (Xu et al., 2021). Specifically, AI Tutoring addresses diverse learning needs across these disciplines by providing targeted support. Xu et al. (2021) noted that accounting students frequently face difficulties in applying theoretical principles to tasks such as preparing financial statements or analysing transactions. AI Tutoring can simulate accounting problems in a risk-free environment, allowing students to refine their skills through hands-on practice (Yang et al., 2024). Similarly, Collins et al. (2021) found that in economics, AI-driven models help students explore cause-and-effect relationships by simulating the impact of variables such as interest rates and inflation. In law, case-based learning is essential, and Murphy et al. (2024) observed that AI-powered virtual case studies enable students to develop critical thinking and legal reasoning skills. These applications highlight how the AI Tutor can cater to the unique demands of each field, making it a valuable tool for business education. Student engagement with AI tools is influenced by multiple factors, including technological familiarity, perceived usefulness, and alignment with educational and career objectives (Naseer et al., 2024). Students who are comfortable navigating digital platforms tend to adopt AI-driven learning tools more readily, while those with limited technological proficiency may require additional guidance and training. Moreover, engagement levels often depend on how relevant students perceive the tool to be in achieving their academic and professional aspirations (Afzal & Crawford, 2022). If students see AI as directly enhancing their future career prospects, they are more likely to integrate it into their studies. Zainuddin (2024) noted that accounting students may engage more with AI-driven simulations if they believe these tools will help them prepare for professional certifications. Similarly, law students may be more inclined to use AI tools when they aid in developing essential skills such as legal reasoning and case analysis, reinforcing its value in their education.

Understanding how students in ACC, ECO, and LAW interact with the AI Tutor is crucial for optimising its effectiveness. By identifying factors that influence engagement, educators and developers can design interventions that maximise the tool's impact (Lobo-Quintero et al., 2024). Murphy et al. (2024) and Xu et al. (2021) argued that incorporating discipline-specific features, such as real-world accounting simulations for ACC students or interactive legal case studies for LAW students, can enhance engagement and learning outcomes. Furthermore, providing training and support can address barriers related to technology familiarity, ensuring that all students benefit from AI-driven learning (Naseer et al., 2024). A deeper understanding of student engagement with the AI Tutor can inform the development of more effective and inclusive AI-driven educational tools, paving the way for transformative changes in business education.

Types of Engagement in ACC, ECO, and LAW

The literature identifies three primary types of engagement with AI tools: application, practice, and problem-solving. In business education, where students must develop both theoretical knowledge and practical skills, each type of engagement plays a crucial role in enhancing learning outcomes. These engagement modes are particularly relevant in accounting (ACC), economics (ECO), and law (LAW), where students face unique challenges in mastering complex concepts. Practice-based engagement plays a crucial role in reinforcing foundational knowledge by enabling students to apply theoretical concepts in a structured and interactive manner. AI-driven platforms enhance this process by generating an extensive range of practice problems, allowing students to engage with course material at their own pace. These tools provide immediate feedback and personalised feedback, helping learners identify and address specific areas of weakness. Collins et al. (2021) highlighted that repeated exposure to practice exercises fosters confidence, as students can refine their understanding without the pressure of high-stakes assessments. In disciplines like economics, personalised practice is particularly

valuable, as it aids students in comprehending complex relationships such as market dynamics, inflation, and interest rate fluctuations. By offering adaptive learning experiences, AI tools support students in mastering critical concepts, ensuring they develop the analytical skills necessary for both academic achievement and future professional success (Ellikkal & Rajamohan, 2024).

Problem-solving is a fundamental skill in legal education, requiring students to cultivate critical thinking and legal reasoning abilities to interpret and apply laws effectively (Hews et al., 2023). AI-powered tools enhance this learning process by presenting students with realistic legal scenarios that mirror the complexities of actual cases. Through these exercises, students are challenged to identify relevant statutes, examine case facts, and formulate well-reasoned legal arguments. Murphy et al. (2024) highlighted that engaging with AI-driven problem-solving activities helps students bridge the gap between theoretical knowledge and practical application, ultimately preparing them for the demands of legal practice. Additionally, these simulations encourage students to think strategically, refine their argumentation skills, and develop a systematic approach to legal analysis. By immersing students in real-world legal challenges, AI tools not only improve academic performance but also equip future legal professionals with the skills necessary for success in the field. While these engagement types serve distinct purposes, they often overlap in practice. An accounting student solving financial transactions may engage in both application and problem-solving, applying theoretical knowledge while also analysing complex issues. Likewise, an economics student working with advanced models may combine practice and problem-solving, using repetition to reinforce learning while critically analysing economic relationships (Zainuddin, 2024). Understanding the dominant engagement type in each discipline enables educators and developers to tailor AI tools to specific learning objectives. By leveraging the strengths of application, practice, and problem-solving, AI tools can offer a comprehensive, adaptive learning experience that meets the diverse needs of students in business education. This targeted approach ensures that AI-driven learning is not only interactive but also aligned with the academic and professional demands of each field.

3. Methodology

The integration of AI in education generates vast amounts of data, offering valuable insights into student engagement, learning patterns, and areas for improvement. Analysing AI usage data is crucial for optimising the tool, ensuring they effectively support students in accounting (ACC), economics (ECO), and law (LAW). According to Chen et al. (2020), AI data can identify the most frequently used features by students, highlight areas where they seek academic support, and track engagement patterns across different disciplines. This paper aims to analyse students' interaction with an AI Teaching Assistant, explore the nature of their engagement, and reflect on usage data to identify potential areas for improvement.

Research Context and AI Integration

In Semester 2, 2024, the authors' affiliated university introduced an AI Teaching Assistant to support student learning across various disciplines, including accounting (ACC), economics (ECO), and law (LAW) subjects. The AI Tutoring solution was rolled out to provide scalable and personalised academic support. By leveraging advanced language models, the AI-powered system generates content summaries, tutoring questions, AI-driven quizzes, and personalised learning pathways. Students can access the AI Tutor via the Learning Tools Interoperability integration within the Learning Management System (LMS). The first and second authors of this paper are directly involved in setting up the AI-powered tutoring solution and integrating

it into the Canvas LMS for the ECO, ACC, and LAW subjects. Additionally, the first author developed a user guide with recommended prompts to enhance student engagement with the AI Tutor and organised demo sessions to familiarise students with its capabilities.

Data Collection and Analysis

To assess student engagement with the AI Teaching Assistant in the ACC, ECO, and LAW subjects of study, data was collected from the AI Tutoring dashboard, which was later accessible via the university Canvas LMS. The interaction logs were examined to categorise student interaction based on their type, such as problem-solving, explanation, and general queries. The nature of the student interaction was also analysed to determine the type of engagement. First, the usage trend within the learning analytics of the AI Tutoring dashboard was explored to determine how students are engaging with the AI Teaching Assistant. Next, the frequency and distribution of query types were examined to determine the nature of student interactions. A content analysis of student interactions with the AI Tutor was carried out to explore the second research question regarding the primary types of engagement in ACC, ECO, and LAW subjects. Following this analysis, a reflection was carried out based on the findings to answer the third research question on potential improvements to the AI Tutoring solution. The study adheres to ethical guidelines for educational research, ensuring student data confidentiality and anonymity. No personally identifiable information was disclosed, and student interactions with the AI Tutor were used solely for research and continuous quality improvement purposes.

4. Results and Findings

A total of 313 interactions were recorded between students and the AI Tutor in the ACC subject. When analysed, practical and application questions were the most frequent, accounting for 127 interactions (41%), indicating a strong preference for applying accounting principles to practical scenarios. This was followed by requests for explanation, which made up 100 interactions (32%), highlighting students' focus on gaining a deeper understanding of accounting concepts before applying them. These trends suggest that students rely on AI Tutoring both for hands-on practical support and for conceptual reinforcement to strengthen their foundational knowledge. Moreover, A higher level of interaction in the area of digital transformation highlights students' awareness of the impact of technology on accounting. The engagement patterns in the ACC subject indicate that students primarily seek hands-on practice, conceptual reinforcement, and application-based learning, accounting for over 70% of their interactions with the AI Tutor (Figure 1).

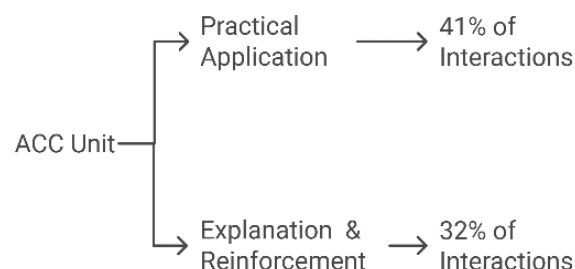


Figure 1: Dominant Type of Engagement with the AI Tutor in the ACC Subject

Essentially, students in the ACC subject demonstrated a high level of engagement with the AI Tutor, with hands-on and practical questions emerging as the most common interaction type. This reflects a strong emphasis on practical applications rather than purely theoretical learning.

Their preference for hands-on learning indicates that AI Tutoring plays a key role in reinforcing accounting skills through application-based problem-solving. While application-based questions were the primary focus, some students also used AI-powered Tutoring to reinforce their understanding of accounting concepts and key principles. By seeking explanations and clarification, they leveraged the tool as a supplementary resource to strengthen their knowledge before applying these concepts in practice. In addition to problem-solving and conceptual learning, the analysis of usage trends within the AI Tutoring dashboard revealed a rise in active users and engaged sessions during the period leading up to assessments and the final exam. Further analysis of the interaction logs on the AI Tutoring dashboard revealed that students engaged with the AI Tutor to review course content, practise quizzes, and request topic summaries, indicating a structured approach to revision. This highlights the role of AI Tutoring in supporting independent study and reinforcing key concepts through interactive learning. Additional examination of the interaction logs also reveals increasing engagement with topics related to digital transformation, as students inquire about digital transformation and cloud computing in accounting, aligning with the subject learning outcomes. As evidenced by the AI Tutoring interaction logs, the remaining student users demonstrated a preference for interactive learning strategies, actively engaging with quizzes, case-based scenarios, and real-world applications. The AI Tutor's ability to provide step-by-step explanations and tailored responses contributed to improved comprehension and deeper engagement. These findings suggest that enhancing the AI Tutor with more interactive features and expanding its knowledge base with additional practical examples could further support student learning and better align with the evolving educational needs in accounting.

In the ECO subject, the analysis of student engagement with the AI Tutor reveals a strong emphasis on problem-solving, explanation requests, and general queries. These findings suggest that students are actively using the AI Tutor to bridge gaps in understanding, particularly in applying economic theories to real-world scenarios. The types of engagement with the AI Teaching Assistant reveal key patterns in student interaction. Problem-solving dominates student inquiries, with 53 out of 149 (36%) interactions focusing on applying theoretical knowledge to practical economic problems. This indicates that students are keen on analytical thinking and real-world applications, aligning with the nature of economics as a discipline that requires problem-solving skills. Concept clarification and explanation form the second-largest category, with 43 out of 149 (29%) interactions, highlighting students' need for deeper understanding rather than just direct answers. This suggests that the AI Tutor plays a crucial role in reinforcing knowledge and ensuring conceptual clarity. Additionally, general queries and study navigation account for 21 out of 149 (14%) interactions, reflecting students' reliance on AI-powered tutoring not only for academic support but also for logistical guidance. This emphasises the broader role of AI in facilitating effective learning management and resource accessibility. As depicted in Figure 2, these three engagement patterns comprise over 70% of students' interactions with the AI Tutor in the ECO subject.

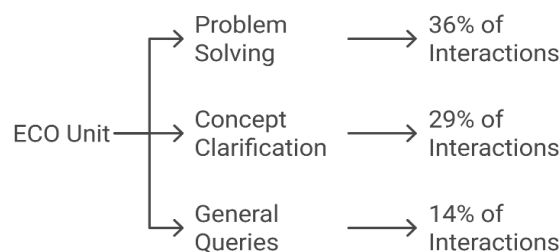


Figure 2: Dominant Engagement with the AI Tutor in ECO Subject

Essentially, application-based queries highlight students' desire to bridge the gap between theory and practice, often requesting guidance on applying economic models to real-world scenarios. Additionally, concept clarification queries indicate a strong focus on understanding fundamental economic principles as students aim to deepen their grasp of theoretical concepts and their practical implications. Beyond conceptual learning, students also make general queries for technical navigation and study resources, using the AI Tutor to access essential course materials and optimise their study strategies. Meanwhile, further analysis of the interaction logs on the AI Tutoring dashboard also revealed that the rest of the students in the ECO subject rely on the AI Tutor for content summarisation, seeking condensed versions of lecture material to aid in revision and improve comprehension. This allows them to quickly access key points, making their study sessions more efficient. Lastly, the analysis of the interaction logs also reveals language support queries, demonstrating the diverse academic and linguistic backgrounds of students. This highlights the need for accessible explanations, multilingual support, and responses tailored to varying levels of proficiency. Together, these engagement patterns highlight the multifaceted role of AI in enhancing student learning, providing academic support and practical guidance.

In the LAW subject, student engagement with the AI Tutor reveals a strong focus on foundational legal knowledge, course review, and exam preparation. A total of 159 interactions between students and the AI Teaching Assistant were recorded. When analysed, general queries accounted for 68 interactions (43%), indicating that students frequently sought broad guidance on legal concepts, case law, and procedural matters. Explanation requests made up 35 interactions (22%), reflecting a need for deeper understanding, with students using the AI Tutor to clarify complex legal principles and interpretations. Additionally, summary requests comprised 21 interactions (13%), highlighting students' reliance on AI-generated overviews to consolidate key topics efficiently, supporting revision and exam preparation. These three dominant engagement patterns highlight the role of AI in supporting both foundational understanding and higher-order analytical thinking in legal education, accounting for over 70% of student interactions with the AI Tutor in the LAW subject (Figure 3).

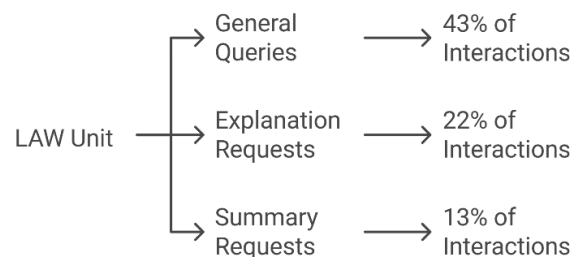


Figure 3: Student Interactions with AI Tutor in LAW Subject

For the general queries and explanation categories, further analysis of the interaction logs reveals that conceptual clarifications were the most common, as students sought explanations of legal doctrines to reinforce their foundational understanding. Additionally, summaries and overviews were frequently requested, highlighting the need for concise content reviews to support revision. Next, analysis of the interaction logs reveals that the remaining students engaged with the AI Teaching Assistant on application and analysis questions, demonstrating an interest in linking theoretical concepts to real-world legal scenarios and emphasising problem-solving skills. Although less frequent, the analysis of interaction logs also reveals essay writing queries, indicating a demand for structured guidance in legal writing, particularly in applying the IRAC framework in the LAW subject.

5. Discussions

The Community of Inquiry (CoI) Framework (Garrison et al., 2000) provides a useful theoretical foundation for understanding how students engage with AI Tutors across different business disciplines. In the ACC subjects, the analysis reveals that students engage with AI Tutors in a manner that reflects the practical nature of accounting education. This aligns with cognitive presence in the CoI framework, as students use AI Tutors to bridge theory with practice, engaging in hands-on problem-solving exercises (Xu et al., 2021). The dominance of application-based queries reinforces the importance of AI-powered tutoring in developing technical skills, supporting findings by Yilmaz and Karaoglan Yilmaz (2023). Additionally, the AI Tutor plays a crucial role in reinforcing complex accounting concepts by offering simplified explanations and analogies, thereby enhancing teaching presence within the learning environment (Khosravi et al., 2022). This structured guidance improves student comprehension and retention, making difficult topics more accessible. Furthermore, the AI Tutor's ability to adapt responses to different learning styles ensures inclusivity and engagement, aligning with the importance of social presence in supporting diverse learners. A key trend in the ACC subject is the growing engagement with digital transformation in accounting. This reflects a shift in student awareness regarding technology's role in the field, reinforcing the teaching presence of AI Tutors in guiding students toward industry-relevant knowledge. Providing structured guidance on the use of AI tools can further optimise engagement by promoting self-directed learning and fostering learner autonomy—core elements of cognitive presence within the CoI framework.

In the ECO subjects, the analysis reveals that the high demand for problem-solving assistance aligns with the applied nature of economics, consistent with Brand-Correa et al. (2022). This pattern of engagement highlights cognitive presence, as students rely on AI Tutors to reinforce analytical skills and enhance problem-solving capabilities. Additionally, the prevalence of explanation-based queries indicates that students view AI Tutors as a complementary tool to traditional instruction, supporting teaching presence by aiding comprehension of complex economic concepts (Kim et al., 2022). A unique aspect of ECO engagement is the frequent use of AI Tutors for resource navigation and logistical queries. This suggests that students face challenges in locating course materials, indicating an opportunity for AI Tutors to be further developed as a structured teaching presence to streamline access to essential study resources. The reliance on content summarisation further highlights the need for efficient revision tools, reinforcing the AI Tutor's role in enhancing cognitive presence by offering structured, digestible summaries tailored to student needs. Moreover, the presence of multilingual queries reflects the diverse student backgrounds in the ECO subject. This aligns with the concept of social presence within the CoI framework, as AI tutors accommodate linguistic and academic diversity, thereby supporting an inclusive learning environment. By improving AI features that support multilingual engagement, the learning experience can be further personalised and enhanced for students from varying educational and cultural contexts.

In the LAW subjects, the analysis reveals that engagement data suggests students primarily use AI-powered tutoring as a supplementary learning tool, focusing on conceptual clarity, content review, and assessment preparation (Grájeda et al., 2023). The dominance of general guidance and explanation-based queries reflects a teaching presence, as students seek AI-generated explanations to support their understanding rather than engaging in deep legal problem-solving. This aligns with the business-oriented focus of the LAW subject, where students are more likely to use AI Tutors for broad academic support rather than specialised legal analysis. Additionally, students' preference for summaries and explanations suggests that AI Tutors

serve as an efficient tool for quick learning and knowledge reinforcement. Rather than engaging in extensive reading or deep legal discussions, students rely on AI-generated summaries to streamline study processes and efficiently review key concepts, highlighting the cognitive presence of AI-powered tutoring in self-directed learning. This pattern aligns with Murphy et al. (2024), who suggest that LAW students benefit from AI-driven knowledge reinforcement when applying legal principles to real-world scenarios. However, the relatively low engagement in problem-solving queries suggests that the AI Tutor's role in fostering critical thinking and analytical skills could be further developed. As noted by Zainuddin (2024), law students may be more inclined to use AI-powered tools when these tools actively facilitate legal reasoning and case analysis, reinforcing the AI Tutor's role in enhancing cognitive presence. To improve engagement, AI Tutors could incorporate interactive case studies, real-world legal problem-solving simulations, and advanced reasoning tools to encourage deeper critical thinking.

6. Reflections and Recommendations

The analysis of AI Tutor engagement patterns across the ACC, ECO, and LAW subjects highlights the efficacy of AI-driven learning tools in supporting discipline-specific education. Using the Community of Inquiry (CoI) framework (Garrison et al., 2000), which emphasises cognitive presence, social presence, and teaching presence, this reflection examines how AI Tutoring aligns with student learning preferences and provides recommendations for further enhancement. The engagement patterns in the ACC subject underscore the strong alignment between AI tutoring and business learning needs, particularly in accounting education. Students primarily use the AI Tutor for hands-on problem-solving, reinforcing key concepts, and preparing for exams, which aligns with the discipline's emphasis on application-based learning. Indeed, cognitive presence within the CoI framework is reflected in the ways AI tutoring supports both knowledge construction and its practical application. AI tutoring in the ACC subject also fosters self-directed learning, allowing students to engage with content at their own pace. To enhance this, providing structured guidance on effective AI tool utilisation could further improve students' autonomy and problem-solving skills. Additionally, incorporating personalised feedback within AI-driven learning experiences could sustain student engagement and confidence, reinforcing both cognitive and teaching presence. To enhance the effectiveness of the AI Tutor, several improvements can be considered. Expanding its knowledge base to include more detailed case studies would provide students with richer contextual learning, allowing them to apply theoretical concepts in practical scenarios. Additionally, integrating more resources on emerging digital tools could further support students in keeping pace with technological advancements relevant to their fields of study. Providing step-by-step solutions for exam-style questions would enable structured problem-solving, helping students develop a deeper understanding of complex topics. Introducing interactive problem-solving modules could further improve student engagement by fostering active learning and critical thinking. Furthermore, exploring the incorporation of a voice feature would enhance accessibility and interactivity, making the AI Tutor more inclusive and user-friendly for a diverse range of learners.

Additionally, the usage data in the ECO subject highlights key learning preferences and trends, emphasising the importance of real-world application. A major engagement trend is students' preference for applied learning, reinforcing the need for practical examples and case studies. This aligns with the cognitive presence outlined in the CoI framework, whereby students actively engage in connecting theoretical knowledge to real-world contexts. Another key engagement pattern is inference-based assistance, where students prefer deeper insights that

connect foundational economic concepts to complex ideas rather than direct answers. This highlights the AI Tutor's role in facilitating deeper conceptual understanding and logical reasoning. Additionally, the strong preference for resource-driven learning, where students frequently use AI for summarisation, indicates the demand for structured and concise learning materials. Incorporating more problem-based learning elements and contemporary case studies would provide students with real-world applications of theoretical concepts, making learning more engaging and relevant. Enhancing AI-generated responses with interactive exercises could further stimulate student engagement by encouraging active participation. Additionally, developing features that support inference-based learning, such as providing logical explanations and connections between concepts would help students deepen their understanding beyond surface-level knowledge. Expanding structured summarisation tools would also be beneficial, catering to students' revision needs by offering clear, concise overviews of key topics for efficient study and retention.

Moreover, the engagement patterns observed in the LAW subject highlight the AI tutor's significant role in clarifying complex legal concepts, thereby reinforcing cognitive presence within the CoI framework. Students rely on the AI Tutor to understand legal doctrines, case law, and foundational legal principles. The high engagement levels suggest that AI tutoring effectively supplements traditional learning by providing conceptual reinforcement and immediate clarifications. Students also use the AI Tutor as a quick reference tool, highlighting its role in summarising key legal topics. Beyond theoretical learning, students show a preference for application-based engagement, seeking guidance in applying legal principles to real-world scenarios. This suggests an opportunity to enhance the AI Tutor's teaching presence by integrating more structured writing materials, such as templates and step-by-step guidance for legal analysis. To enhance the AI Tutor's effectiveness in legal education, several improvements should be implemented. Expanding the knowledge base to include additional case studies and real-world examples would provide better support for practical legal applications, helping students bridge theoretical knowledge with real-world scenarios. Integrating structured writing materials, such as legal frameworks and templates, would further assist students in conducting legal analysis by offering clear guidance on structuring their responses. Additionally, enhancing interactive tools, including quizzes and problem-solving exercises, could reinforce legal concepts and improve exam preparation by enabling students to test their understanding in a structured manner. Strengthening AI-generated responses with tailored explanations aligned with students' learning progress would ensure that the support provided remains relevant to their evolving academic needs, fostering deeper comprehension and application of legal principles.

6. Conclusion and Future Direction

Artificial Intelligence (AI) is increasingly integrated into education to support student learning, enhance engagement, and provide personalised tutoring experiences. AI-powered tutors facilitate self-directed learning by offering on-demand explanations, problem-solving assistance, and interactive learning opportunities. In accounting education, where mastery of theoretical concepts and their practical applications is essential, AI Tutors serve as valuable tools for reinforcing knowledge and guiding students through complex financial transactions and problem-solving tasks. This study explores how students engage with the AI Tutor in undergraduate accounting (ACC), economics (ECO) and law (LAW) subjects. By analysing student interaction logs within the AI Tutoring dashboard, this study aims to understand how students engage with AI tutoring, identify the primary types of engagement, and propose enhancements to maximise AI Teaching Assistant's effectiveness in self-directed learning. The

findings offer insights into the evolving role of AI Tutors in business education and suggest improvements for AI-driven tutoring solutions. The analysis of AI Tutor engagement in the ACC subject highlights the efficacy of AI-driven learning tools in enhancing accounting education. Students predominantly use the AI Tutor for practical application, concept reinforcement, and exam preparation, highlighting its strong alignment with the application-based nature of accounting. These findings suggest that AI-powered Tutoring effectively adapts to discipline-specific learning styles, offering targeted support that enhances student comprehension and engagement. Moreover, AI tutoring fosters self-directed learning by enabling students to interact with course material at their own pace. To maximise its impact, providing structured guidance on effective AI usage and incorporating personalised feedback could further enhance student autonomy, confidence, and problem-solving skills.

In the ECO subject, the AI Tutor usage data reveals key learning preferences and trends, providing insights into how AI-powered tutoring can be optimised to support students better. The high demand for problem-solving aligns with the applied nature of economics. The prevalence of explanation-based queries suggests that ECO students use the AI Tutor as a complementary tool to clarify complex topics. Additionally, frequent resource navigation and logistical queries suggest AI could streamline access to essential resources on the Canvas LMS for the ECO subject. The focus on content summarisation highlights the need for efficient revision tools, while the presence of multilingual queries highlights the AI Tutor's ability to support diverse linguistic and academic needs. Overall, the data in the ECO subject suggests that AI tutoring is not just a tool for answering questions but also a platform for conceptual reinforcement, logical reasoning, and applied learning. In the LAW subject, the engagement data suggests that students seek broad academic support rather than specialised legal problem-solving, reflecting its focus on business education. The preference for summaries indicates a reliance on AI for quick, accessible learning, particularly during exam preparation. Additionally, the emphasis on application-based queries suggests that students actively apply legal concepts to real-world scenarios. The lower engagement with problem-solving highlights an opportunity to enhance the AI Tutor's role in fostering analytical and critical thinking skills, aligning with the need for tools that support legal reasoning and case analysis. While AI-powered Tutoring effectively supports theoretical comprehension, further enhancements in practical legal analysis and case application could maximise its impact on student learning.

In summary, the findings establish the AI-powered Tutor as an effective academic support tool, demonstrating consistent value across multiple disciplines. Using the CoI as the theoretical framework, this study provides coherent interpretations of its implementation across the ACC, ECO and LAW subjects examined. The strong reliance on AI for problem-solving, explanation, concept reinforcement, summarisation and quizzes highlights its efficacy as a supplementary learning resource. To maximise its impact, improvements could include expanding the knowledge base with detailed case studies, problem-solving resources, and providing guided solutions for exam-style questions. Incorporating structured writing materials—such as templates and guidance on relevant frameworks—could better support practical applications and tailor responses to students' progress and learning needs. By integrating new features such as role-playing, essay grading, voice capabilities, and file uploads for AI-driven interactions, AI-powered tutoring can continue to provide tailored, efficient, and engaging learning experiences across disciplines.

The findings of this study offer valuable insights for academics seeking to integrate AI-powered learning aids to enhance student experiences and outcomes. For educational administrators and policy stakeholders, the results provide evidence-based guidance for

curriculum design and activity development. Furthermore, by applying the CoI framework across three distinct disciplines in business education, this study makes a significant theoretical contribution while identifying promising directions for future studies. Future research should explore the long-term retention of knowledge and skills gained through AI Tutoring by employing longitudinal studies, incorporating surveys and performance assessments across multiple semesters. Additionally, exploring best practices for integrating AI Tutors into teaching strategies through a mixed-methods approach, combining surveys and classroom observations, could offer valuable insights into instructors' experiences, challenges, and successful implementation models. Finally, investigating adaptive learning algorithms through experimental studies that track AI-driven personalisation and student performance could enhance AI tutoring's ability to provide customised learning experiences. Addressing these gaps would strengthen the effectiveness of AI in education by fostering sustained learning, ensuring balanced integration with human instruction, and improving personalised support to maximise student engagement and academic success.

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