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Artificial Intelligence for Effective Student Support

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Abstract

Student success in higher education is important to qualification completion, yet first-year dropout rates at universities of technology remain high, with an average of 33%, according to the Council on Higher Education. This emphasises the importance of developing new and scalable support mechanisms to meet the different needs of students. Artificial intelligence (AI) offers a possible solution by offering personalised, flexible, and ongoing academic support. This study investigates the usefulness of AI-powered tools in boosting student success, with an emphasis on the integration of an AI-powered chatbot into a first-year Mathematics module and evaluates quantitative proof of a relationship between student achievement in a first-year mathematics program at a South African University of Technology and AI engagement. Mathematics is frequently viewed as a high-risk topic because of its cognitive difficulty and historically poor pass rates. A case study approach was adopted to examine how the chatbot supports student learning by providing real-time responses to queries, facilitating access to academic resources, and encouraging consistent engagement beyond traditional classroom settings. Through descriptive, the results show that student engagement has significantly improved, as seen by more frequent participation in academic activities and more contact with learning resources. Students also expressed satisfaction with the chatbot's availability and promptness of

assistance. These findings imply that AI-enhanced support systems can successfully supplement traditional teaching techniques, especially in complex programs, and help increase student success and retention.

Keywords
Artificial intelligence 1, Student support 2, dropout rate 3, first year experience 4 and student success 5. (10 font)

1. Introduction
The transition into higher education represents a critical stage in the academic journey of first-year students, often characterised by increased cognitive demand and reduced structured support and as result of independent learning. Within South Africa University of Technology, this transition is particularly challenging, with first-year dropout rates in engineering education remaining persistently high. According to (Motsabi, Diale, & Van Zyl, 2020), approximately 33% of first-generation students (students that are first in their family to attend university) fail to complete their studies, highlighting systematic challenges in student support and the need for scalable and effective interventions. These challenges are specifically pronounced in foundational subjects such as mathematics, where students frequently struggle with conceptual understanding and problem-solving skills.

Mathematics is widely regarded as regarded as high-risk subject due to its abstract nature and cumulative knowledge structure, which requires strong foundational competencies. Inherent to South-Africa previously disadvantaged Universities such as UoT, first-year students enter higher education with gaps in prior knowledge, leading to reduced academic performance and increased likelihood of attrition (maybe we have a reference for this). Research has shown that targeted intervention, particularly those that provide adaptive and personalised learning, can significantly improve student learning outcomes in introductory STEM courses (Aldape-Valdes, Rincon-Flores, Castano, & Guerrero, 2026; Heredia, del Pilar García-Chitiva, Camacho-Zúñiga, Mirabal, & Vázquez-Villegas, 2025). However, traditional support mechanisms such as tutorials and consultations are often insufficient to meet the diverse and growing needs of students, particularly in large classes that characterise first year courses.

The rapid advancement of artificial intelligence (AI) presents new opportunities to transform teaching and learning in higher education. AI technologies have been shown to enhance educational practices by enabling personalised learning through real-time feedback(Slavuj, Jakšić, & Ašenbrener Katic, 2024; Taibi & Fulantelli, 2024). In STEM education, generative AI tools such as ChatGPT have demonstrated the ability to support conceptual understanding, address misconceptions, and improve student engagement when integrated effectively into the learning process(El Fathi, Saad, Larhzil, Lamri, & Al Ibrahmi, 2025). Furthermore, AI-supported learning environments have been associated with improvements in higher-order skills, reflection, and overall academic performance(El Fathi et al., 2025; Wu, Lee, Chen, Lin, & Huang, 2025). However, empirical evidence from real-world mathematics classrooms where generative AI is permitted remains limited and this applicable to the South African Higher Education Sector.

Among AI applications, chatbots have emerged as a particularly promising tool for providing scalable academic support. Chatbots can simulate interactive dialogue and provide real-time responses that guide students in the problem-solving process in a personalized manner (Hashmi & Rebello, 2025). Analysis of undergraduate problem-solving skills through interaction with AI showed enhanced student engagement and increased confidence in physics by providing continuous and accessible support. Additionally, chatbot-based interventions promote active learning and sustained interaction with course material, particularly in large-enrolment courses where individualized support is limited.

In the context of mathematics and physics education, AI integration is increasingly recognized to enhance both engagement and comprehension. Recent studies by (Choi, 2026; Younis, 2025) indicate that AI-supported learning environments can improve students' conceptual understanding and academic achievement. This is further enhanced when combined with structured pedagogical approaches such as reflective learning and collaborative problem-solving. Moreover, AI tools can help bridge the gap between classroom instruction and independent study by providing on demand assistance and reinforcement learning outside formal teaching environments.

Despite these advancements, there remains a need for empirical evidence on the effectiveness of AI-powered chatbots in improving student success within the South African Higher education context, particularly in high-risk modules such as first-year Mathematics. This study addresses this gap by investigating the integration of AI-powered chatbot into the first-year Mathematics module at a University of Technology in South Africa. Using a case study, the research examines how chatbot supports student learning through real-time query resolution, improved access to academic

resources, increased engagement beyond the classroom and higher grades. These findings further demonstrate that the use of chatbot leads to enhanced comprehension of mathematical concepts.

The remainder of the paper is structured as follows. Section 2 presents a review of related work on AI in higher education, with particular focus on chatbot-based learning support in STEM disciplines. Section 3 outlines the research methodology, including the case study design, the implementation of the AI-powered chat, and the data collection procedures. Section 4 presents and analyses the results, focusing on student engagement, interaction patterns and perceived impact on comprehension (derived from assessment results). Section 5 discusses the implications of the findings for teaching and learning in first-year mathematics, as well as the role of AI in student support within the South African higher education context. Finally, Section 6 concludes and outlines recommendations for future research.

2. Literature review

2.1 Artificial Intelligence in Higher Education

AI has increasingly become a transformative force in higher education, enabling new approaches to teaching, learning, and student support(Khoalenyane & Ajani, 2024; Opesemowo & Adekomaya, 2024). Prior to the widespread adoption of AI, various pedagogical frameworks were developed to enhance students' engagement and learning effectiveness. For instance, quiz-based learning systems have been used to dynamically adjust the difficulty of text-based questions in order to sustain learners' engagement, particularly for adaptive learners. In contrast, more systematic learners benefit from progressively structured questions that reinforce understanding over time(Gopi, Sreekanth, & Dehbozorgi, 2024). Similarly, multiple-choice questions (MCQ) approaches have been widely adopted as interactive learning tools. These methods not only support recall but also help uncover misconceptions by exposing students to plausible distractors, thereby improving attention and memory retention(Malandrino, Manno, Palmieri, Scarano, & Filatrella, 2014)

A key limitation of these traditional approaches lies in their inability to provide truly personalized, real-time support comparable to that of a human tutor. Although adaptive mechanisms exist, they are often rule-based and lack the flexibility to respond dynamically to diverse student queries, learning styles and level of understanding. This gap has led to increasing interest in more intelligent systems capable of delivering tailored educational experiences at scale.

Studies(Slavuj et al., 2024; Taibi & Fulantelli, 2024) have shown that AI can enhance learning outcomes by supporting self-regulated learning and enabling data-informed instructional strategies. Recent advancements in generative AI have further expanded the capabilities of these systems, allowing for more interactive and context-aware learning support. Large language model tools such as ChatGPT and Bing Chat have demonstrated the ability to help learners develop critical thinking, concept comprehension, and problem-solving skills(Vasconcelos & Santos, 2023). However, the authors highlight the need to integrate AI with traditional education activities to address concerns of diminished human interaction and AI information accuracy and reliability.

2.2 AI Applications in Higher Education

There is current significant expansion of AI applications in education which comprises of intelligent tutoring systems, computerized grading, personalized learning systems, and conversational agents. Four major AI application domain have been identified by Richter et al.(Zawacki-Richter, Marín, Bond, & Gouverneur, 2019) which are appraisal, data analysis and categorization, dialogue system, intelligent tutoring systems. There is combination of domain knowledge with instructional method to give individualized instruction that is accommodating to student responses according to Intelligent tutoring systems(ITS). This mean that research indicates well-designed ITS could produce learning gains comparable to human teaching, with impact standard deviation sizes ranging from 0.4 to 1.0(Rienties & Toetenel, 2016). Virtual agent systems engage natural language processing(NLP) to clarify student input, allow normal and obtainable interactions. Recent development in generative AI have improved educational chatbot abilities, assisting complex discussion, thorough explanations, and also accurate responses to various questions(Mathews, 2003).

2.3 AI-powered Chatbots for Student Support

Conventional learning methods in STEM education are frequently short in providing adequate individualized teaching and tutoring support to undergraduate students(Lange-Hegermann, Schmohl, Watanabe, Heiss, & Rubart, 2021). The ability of generative AI to have contextual understanding responsive dialogue and semantic generation are some of the offers promising possibilities to address teachers' cognitive feedback capacity(S.-Y. Chen, Chen, & Lai, 2025). A growing body of research indicates that AI assisted learning improves in learning performance and reduces cognitive

load across various learning contexts(S.-Y. Chen et al., 2025; Slavuj et al., 2024). Primarily, the provision of a comfortable space where learners need no fear making mistakes and the immediate formative feedback are some of the high degrees of versatility characterizing AI chatbots.

AI-driven systems facilitate per and limitations of AI explain complex concepts, generate practice problem and provide step-by-step guidance, thereby supporting both cognitive and metacognitive processes(Weimann, 2025). Interaction logs evaluation and thematic analysis of AI dialogues(J. Chen et al., 2024; Vasconcelos & Santos, 2023) (J. Chen et al., 2024) have shown that that Chatbots facilitate multi-level cognitive regulation and verbalized reflection.

2.4 Mathematics Education Challenges

Mathematics module has been recognized as obstacle to STEM success because of it high poor performance rate when compared with other subjects. This presents a peculiar challenges to rendering effective support critical(Bressoud, 2015; Ejiwale, 2013; Saha, Islam, Akhi, & Saha, 2024; Sithole et al., 2017). Restricted support access, substandard education, Maths phobia, insufficient study method is contributing factors to these challenges. The compounding nature of mathematical knowledge causes major difficulties for students that lack support concept for mastery(Cavalcante, Savard, & Polotskaia, 2024; Eisenhart et al., 1993; Ganal & Guiab, 2014). Conventional support system finds it hard to proffer solution to this given their episodic nature. AI-assisted system offers continuous, prompt assistance present possibilities to address these problems more efficiently.

2.5 AI for students' engagement and success in Mathematics education

Research on generative AI in higher education documents mixed reflection across students' perceived benefits and reduced critical thinking abilities. (Choi, 2026), found that situational pressure shapes AI use and that regulations may determine how effective the learning outcomes are. Mathematics and STEM-related education display a range of cognitive learning needs such as creative visualization, analytical-problem solving, and adaptive thinking.

The current state of research demonstrates the potential of AI chatbots in STEM education(Thembane & Tshibangu, 2026). However, despite these promising prospects, mainly general-purpose AI chatbots have demonstrated considerable potential in education(Rücker & Becker-Genschow, 2025). Leaving the broader state of research in AI education with notable limitations as there remains a substantial gap in developing and validating custom AI chatbots(Phokoye, Epizitone, & Moyane, 2025). Particular to South Africa socio-economic disparity, AI risks deepening inequality as reflected in the digital divide amongst higher institutions(Maimela & Mbonde, 2025).

The abstract nature of mathematics and the reliance sequential knowledge acquisition often result in gaps in learning that accumulates over time. Mathematics education shows analogous challenges that makes it benefits from AI chatbot intervention(Rücker & Becker-Genschow, 2025). While earlier chatbot model focused on language writing and learning, attention has increasingly shifted towards STEM education(Choi, 2026). Chatbots have made significant strides for first year STEM students, with models now well capable of solving a wide range of tasks and draft plausible reasoning with high degree of fidelity(Kortemeyer, 2025).

2.6 Artificial Intelligence in Manufacturing Industries

One of the largest areas where AI technologies can be applied is the Manufacturing industries. The role of AI in improving automation, production efficiency and quality control has been thoroughly investigated by researchers(Ghelani, 2024; Hasan, Kasedullah, Ripon, & Khan, 2025). AI systems can use machine learning algorithms and sensor data to monitor manufacturing operations and this optimizes process parameters in real time(Kim, Kong, Lee, & Lee, 2022). Studies have shown that AI-driven smart factories improve productivity by reducing human error, minimizing downtime, and increasing process precision. Predictive maintenance systems powered by AI analyze machine conditions such as vibration, temperature, and operational data to detect early signs of equipment failure before breakdown occurs. This reduces maintenance costs and improves equipment reliability(Okpala, Chikwendu, & Onyeka, 2025).

AI-based robotics also transforms industrial automation. Smart robots conduct repetitive and dangerous work with greater accuracy and regularity. Collaborative robots, or cobots, operate together with human operators to enhance operational flexibility and safety in the workplace. AI-powered machine vision systems can be used for automatic inspection and flaw identification in production lines, leading to better quality products and less waste of materials(Rahman, Khatun, Jahan, Devnath, & Bhuiyan, 2024).

2.7 South African context: challenges, adoption and emerging evidence

The integration of Artificial Intelligence (AI) in South African universities presents both opportunities and challenges(Maimela & Mbonde, 2025). The integration of AI in South Africa higher education is influenced by both global technological and digital inequality(Maleka & Maidi, 2024; Naidoo, 2025; Phokoye et al., 2025). Structural inequality, resource constraints and diverse students background contribute to difficulties in foundational subjects such as mathematics(Maimela & Mbonde, 2025). However, while AI implementation is uneven in South Africa Higher Education Sector, with historically privileged universities benefiting from better infrastructure and funding, AI technologies has largely developed within Western paradigms (Heleta & Chasi, 2023; Modiba, Van den Berg, & Mago, 2025) echo this sentiment by identifying infrastructural unreadiness and accepting technology as much needed investment as possible gaps.

Recent studies highlight the growing interest in AI as a tool to address these systemic issues (Zenda & Dewa, 2025). systematic literature review of AI in open distance learning reveals that AI can enhance student engagement by providing flexible, personalized support in contexts where traditional support structures are limited by scale and accessibility. (Modiba et al., 2025) Also points to the strong wiliness of higher education institutions to adopt responsible use of AI for turning the challenges of generative AI into innovation.

Further insights into the opportunities of Ai adoption in African classrooms are provided by (Patel & Ragolane, 2024), who echo the transformative potential of AI in higher education and the need for careful, context-sensitive implementation. Their work emphasizes the potential of generative AI to support both teaching and research by facilitating access to information. From a research landscape perspective, (Phoobane & Gudyanga, 2026) provides a mapping of AI in STEM education within South Africa, noting that while interest in AI is growing, empirical studies – particularly those focused on students learning outcomes remains limited. This realization is significant, as much work focuses on policy considerations and exploratory implementation rather than rigorous evaluation of impact on student success.

Collectively, these emerging studies indicate that while AI adoption in South Africa Higher education is still in its early stages, there is a strong potential for its application in addressing persistent challenges related to student engagement and success. However, there remains a lack of empirical, discipline specific evidence demonstrating how AI tools – particularly chatbot – impact learning outcome in high subjects such as mathematics. This study addresses this gap by providing a case-based evaluation of an AI-powered chatbot implemented in a first-year mathematics module at a South African University of Technology. By focusing on student learning outcome, the work contributes locally grounded evidence to the emerging discourse on AI in South African higher education.

2.8 Root causes affecting AI-based Student Support

- Limited Technological Infrastructure: One of the key fundamental problems that affects the effective application of AI in student assistance systems is the inadequate technological infrastructure. AI systems rely on robust internet connections, cloud computing resources, advanced software platforms, secure databases, and high-performance computing systems. Many educational institutions, particularly in poor areas, don't have adequate digital infrastructure for advanced AI technology(Pedro, Subosa, Rivas, & Valverde, 2019). Lack of good internet access, obsolete computer systems, restricted server capacity and unstable power supply can affect AI based learning systems and reduce students' accessibility. AI systems need a solid technology infrastructure to work well and to give good help for teaching(Matthew, Kazaure, & Okafor, 2021).
- Insufficient Data Quality and availability: AI systems require training, prediction and decision making using enormous quantities of accurate, well-structured data. Many colleges have many student data that are inaccurate, inconsistent, obsolete, or poorly organised. Poor data quality affects badly the performance of AI algorithms and predictive models(Vudugula, Chebrolu, Bhuiyan, & Rozony, 2023).
- Resistance to Technological change: Another significant influence for AI integration in education is human opposition to technological progress. Some teachers, students and administrators could worry that the AI tools could substitute for human connection, limit instructional responsibilities and undermine education quality(Beirat, Tashtoush, Khasawneh, Az-Zo'bi, & Tashtoush, 2025). Students may also feel uncomfortable communicating with AI systems owing to privacy issues, lack of emotional understanding, or less intimate communication. Resistance to change is typically a barrier to technology adoption and decreases the effectiveness of AI-driven student support efforts(Romano, 2024).

3. Methodology

3.1 Research design

A key objective of this study is to examine the relationship between AI platform engagement and student academic performance. This study adopts a case study research design approach to investigate the effectiveness of an AI powered chatbot in supporting student learning within a first-year Mathematics module at a University of Technology in South Africa. The case study allowed for a quantitative-dominant mixed-methods approach to be employed. This chatbot is not off the shelf ChartGTP chatbot but it was a scientifically design solution for STEM fliers and this development was based on empirical and scientifically validated educational framework for STEM education which undergone user evaluation with STEM learners. Quantitative data derived from the AI platform analytics were used to examine patterns of student engagement and performance, while qualitative insights from lecturers' evaluation of assessment provided contextual understanding of student interaction with the AI system.

3.2 Study context and participants

The study was conducted with Foundation Mathematics Programme, which supports first-year students transitioning into university-level mathematical thinking. The test was conducted for four months and the work is still in progress. The module is characterized by diverse preparedness levels and has historically been identified as high-risk subject. A total of 511 students across six groups (DX, MX, PX, VX, YX, and XX) participated in the study. These groups represent a cross-section of the student population, providing a suitable basis for analysing variations in engagement and academic performance. Although all students were enrolled in the module, participation in the AI platform varied across groups, allowing for comparative analysis between levels of engagement and learning outcomes (Figure 1).

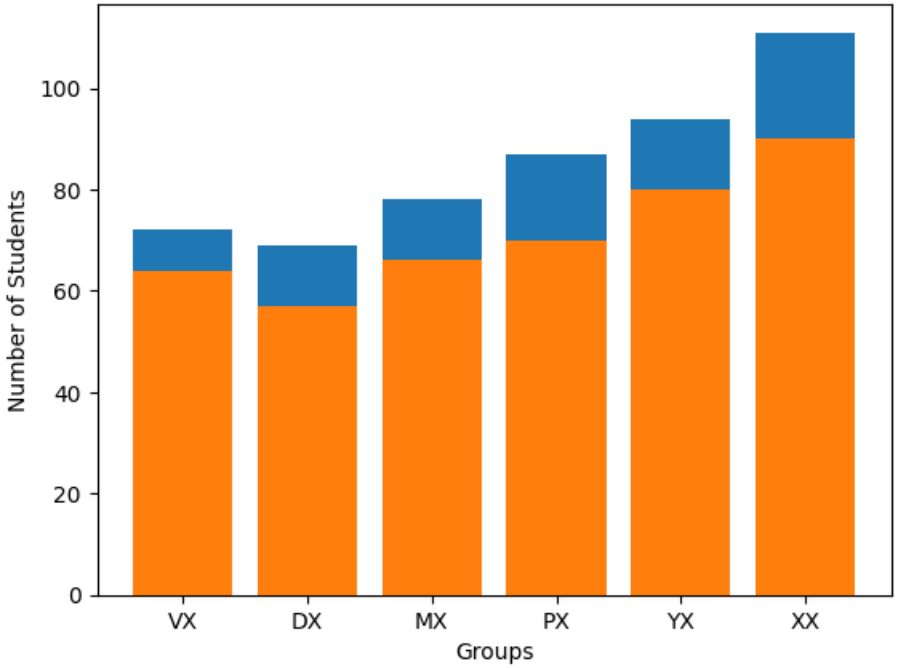

Figure 1: Number of students per group (blue+orange) vs AI platform students (orange)

3.3 AI platform ad Chatbot implementation

The study utilised the AI learning Platform introduced in the Foundation Programme to assist teaching and learning through structured and interactive activities. The platform integrates Ai-driven tools designed to support student learning as they transition from school-level procedural mathematics to university-level conceptual understanding and analytical reasoning. The platform was introduced as supplementary learning tool, complementing traditional lectures and tutorials. Students were encouraged to engage with the chatbot outside of formal teaching sessions to reinforce learning and improve conceptual understanding. The chatbot components allows students to ask questions related to the mathematical concepts, receive immediate, step by step explanation through visualization and feedback loops.

4. Results and Discussion

4.1 Student participation and Platform Engagement

Participation on the AI platform: The data indicates that while most students across all groups are enrolled and engaging with the platform, full participation has not yet been achieved, as there is a consistent gap between total enrolment and platform usage. The analysis of student participation across the six foundation Mathematics groups (VX, DX, MX, PX, YX, and XX) indicates generally high levels of adoption of the AI platform, although full participation was not achieved. As illustrated in Figure 2., a consistent gap exists between total enrolment and active participation, suggesting that while the platform is widely accepted, barriers such as limited access to devices, connectivity challenges, and varying levels of digital literacy may influence engagement. Higher participation levels of digital levels were observed in groups such as YX and XX, while relatively lower engagement levels were noted in groups like DX and VX. This variation in engagement provides a useful basis for analysing the relationship between AI usage and academic performance.

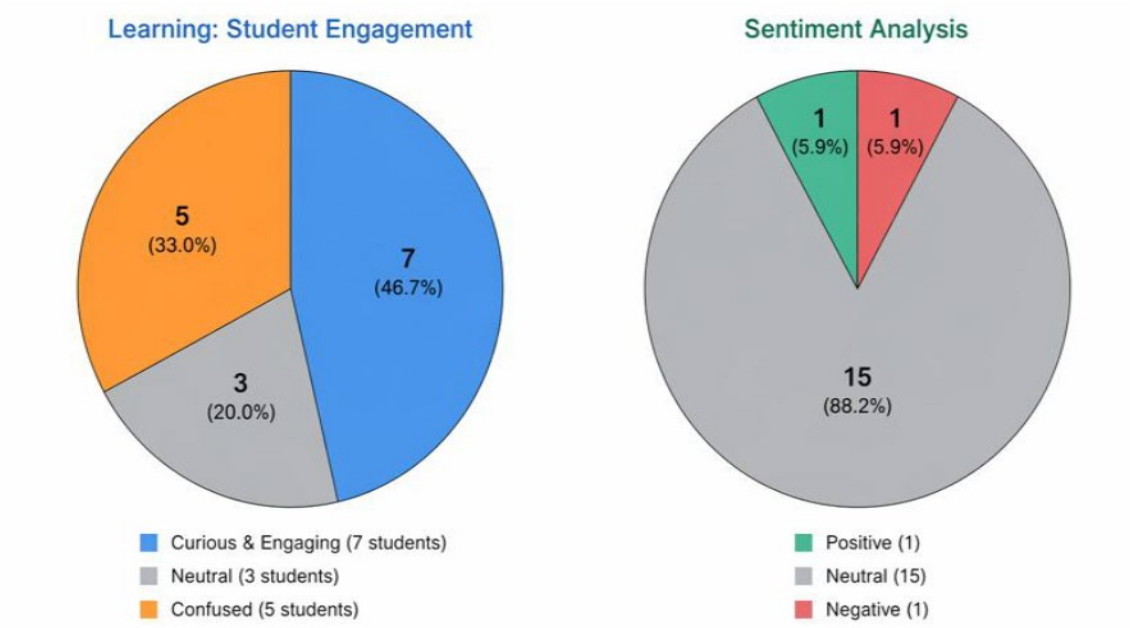

Figure 2: Student engagement and sentiment with the Chabot (single group)

4.2 Student engagement and learning Experience

Student interaction with the AI chatbot reveals important insights into engagement and learning behaviour. As shown in Figure 3., approximately 46.7% of students were classified as curious and actively engaged, indicating a strong level of interaction with the platform. However, 33.0% of students were identified as confused, suggesting that while the chatbot is being used. A portion of students still experience conceptual difficulties. A further 20.0% displayed neutral engagement, indicating moderate interaction without strong positive or negative learning.

When scaled to a larger (Figure 3), similar trends are observed, reinforcing the reliability of these patterns. The presence of substantial "curious and engaging" group suggests that the chatbot successfully stimulates active learning, while the "confused" category highlights opportunities for improving the quality of AI explanations and scaffolding mechanisms.

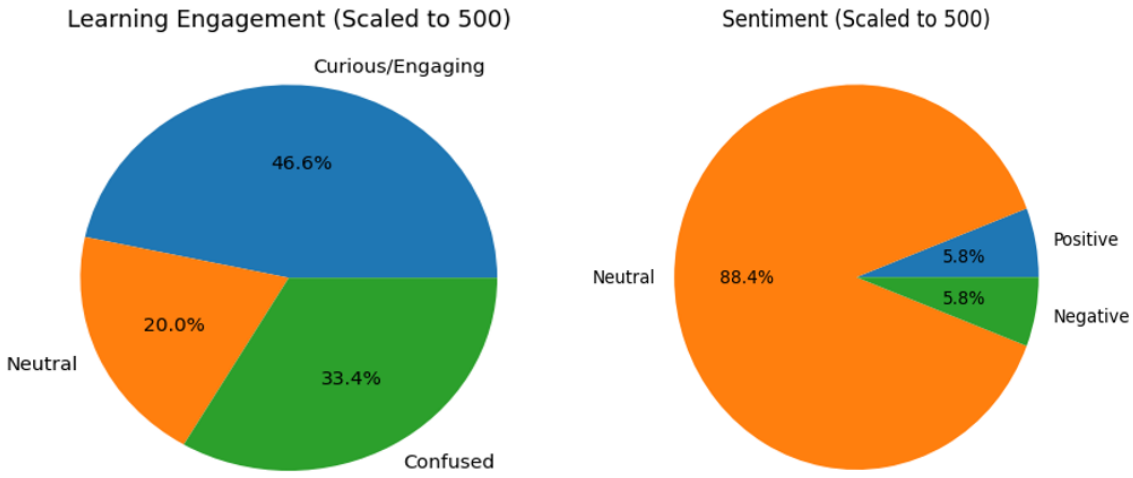

Figure 3: Student engagement and sentiment with the Chabot (combined groups)

4.3 Relationship between AI engagement and Academic performance

Figure 4., illustrates a positive correlation between AI participation rates and Assessment 1 pass rates across the six groups. The computed Pearson correlation coefficient (r≈ 0.70) indicates a moderate-to-strong positive relationship, suggesting that higher levels of engagement with the AI platform are associated with improved academic outcomes. Specifically; lower engagement groups (e.g., DX and VX) are associated with pass rates in the range of approximately 64%-68%, and higher engagement groups (e.g., YX and XX) demonstrate improved performance, with pass rates reaching up to 87%.

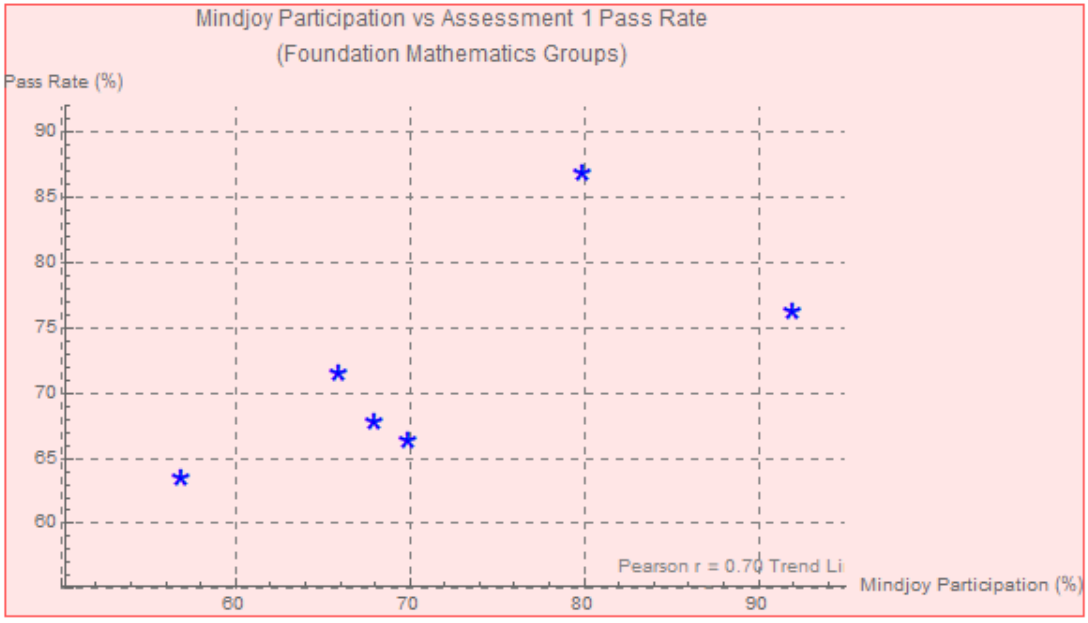

Figure 4: Correlation graph

The scatter plot visually explores trends between engagement and pass-rate across the six groups. Although some variations exist – such as group XX showing high engagement but slightly lower-than-expected performance – the overall trend clearly indicates that increased interaction with the chatbot is linked to better academic results.

4.5 Discussion and implications

The predominance of neutral sentiment (approximately 88%), with smaller proportions reflecting positive (≈5.8%) and negative ((≈5.8%)) experiences (Figure 2 and Figure 3) from the student interaction analysis with the chatbot suggests that the students perceive the chatbot as a functional academic support tool rather than an emotionally engaging system. This is not necessarily a limitation, as the primary role of the chatbot is to provide academic assistance. However, the relatively low proportion of explicitly positive sentiment may indicate the need to improvements in user experience. At the same time the minimal negative sentiment that the chatbot does not hinder the learning process, reinforcing its suitability as supplementary educational tool.

The findings of this study reinforce and extend existing research on the role of Artificial intelligence in higher education, particularly in enhancing student engagement and academic performance. Consistent with the work of (Slavuj et al., 2024), this study demonstrates that AI learning can facilitate student engagement as it encourages active participation and self-directed learning. Furthermore, the findings corroborate research by (Taibi & Fulantelli, 2024; Wu et al., 2025), which report improvements in academic performance and higher-order thinking skills through AI-supported learning environments. The moderate to strong positive correlation ($r \approx 0.70$) identified in this study provides empirical evidence that increased interaction with AI tools is associated with improved performance in mathematics, a subject characterised by high failure rate.

However, the sentiment analysis reveals a predominance of neutral responses – suggesting that the chatbot is primarily perceived as a function academic tool rather an engaging or transformative companion. This observation highlights a gap between technical effectiveness and user experience. This may motivate that future AI Chatbot implementation should focus not only on accuracy and accessibility but also use animation software to illustrate or clarify otherwise abstract theoretical concepts.

From a South African perspective, the study contributes to the research gap identified by (Phoobane & Gudyanga, 2026), who notes the limited availability of empirical studies in AI in STEM education Within South Africa. The findings align with (Patel & Ragolane, 2024), who identify AI as a scalable solution for improving access to academic support in institutions with large student populations that cannot be individually tutored. At the same time, the study reinforces the need for context-aware implementation strategies that account for inequalities in access and preparedness. In contextualising the study within local realities, the variation in participation rates observed across student groups may be attributed to student readiness in digital access and learning culture as in (Maimela & Mbonde, 2025).

5. Conclusion

This study provides quantitative evidence linking AI engagement to student performance in a first-year mathematics module at a University of Technology in South Africa. The study employed descriptive statistics to summarise students' engagement levels when using Chabot as a complement to conventional lectures and exercises. A Person correlation analysis helped visualize the relationship between platform participation and student performance.

It is important to note that while this relationship is significant, correlation does not imply causation. Other factors, including prior knowledge, teaching quality, and student motivation, may also influence performance, nevertheless, the observed trend provides strong empirical support for the role of Ai enhancing student learning.

The institutions are expected to develop a Clear AI Strategy and Institutional Framework, invest in Digital Infrastructure and Technology, enhance Data Management and Quality, train Educators and Administrative Staff for adoption for effective student support.

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Biographies

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Dr. Ayodele Abraham Ajayi is currently a postdoctoral research fellow in department of Industrial, operational management and mechanical engineering department of Vaal University of Technology of South Africa. His work experience in the last 15 years span across industry, academic and research establishment. He has also mentored young learners and he still mentoring young leaners in academic and research institutions. Dr Ajayi obtained his Doctor of Engineering degree in Mechanical engineering from Durban University of Technology South Africa, Master of Science degree in Mechanical engineering from University of Ibadan and Bachelor degree in Mechanical engineering from Ladoke Akintola University of Technology Ogbomosho in Nigeria.

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