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Motivation and Perceived Learning Benefits in the Use of AI-Assisted Learning Tools: Evidence from Higher Education in Malaysia

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Abstract: This study investigates the reciprocal relationship between student motivation and perceived learning benefits (PLB) of AI-assisted learning tools in higher education. Building on the Technology Acceptance Model (TAM) and motivational theories (ARCS and Self-Determination Theory), the research develops a novel reciprocal model that distinguishes PLB from broader constructs such as engagement. A structured survey of 325 Malaysian undergraduates was analysed using correlation and regression analyses. Motivation was measured through critical thinking and understanding complex topics, while PLB captured helpfulness, assignment quality, subject understanding, and academic performance. Reliability results indicated acceptable consistency for motivation ($\alpha = .660$) and moderate consistency for PLB ($\alpha = .604$). Findings revealed a moderate, positive correlation between motivation and PLB ($r = .428$, $p < .001$). Regression analyses confirmed significant reciprocal effects ($\beta = .428$, $p < .001$), with both models explaining 18.3% of the variance ($R^2 = .183$). While the explained variance is modest, it reflects typical effect sizes in behavioural research and highlights the reinforcing cycle between motivation and PLB. The study contributes theoretically by refining PLB as a distinct construct and empirically demonstrating its reciprocal link with motivation in the context of Malaysian higher education. Practically, the findings suggest that integrating AI tools strategically can enhance both motivation and learning benefits, while also underscoring the need for responsible and ethical adoption. Future studies should expand item sets and adopt longitudinal and cross-cultural designs to strengthen construct validity and explanatory power.

Keywords: *AI-assisted learning tools, student motivation, perceived learning benefits, higher education, technology-enhanced learning*

1. Introduction

The rapid adoption of AI-assisted learning tools such as ChatGPT, Grammarly, and AI-driven research platforms has transformed the higher education landscape. These tools reflect prior research, which argues that AI can improve academic performance as it fosters deeper engagement with lessons.

Learning has undoubtedly changed with the integration of tools such as ChatGPT, Grammarly, and AI Help platforms. Remarkably, they have transformed academia by improving feedback systems, modifying the quality of work done, and the ease with which customised learning can be done. Research designed by Lalira et.al, 2024, and Suwadi, 2023, has proven that the use of AI tools helps increase academic outcomes, especially in cases where students have writing and grammatical structuring problems. Tools such as ChatGPT and Grammarly have shown positive outcomes in AI tool integration. Even beyond the academic realm, their use has proven that students are more active participants in their learning processes (Jegede, 2024). Nevertheless, the evidence and insights derived from studies conducted by Maala et.al, 2024 and Uppal & Hajian, 2024 caution against the use of these tools. They argue about the ease of learning with these instruments, which might bring about the dangers of thinking and procrastination.

Again, there is the issue of ethics, which includes factors like academic dishonesty or the fear that AI may take the place of educators, and they have to be dealt with (Varghese, 2024; V & S, 2024). Despite the gripes, it has been established that AI tools enhance outcomes, increase participation, and assist teachers with administrative tasks (V & S, 2024; Bilad et al., 2023). Finding the proper mix of incorporating AI and traditional strategies is equally important to the necessity for teachers to assist the learners in nurturing responsible autonomous use of AI, critical thinking, and self-learning (Jahani et al., 2024; Bilad et al., 2023). The more AI

progresses, the greater the need for higher learning institutions to formulate policies and have in place comprehensive plans on the use of these tools in ways that sustain, complement, and augment current educational pedagogies (Krause et al., 2024).

Student motivation, defined as the internal drive to initiate and sustain learning behaviours, is a critical determinant of academic success. Alongside motivation, students' perceived learning benefits (PLB) from AI tools, such as helpfulness, improvements in assignment quality, enhanced understanding of subject matter, and perceived gains in academic performance, are equally important. Unlike broader constructs such as engagement, which often combine positive and negative dimensions, PLB focuses specifically on the positive outcomes students associate with AI tools.

AI tools can significantly impact the overall academic success of students through student motivation and perceived learning benefits (PLB), a fact demonstrated by several studies. The use of AI tools is found to contribute to a significant increase in student motivation through personalised learning experiences, immediate feedback, and adaptive learning, which can meet the specific requirements and needs of each learner (Mallillin, 2024; Ward et al., 2024; Ronsumbre et al., 2023). These tools have not only a positive impact on motivation but also on cognitive capacity and problem-solving skills, which lead to improved academic performance (Elbadiansyah et al., 2024; Abdurrahman et al., 2024). Attention, relevance, confidence, and satisfaction are the four key aspects of the ARCS motivation model that have successfully been implemented in AI-enhanced learning settings and shown to lead to greater student motivation and engagement (Huang & Chang, 2024; Subbiah, 2024). AI also supports personalised feedback and adaptive test adjustments, which students find useful and, as a result, study habits and academic performance increase (Ward et al., 2024; Rohana et al., 2024). However, the challenges of excessive dependence on AI, ethics in terms of privacy, and the necessity of responsible implementation remain (Elbadiansyah et al., 2024; Abdurrahman et al., 2024). Nevertheless, there have been primarily positive results of AI integration into education, where students report having improved the quality of their assignments, their understanding of the subject matter, and they believe that their academic performance is affected (Capinding & Dumayas, 2024; Xudayberdiyevna, 2024). The innovative power of AI in education highlights the need to balance the use of technology in education with traditional approaches to education to optimise the benefits of education and overcome ethical and practical issues (Ward et al., 2024; Rohana et al., 2024). On the whole, AI tools, used intelligently, can be an excellent way to motivate students and increase their perceived learning benefits, which will translate into higher academic success.

Although research on AI in education is gradually accumulating, previous research frequently addresses learning outcomes too vaguely, not differentiating between motivation and perceived advantage specific to education. That leaves a knowledge vacuum on the relationship between students' motivation and perceived benefits of AI-assisted tools and how they affect each other.

This study contributes in two important ways. Theoretically, it integrates the Technology Acceptance Model (TAM) and motivational theories such as the ARCS model and Self-Determination Theory (SDT) to frame motivation and PLB as reciprocally reinforcing constructs. Unlike prior studies, PLB is conceptualised as distinct from engagement, capturing specific positive learning outcomes (helpfulness, assignment quality, understanding, performance). Methodologically, the study introduces a reciprocal model in the under-researched context of Malaysian higher education, providing empirical evidence from a sizeable student sample. This combination of theoretical refinement and methodological application differentiates the present research from existing work.

2. Literature Review

AI and Student Motivation

Several past studies have found that AI tools can be used to enhance motivation through fewer cognitive tasks, provide immediate feedback, and support self-directed learning (Zhai, 2022; Alkaissi & McFarlane, 2023). The motivation level is higher when students feel that these tools help them to understand better and achieve better results at school. However, the sustainability of such motivation will rely on the way students will include AI in their overall learning processes without compromising critical thinking.

AI-based learning aids, including ChatGPT, have demonstrated great promise in improving student motivation and engagement, which are important determinants of academic success. These tools provide feedback instantly and tailor learning experiences, which can reduce the cognitive load and make learning more efficient. In other scenarios, like in English writing classrooms, ChatGPT has been found to help learners develop a sense of agency and improve the quality of writing, which then leads to positive attitudes toward AI tools (Zhang, 2024). Similarly, a research study involving university students in Hong Kong found that AI-supported feedback can be helpful not only in assisting students to improve the quality of their essays but also in encouraging and engaging the students to write more (Chan et al., 2024). In the context of second language acquisition, ChatGPT is interactive in nature, which creates a safe practice space and encourages engagement and participation via several conversational activities and tailored feedback (Anjum et al., 2025). Additionally, ChatGPT has already been shown to promote behavioural, cognitive, and emotional involvement in EFL writing courses, which consequently leads to the creation of student-centred classes to complement traditional teaching methods (Anjarani et al., 2024). In addition, AI tools like Grammarly and ChatGPT can contribute to content creation and grammar verification, which can be used to sharpen research skills, write better academic papers, and think creatively (Sasirekha, 2024). Combined, these studies highlight the transformative potential of AI tools in the education sector, since it is linked to the increase in student motivation and better student learning outcomes in various education environments.

AI and Perceived Learning Benefits

Subjective consideration of how such technologies could enhance the learning processes among students constitutes perceived learning benefits (PLB) of AI in education. Research has demonstrated that AI applications have a significant positive impact on learning behaviours, time management, and feedback mechanisms, leading to improved performance in school and reduced study time (Ward et al., 2024). Besides, students also report that their performance in terms of productivity and individual learning experiences has supported them to meet success in their academic results (Zhou et al., 2024). A systematic review suggests that the use of AI can enhance cognitive learning outcomes, although reliance issues and other ethical concerns, such as data privacy, also exist (Ambarita & Nurrahmatullah, 2024; Sasikala & Ravichandran, 2024). In addition, the students consider AI as a useful didactic classroom tool that helps to attract the attention of people and make the process of communication a two-way process, which only emphasises the need to adjust the educator to these technologies (Khairuddin et al., 2024). In this way, although AI tools are associated with significant PLB, it is necessary to implement them with caution to reduce possible disadvantages.

Perceived learning benefits (PLB) linked to AI-assisted technologies, such as ChatGPT, play a critical role in acceptance and the integration of this type of technology into student learning processes. Research has found that students recognise a wide range of positive changes, including improved knowledge, increased grades, and increased interactions, which are positively correlated with the Technology Acceptance Model (TAM) in which perceived usefulness is a key variable of technology use (Sukirman et al., 2024; Adelhardt & Eberle, 2024; Valenzuela et al., 2024). To illustrate this point, the research indicates that when students think that ChatGPT is both practical and convenient to use, they tend to form positive attitudes towards its usage, which, in turn, leads to the increased intention to use it regularly, as an educational tool (Jeong, 2023; Le & Tran, 2024). However, the challenges related to overreliance on these tools and their impact on the efficiency of the learning process are still present (Adelhardt & Eberle, 2024; Le & Tran, 2024), and the need to find a balance between the application of technology in the classroom persists. In general, a positive atmosphere that alleviates these fears and reinforces the perceived advantages can improve the learning experience with AI technologies.

According to recent research, the effects of AI tools on student learning and academic performance are multifactorial, and they are perceived to be beneficial in different educational settings. Janaki and Mariyappan (2024) also emphasised that AI-based tools may be used to facilitate personalised learning, taking into account the strengths and weaknesses of students, leading to improved understanding and retention of complex information. Furthermore, the findings of Fahira et al.'s (2022) research showed that, in addition to bringing about a positive impact on writing skills and understanding, AI tools also introduce the issue of dependency. All in all, these implications hint at the idea that the correlation between AI tools and academic performance is predetermined by the subjective experiences of students and the situational use of these technologies (Case Study of Using AI Tools in Higher E... 2025; Janaki & Mariyappan, 2024; Fahira et al., 2024; Y et al., 2024).

Perceived Learning Benefit (PLB), related to the use of AI tools, contributes to the formation of positive academic and psychological outcomes such as self-efficacy and satisfaction. It has been identified that AI-aided learning methods (including project-based learning) can lead students to achieve high-order thinking and self-efficacy more than conventional teaching practice (Zheng et al., 2024). However, the other research study has also discovered that 70 per cent of the university students have also mentioned that they feel more confident and efficient in studying academic resources with the help of AI applications (Hutapea et al., 2024). Moreover, the implementation of AI technologies has been associated with the growth of learning satisfaction that can be explained by such factors as performance expectancy and social influence (Handoko et al., 2024). The use of AI may, however, also cause anxiety that cannot be easily connected to self-efficacy, implying that, despite potentially increasing confidence, AI may also cause fear in students (Zhou, 2024). Generally, PLB acts as a decisive intermediary in improving both academic achievement and motivation constructs within school (Abbas et al., 2023).

The academic research on how students think about AI tools demonstrates that the picture is not that simple and that the perceived learning benefits (PLB) do not have a uniformly positive effect. Although most students admit that AI has made learning experiences more positive, e.g., by improving writing skills, personalisation, and motivation, most individuals are worried about the effect of AI on independent learning and critical thinking (Terriquez, 2024; Maala et al., 2024; Capinding & Dumayas, 2024). As a point of interest, many students express their concerns about over-dependence on AI that can deprive them of critical and creative thinking (Fahira et al., 2024; Schei et al., 2024). Such a discrepancy in perceptions suggests the need to present PLB as a construct owing to the acceptable ranges in the degree of dependence on AI tools in some categories of students and disciplines and the ability of these tools to initiate favorable transformations in academic performance (Terriquez, 2024; Capinding & Dumayas, 2024). In this way, the extra research should unveil these nuances so that the educational strategies could address the implementation of AI in relation to the academic learning practices (Maala et al., 2024; Schei et al., 2024).

Research Gap

Most existing studies have either examined motivation in isolation or subsumed it under the broader construct of engagement, which combines both positive and negative learning behaviours. As a result, little is known about how motivation specifically interacts with students' perceived learning benefits (PLB) of AI-assisted tools. Few studies have explicitly tested the reciprocal relationship between these two constructs. This study addresses this gap by investigating how PLB predicts motivation and, in turn, how motivation predicts PLB, thereby offering a clearer theoretical and empirical understanding of how AI tools influence student learning.
To address this gap, the present study develops and tests a reciprocal model linking student motivation and perceived learning benefits (PLB) of AI-assisted learning tools. By examining how PLB predicts motivation and, conversely, how motivation predicts PLB, the study provides a more precise theoretical and empirical understanding of how AI tools shape student learning experiences.

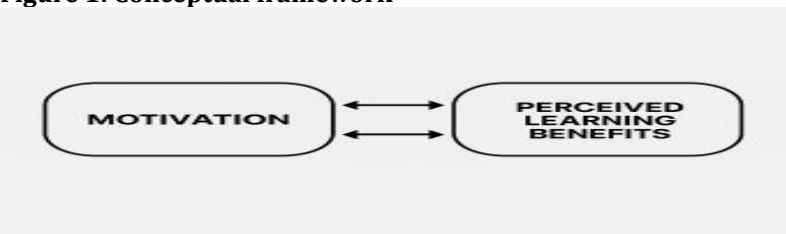
Research Objectives

RO1: To examine the effect of perceived learning benefits (PLB) of AI-assisted learning tools on student motivation.
RO2: To investigate how student motivation influences their perceived learning benefits (PLB) from AI-assisted learning tools.

Hypotheses

H1: Perceived Learning Benefits (PLB) positively predict student Motivation.
H2: Student Motivation positively predicts Perceived Learning Benefits (PLB).

Figure 1: Conceptual framework



Conceptual Framework

Figure 1 illustrates the conceptual framework for this study. It depicts the reciprocal relationship between student motivation and perceived learning benefits (PLB) in the context of AI-assisted learning tools. Motivation is conceptualised through two aspects: critical thinking and the ability to understand complex topics. PLB is represented by four dimensions: helpfulness, quality improvement, subject understanding, and academic performance.

Grounded in the Technology Acceptance Model (TAM) and motivational theories such as the ARCS model, the framework proposes that perceived usefulness (PLB) enhances student motivation, while motivated learners are more likely to recognise and value the benefits of AI-assisted tools. This bidirectional relationship suggests a reinforcing cycle, in which perceptions of usefulness strengthen motivation, and motivation in turn enhances the perception of benefits.

3. Methodology

Research Design

This study adopted a quantitative research design using a structured survey to examine the reciprocal relationship between student motivation and perceived learning benefits (PLB) of AI-assisted learning tools. A quantitative approach was deemed appropriate as it enables the empirical testing of hypothesised relationships through statistical analysis, specifically correlation and regression techniques.

Sample and Data Collection

Data were collected from 325 higher education students across multiple faculties in Malaysia, all of whom had prior exposure to AI-assisted tools such as ChatGPT or Grammarly. A convenience sampling approach was used due to accessibility and the exploratory nature of the study.

The sample size is adequate according to Krejcie and Morgan's (1970) guidelines, which recommend approximately 300 respondents for populations exceeding 10,000 at a 95% confidence level. This ensures sufficient statistical power for regression analysis while capturing the perceptions of students actively engaged with AI tools. Although convenience sampling may limit generalisability, the study provides valuable insights into early adoption patterns in the Malaysian higher education context.

Instrument Development

The survey items were adapted from established scales and prior studies to ensure validity. Motivation was measured using two items: (1) "AI tools enhance my critical thinking and problem-solving skills" and (2) "AI tools help me understand complex topics or concepts." Although two-item scales are less common, they are accepted in exploratory research when items are conceptually aligned. These items were drawn from prior work on AI's role in fostering cognitive engagement and critical thinking (Zhai, 2022; Alkaissi & McFarlane, 2023).

Perceived Learning Benefits (PLB) were measured with four items reflecting helpfulness, assignment quality, understanding of subjects, and academic performance. These were adapted from constructs of Perceived Usefulness within the Technology Acceptance Model (Jeong, 2023; Sukirman et al., 2024) and from recent studies of AI in education (Ward et al., 2024; Khairuddin et al., 2024). All items were rated on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

Data Analysis

Data were analysed using SPSS (Version 28). Several statistical procedures were conducted:

- Descriptive statistics summarised the distribution of motivation and PLB.
- Reliability analysis assessed internal consistency, yielding Cronbach's alpha coefficients of .660 for motivation (acceptable for a two-item scale) and .604 for PLB (adequate for exploratory research).
- Pearson correlation analysis examined the association between motivation and PLB.
- Regression analysis tested the reciprocal hypotheses: that PLB positively predicts motivation (H1) and that motivation predicts PLB (H2). Statistical significance was set at $p < .05$.

4. Results

This section presents the results of the statistical analyses, including reliability, correlations, and regression tests of the study constructs.

Reliability

Table 1 presents the results of the reliability analysis for the study constructs. The Motivation scale achieved an acceptable level of internal consistency (α = .660), while the Perceived Learning Benefits (PLB) scale demonstrated moderate reliability (α = .604), which is considered adequate for exploratory research.

Table 1: Reliability Statistics

Construct	Items	Cronbach's Alpha	Interpretation
Motivation	2	0.660	Acceptable (2-item scale)
Perceived Learning Benefits	4	0.604	Moderate, exploratory use

Reliability analysis was conducted to assess the internal consistency of the scales used in this study. The Motivation construct, measured using two items (critical thinking and understanding complex topics), achieved a Cronbach's alpha of .660. Although this value is slightly below the conventional threshold of .70, it is considered acceptable for a two-item scale in exploratory research, particularly when both items are conceptually aligned and moderately correlated. This indicates that the two items provide a reasonably consistent measure of student motivation.

The Perceived Learning Benefits (PLB) construct, which included four items (helpfulness, quality improvement, understanding subjects, and academic performance), yielded a Cronbach's alpha of **.604**. While this value is lower than the desired benchmark of .70, it remains within an acceptable range for exploratory studies in educational research. The relatively modest alpha suggests that although the items are related, they capture slightly different facets of students' perceptions of AI-assisted tools. This implies that PLB is a multi-dimensional construct encompassing several aspects of perceived benefits.

Correlations

Table 2 shows the Pearson correlation between Motivation and PLB. The results indicate a moderate, positive, and statistically significant relationship ($r = .428$, $p < .001$), suggesting that students who perceive greater learning benefits from AI-assisted tools also report higher motivation.

Table 2: Correlation

Variables	1	2
1. Motivation	—	
2. Perceived Learning Benefits	.428**	—

Note. N = 325. **p** < .001.

Correlation Analysis

Correlation analysis was conducted to examine the bivariate association between Motivation and PLB. The results revealed a moderate, positive, and statistically significant correlation ($r = .428$, $p < .001$). This finding indicates that students who reported higher perceived benefits from AI-assisted tools—such as finding them helpful, improving the quality of their work, and enhancing their academic performance—were also more likely to report higher levels of motivation. Conversely, students with stronger motivation tended to perceive AI tools as more beneficial to their learning. The strength and significance of this correlation support the proposition that the two constructs are closely related and mutually reinforcing.

Table 3 summarises the regression analyses used to test the hypothesised reciprocal relationships. The results confirm that PLB significantly predicts Motivation ($\beta = .428$, $p < .001$), explaining 18.3% of the variance. Conversely, Motivation also significantly predicts PLB ($\beta = .428$, $p < .001$), with the same amount of explained variance ($R^2 = .183$). These findings provide strong support for both hypotheses.

Table 3: Regression

Model	Dependent Variable	β	R^2	F	Sig.
H1: PLB → Motivation	Motivation	.428**	.183	72.48	<.001
H2: Motivation → PLB	PLB	.428**	.183	72.48	<.001

Note. N = 325. **p** < .001.

Regression Analysis

The regression models showed that PLB and Motivation significantly predicted each other, with R^2 = 0.183. While this indicates that approximately 18% of the variance is explained by the model, such values are typical in behavioural and educational research where multiple external factors influence learning outcomes (Hair et al., 2010). Importantly, the moderate correlation (r = .428, p < .001) and significant regression coefficients (β = .428, p < .001) highlight the practical importance of the reciprocal link.

These findings underscore that PLB and motivation, although not exhaustive predictors of each other, form a mutually reinforcing cycle. Students who perceive AI-assisted tools as beneficial are more motivated, and motivated learners are more likely to recognise these benefits. The results, therefore, contribute evidence of reciprocity while also signalling the need for models with broader constructs (e.g., self-efficacy, study habits, or academic engagement) in future work.

Discussion

The present study investigated the reciprocal relationship between student motivation and perceived learning benefits (PLB) of AI-assisted learning tools in higher education. The findings provide robust evidence that the two constructs are strongly interrelated, with significant predictive effects in both directions. This suggests that motivation and perceptions of AI's benefits reinforce each other, forming a mutually reinforcing cycle.

First, PLB was found to predict student motivation significantly. Students who perceived AI tools as helpful, capable of improving the quality of assignments, and enhancing their understanding of subjects reported higher levels of motivation. This finding is consistent with prior studies demonstrating that AI tools reduce cognitive workload and provide personalised learning support, thereby stimulating student engagement (Zhai, 2022; Alkaissi & McFarlane, 2023; Elbadiansyah et al., 2024). From a theoretical perspective, this supports the Technology Acceptance Model (TAM), in which perceived usefulness drives learning behaviour, and aligns with the ARCS model, where relevance and confidence are enhanced through AI-enabled feedback and support.

Second, the results indicate that student motivation also predicts PLB. Motivated learners are more likely to adopt AI tools actively and to perceive them as beneficial. This resonates with findings by Heil et al. (2023, 2024) and Suntharalingam (2023, 2024), who emphasised that students' attitudes and motivational states strongly influence their engagement with digital technologies. In line with Self-Determination Theory (SDT), motivated students tend to exercise autonomy and competence in their learning processes, which enhances their recognition of the benefits of AI-assisted tools. Together, these results extend prior research by confirming that motivation and PLB are not unidirectional but reciprocally reinforcing constructs.

The reliability analysis further highlighted that while the motivation construct achieved acceptable internal consistency, PLB demonstrated only moderate reliability. This suggests that PLB is not a monolithic construct but rather multidimensional, encompassing usefulness, quality improvement, understanding, and academic performance. This nuance enriches the literature by positioning PLB as a construct requiring refinement and validation, for instance, through confirmatory factor analysis or expansion of item sets in future studies.

From a practical perspective, the findings underscore the importance of making the benefits of AI tools visible to students. When learners clearly recognise AI's contributions to understanding and performance, their motivation increases. Conversely, motivated students are more likely to engage deeply with AI, reinforcing positive academic outcomes. For educators, this means that AI tools should be integrated not simply as supplementary aids, but as active resources in teaching and assessment strategies. For higher education institutions, the results point to the need for policies, training, and guidelines that help students use AI responsibly while maximising its benefits. In the Malaysian and ASEAN context, where digital transformation

in education is rapidly accelerating, these findings provide timely insights for balancing innovation with academic integrity and independent learning.

In summary, this study contributes to the literature by replacing the broad construct of engagement with the more focused construct of PLB and by empirically demonstrating the reciprocal relationship between PLB and motivation. This dual contribution advances both theoretical clarity and practical implications for higher education. The findings suggest that strategies aimed at enhancing either construct—motivation or perceived learning benefits—are likely to strengthen the other, thereby supporting improved learning outcomes in the digital era.

5. Conclusion

This study examined the reciprocal relationship between student motivation and perceived learning benefits (PLB) in the context of AI-assisted learning tools. Based on data from 325 higher education students, the results indicate that both motivation and PLB are rated highly, and they reinforce each other in a bidirectional manner. Regression analyses confirmed that PLB significantly predicts motivation and, conversely, motivation significantly predicts PLB. These findings highlight that when students recognise the helpfulness, quality improvements, subject understanding, and performance gains associated with AI tools, they become more motivated; in turn, motivated students are more likely to perceive these benefits.

The study contributes to the literature by replacing broad and inconsistent measures of engagement with PLB, a more focused construct that captures the positive outcomes of AI use. By distinguishing PLB from motivation, this research offers a clearer theoretical and empirical framework for understanding how AI tools shape learning in higher education.

From a practical perspective, the findings suggest that educators should integrate AI strategically to highlight its usefulness in improving learning outcomes. At the same time, institutions should provide training and policies that guide responsible use. At a policy level, the results are relevant to higher education systems in Malaysia and the wider ASEAN region, where digital transformation is rapidly advancing. Overall, the study confirms that motivation and PLB form a mutually reinforcing cycle, underscoring the importance of approaches that simultaneously enhance both constructs. Future research should refine the PLB construct with more robust measurement, apply longitudinal designs, and explore cross-cultural comparisons to deepen understanding of how AI-assisted tools influence learning globally.

Practical Implications

For Educators: AI-assisted tools should be integrated strategically to highlight their learning benefits, as students' perceptions of usefulness and academic value are strongly tied to motivation. Classroom practices that emphasise how AI enhances understanding and improves assignment quality can reinforce both motivation and perceived benefits.

For Institutions: Training programmes and policy guidelines are needed to showcase AI's positive contributions to student learning. Institutions are encouraged to design frameworks that promote responsible and ethical AI use, ensuring that students maximise its benefits without fostering over-reliance or academic integrity concerns.

For Researchers: This study highlights the importance of refining the construct of PLB. Future studies could expand the scale with additional items to enhance reliability and investigate its relationship with broader outcomes, such as self-regulated learning, critical thinking, and academic achievement across diverse disciplines.

Limitations and Future Research

Several limitations should be noted. First, the motivation construct was measured with only two items, which, though conceptually aligned and reliable for exploratory purposes, had limited dimensionality. Future studies should adopt multi-item scales grounded in ARCS or SDT frameworks to capture the full spectrum of motivation. Second, the PLB scale achieved only moderate internal consistency ($\alpha = .604$), suggesting the need for refinement. Expanding item sets and applying confirmatory factor analysis would strengthen construct validity.

Third, the R^2 value of 18% indicates modest explanatory power. While consistent with behavioural research norms, it suggests that additional constructs such as self-efficacy, critical thinking, and self-regulated learning should be incorporated to explain the dynamics of motivation and PLB better.

Finally, the use of convenience sampling in one national context limits generalisability. Future research should employ stratified or random sampling across multiple cultural and institutional contexts, ideally with longitudinal designs, to validate the reciprocal relationship.

References

Abbas, N., Ali, I. B., Manzoor, R., Hussain, T., & Hussain, M. (2023). *Role of Artificial Intelligence Tools in Enhancing Students' Educational Performance at Higher Levels*. https://doi.org/10.55529/jaimlnn.35.36.49

Abdurrahman, A. R., Rizki, M. B., & Pradana, R. B. (2024). Pengaruh penggunaan ai terhadap kompetensi dan motivasi belajar mahasiswa. *JATI (Jurnal Mahasiswa Teknik Informatika)*, *9*(1), 201–210. https://doi.org/10.36040/jati.v9i1.12205

Adelhardt, Z., & Eberle, T. S. (2024). The 4I Model of Benefits and Its Integration with the Technology Acceptance Model (TAM): Teenagers' Perspectives on Using ChatGPT for Homework. *Proceedings of the International Conference on AI Research*, *4*(1), 1–9. https://doi.org/10.34190/icair.4.1.3205

Alkaissi, H., & McFarlane, S. I. (2023). Artificial hallucinations in ChatGPT: Implications in scientific writing. Cureus. https://doi.org/10.7759/cureus.35179

Ambarita, N., & Nurrahmatullah, Muh. F. (2024). Impacts of Artificial Intelligence on Student Learning: A Systematic Literature Review. *Jurnal Varidika*, 13–30. https://doi.org/10.23917/varidika.v36i1.4730

Anjarani, S., Furqon, M., & Rakhmawati, F. (2024). ChatGPT to foster students' engagement in writing class: An intervention study. Voices of English Language Education Society, 8(3). https://doi.org/10.29408/veles.v8i3.27687

Anjum, F., Raheem, B. R., & Ghafar, Z. N. (2025). The impact of ChatGPT on enhancing students' motivation and learning engagement in second language acquisition: Insights from students. Journal of e-learning Research, 3(2), 1-11. https://doi.org/10.33422/jelr.v3i2.679

Bilad, M. R., Yaqin, L. N., & Zubaidah, S. (2023). Recent Progress in the Use of Artificial Intelligence Tools in Education. *Jurnal Penelitian Dan Pengkajian Ilmu Pendidikan*. https://doi.org/10.36312/esaintika.v7i3.1377

Capinding, A. T., & Dumayas, F. T. (2024). Transformative pedagogy in the digital age: unraveling the impact of artificial intelligence on higher education students. *Problems of Education in the 21st Century*, *82*(5), 630–657. https://doi.org/10.33225/pec/24.82.630

Carrasco Valenzuela, A. C., Martínez García, V. M., Vázquez Meza, J. A., Y Díaz Romero, Y. (2024). Percepción de los estudiantes sobre el uso de la inteligencia artificial en el nivel superior. *REDTIS*, *8*(1), 154–162. https://doi.org/10.61530/redtis.vol8.n1.2024.187

Case Study of Using AI Tools in Higher Education. (2025). *Advances in Educational Technologies and Instructional Design Book Series*, 105–138. https://doi.org/10.4018/979-8-3693-3474-4.ch005

Chan, S., Lo, N., & Wong, A. (2024). Generative AI and essay writing: Impacts of automated feedback on revision performance and engagement. rEFLections, 31(3), 1249-1284. https://doi.org/10.61508/refl.v31i3.277514

Chan, T. M., Purdy, E., & Thoma, B. (2024). In reply to Chow et al. https://doi.org/10.32920/27926454

Chen, C., & Gong, Y. (2025). The Role of AI-Assisted Learning in Academic Writing: A Mixed-Methods Study on Chinese as a Second Language Students. *Education Sciences*. https://doi.org/10.3390/educsci15020141

Chen, L. (2024). Unlocking the Beat: How AI Tools Drive Music Students' Motivation, Engagement, Creativity, and Learning Success. *European Journal of Education*. https://doi.org/10.1111/ejed.12823

Elbadiansyah, Z. H., Sain, U. S., Lawal, C. C., & Thelma, A. L. A. (2024). Exploring the Role of Artificial Intelligence in Enhancing Student Motivation and Cognitive Development in Higher Education. *Techcomp Innovations*, *1*(2), 59–67. https://doi.org/10.70063/techcompinnovations.v1i2.47

Fahira, A. N., Siagian, C., Simarmata, D. Y., Manik, S. F., & Natsir, M. (2024). The Impact of AI Usage in Supporting English Literature Students' Learning. *Indonesian Journal of Education and Development Research*, *3*(1), 756–762. https://doi.org/10.57235/ijedr.v3i1.4921

Gutiérrez Terriquez, M. C. (2024). Percepción de estudiantes de nivel medio superior respecto al uso de Inteligencia Artificial como herramienta de aprendizaje. Caso de estudio. *Latam*, *5*(4). https://doi.org/10.56712/latam.v5i4.2369

Handoko, B. L., Thomas, G. N., & Indriaty, L. (2024). *Adoption and Utilisation of Artificial Intelligence to Enhance Student Learning Satisfaction*. 1–6. https://doi.org/10.1109/iciss62896.2024.10751260

Heil, J., Delcker, J., Ifenthaler, D., Seufert, S., & Spirgi, L. (2024). KI-Kompetenz zu Studienbeginn als Prädiktor für die Nutzung von KI-Werkzeugen zur Unterstützung von Lernprozessen. *Informatik Spektrum*. https://doi.org/10.1007/s00287-024-01570-2

Huang, H.-W., & Chang, T.-S. (2024). *Students' Motivation and Perceptions in an AI Chatbot-based Climate Change Classroom*. 55–60. https://doi.org/10.1109/isai63299.2024.00020

Hutapea, E., Hutabalian, R., & Hartati, R. (2024). Summarising AI Application on Student Learning Efficiency in Understanding Academic Reading Materials. *Indonesian Journal of Education and Development Research*, *3*(1), 737–745. https://doi.org/10.57235/ijedr.v3i1.4878

Jahani, M., Baruah, B., & Ward, A. E. (2024). *Exploring ChatGPT Utilization Among Master's Students in Higher Education*. https://doi.org/10.1109/ithet61869.2024.10837601

Janaki, T., & Mariyappan, M. (2024). Exploring the Influence of AI-Powered Learning Tools on Student Understanding and Academic Performance: A Comprehensive Analysis. *Shanlax International Journal of Management*. https://doi.org/10.34293/management.v11is1-may.7834

Jegede, O. O. (2024). *Artificial Intelligence and English Language Learning: Exploring the Roles of AI-Driven Tools in Personalizing Learning and Providing Instant Feedback*. https://doi.org/10.70315/uloap.ullli.2024.0102002

Jeong, H. (2023). Exploring Learner Acceptance of ChatGPT for Educational Utilization: Focusing on the Structural Relationships Among Perceived Ease of Use, Perceived Usefulness, Attitude, and Intention to Continuously Use. *Gyoyug Munje Yeon'gu*. https://doi.org/10.24299/kier.2023.364.1

Khairuddin, Z., Shahabani, N. S., Ahmad, S. N., Ahmad, A. R., & Zamri, N. A. (2024). Students' Perceptions of The Artificial Intelligence (AI) Tools As Academic Support. *Malaysian Journal of Social Sciences and Humanities*, *9*(11), e003087. https://doi.org/10.47405/mjssh.v9i11.3087

Krause, S., Panchal, B. H., & Ubhe, N. (2024). The Evolution of Learning: Assessing the Transformative Impact of Generative AI on Higher Education. *arXiv.Org*. https://doi.org/10.48550/arxiv.2404.10551

Krejcie, R.V., & Morgan, D.W. (1970). Determining Sample Size for Research Activities. Educational and Psychological Measurement, 30, 607-610. https://doi.org/10.1177/001316447003000308

Lalira, J. E., Pangemanan, Y. A. T., Scipio, J. E., Lumi, S., Merentek, T. Ch., & Tumuju, V. N. (2024). Evaluating the Impact of AI Tools on Grammar Mastery: A Comparative Study of Learning Outcomes. *VELES (Voices of English Language Education Society)*. https://doi.org/10.29408/veles.v8i3.27856

Le, M., & Tran, K. N. (2024). Vietnamese University Students' Perceptions of ChatGPT for Homework Assistance. *International Journal of Interactive Mobile Technologies*, *18*(15), 190–204. https://doi.org/10.3991/ijim.v18i15.48819

Leny, L. (2024). Peningkatan Motivasi Belajar Siswa dalam Pembelajaran Melalui Penggunaan Artificial Intellgence. *Prosiding Seminar Nasional Fakultas Tarbiyah Dan Ilmu Keguruan IAIM Sinjai*, *3*, 47–53. https://doi.org/10.47435/sentikjar.v3i0.3133

Maala, G. L. I., Montoya, L. M., Pampan, F. N., Cahapin, E., Anciro, E., & Malabag, B. (2024). Exploring the Impact of AI Tools on Student Learning Through Text Mining. *Journal of Interdisciplinary Perspectives*, *3*(1). https://doi.org/10.69569/jip.2024.0602

Mallillin, L. L. D. (2024). Artificial Intelligence (AI) Towards Students' Academic Performance. *Innovare Journal of Education*, 16–21. https://doi.org/10.22159/ijoe.2024v12i4.51665

Montañez Díaz de León, T. I., Morell Pérez, L., Gutiérrez Morales, E. P., y Hernández Ramos, H. (2024). Impacto de la Inteligencia Artificial en el aprendizaje de los nuevos estudiantes de la Universidad Estatal Amazónica. *Revista Cognosis*, *9*(2), 133–143. https://doi.org/10.33936/cognosis.v9i2.6443

Narbayeva, M. X. (2024). Integrating educational technology for enhancing project-based learning motivation in students. *American Journal Of Social Sciences And Humanity Research*, *4*(11), 156–160. https://doi.org/10.37547/ajsshr/volume04issue11-20

Rohana, D. D. A., Ardhiansyah, A. N., & Widodo, D. P. (2024). *Digital learning with artificial intelligence (AI): the correlation of AI to student learning motivation*. *1*(1), 198–209. https://doi.org/10.31316/icasse.v1i1.6913

Ronsumbre, S., Rukmawati, T., Sumarsono, A., & Waremra, R. S. (2023). Pembelajaran Digital Dengan Kecerdasan Buatan (AI): Korelasi AI Terhadap Motivasi Belajar Siswa. *Journal Educatio FKIP UNMA*, *9*(3), 1464–1474. https://doi.org/10.31949/educatio.v9i3.5761

Sasikala, P., & Ravichandran, R. (2024). Study on the Impact of Artificial Intelligence on Student Learning Outcomes. *Journal Of Digital Learning And Education*, *4*(2), 145–155. https://doi.org/10.52562/jdle.v4i2.1234

SASIREKHA, D. (2024). Influence of artificial intelligence (AI) tools on the research capabilities of college students. *International Journal of Scientific Research in Engineering and Management*, 08(10), 1-7. https://doi.org/10.55041/ijsrem37999

Schei, O. M., Møgelvang, A., & Ludvigsen, K. (2024). Perceptions and Use of AI Chatbots among Students in Higher Education: A Scoping Review of Empirical Studies. *Education Sciences*, *14*(8), 922. https://doi.org/10.3390/educsci14080922

Subbiah, A. (2024). *Enhancing Learner Motivation and Academic Achievement* (pp. 270–288). IGI Global. https://doi.org/10.4018/979-8-3693-3609-0.ch012

Sukirman, S., Supriyanto, E., Setiawan, A., Chamsudin, A., Yuliana, I., & Wantoro, J. (2024). *Exploring Student Perceptions and Acceptance of ChatGPT in Enhanced AI-Assisted Learning*. https://doi.org/10.1109/siml61815.2024.10578145

Suntharalingam, H. (2024). Enhancing Digital Learning Outcomes Through the Application of Artificial Intelligence: A Comprehensive Review. *International Journal of Innovative Science and Research Technology*. https://doi.org/10.38124/ijisrt/ijisrt24apr530

Suwadi, S. (2023). *A Utilization of Artificial Intelligence in Learning Writing in Higher Education*. https://doi.org/10.29062/edu.v7i2.768

Tang, R. (2024). A Case Study on College Students' Strategies for Employing Artificial Intelligence in Writing a Second Language Thesis. *Arts, Culture, and Language*. https://doi.org/10.61173/7y8s5n95

Uppal, K., & Hajian, S. (2024). Students' Perceptions of ChatGPT in Higher Education: A Study of Academic Enhancement, Procrastination, and Ethical Concerns. *European Journal of Educational Research*. https://doi.org/10.12973/eu-jer.14.1.199

V, S., & S, J. (2024). Impact of Artificial Intelligence in Education. *Shanlax International Journal of Management*. https://doi.org/10.34293/management.v11is1-mar.7992

Varghese, R. M. (2024). *Transforming education with AI: Embracing ChatGPT and Addressing Challenges for the future*. https://doi.org/10.58532/v3bhma17p2ch4

Ward, B., Bhati, D., Neha, F., & Guercio, A. (2024). *Analysing the Impact of AI Tools on Student Study Habits and Academic Performance*. https://doi.org/10.48550/arxiv.2412.02166

Y, M. N., H. L. P., & N. S. (2024). Revolutionizing Education: Harnessing AI for Personalized Learning Pathways and Student Success. *International Journal For Multidisciplinary Research*. https://doi.org/10.36948/ijfmr.2024.v06i05.28371

Zhai, X. (2022). ChatGPT user experience: Implications for education. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.4312418

Zheng, R., Huifen, X., Wang, M., & Lu, J. (2024). The Impact of Artificial General Intelligence-assisted Project-Based Learning on Students' Higher Order Thinking and Self-efficacy. IEEE Transactions on Learning Technologies, 1–8. https://doi.org/10.1109/tlt.2024.3488086

Zhou, J. (2024). The Impact of AI Use on College Students' Academic Self-efficacy: Exploring the Mediating Role of Anxiety. *Lecture Notes in Education Psychology and Public Media*, *75*(1), 139–146. https://doi.org/10.54254/2753-7048/2024.17925

Zhou, X., Zhang, J., & Chan, C. (2024). Unveiling Students' Experiences and Perceptions of Artificial Intelligence Usage in Higher Education. *Journal of University Teaching and Learning Practice*. https://doi.org/10.53761/xzjprb23