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Influence of Artificial Intelligence on Enhancing the Learning Process in Tourism Management Education

Chen Jiamin 

Universiti Kebangsaan Malaysia
 Bangi, Malaysia

Intan Farahana Kamsin* 

Universiti Kebangsaan Malaysia
 Bangi, Malaysia

Abstract. Artificial intelligence is an important element of higher education, which eventually affects the quality of teaching, learning, and students' learning outcomes. Although it is adopted widely in practice, there is little empirical evidence available on how it influences the learning process of students in education related to tourism management. Thus, this study aims to explore the association between the frequency of using AI and two important elements related to learning such as self-efficacy and motivation for learning among undergraduates majoring in tourism management. Based on Self-Determination Theory and Adaptive Learning Theory, the study has employed a quantitative research method. For this research, survey data were collected from three universities' tourism management undergraduates (N = 300) by a structured questionnaire. Descriptive statistics were applied to briefly describe the data. Further, the simple linear regression analyses were conducted to look at the relationships between AI usage frequency, self-efficacy, and learning motivation. The findings show that AI utilization

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*Corresponding Author: Intan Farahana Kamsin; intanfarahanakamsin@ukm.edu.my

was positively linked to both constructs, and it significantly predicted these factors in the regression models. The results suggest that AI-supported learning environments may strengthen students' confidence and motivation through personal feedback, adaptive learning support, and flexible learning experiences. This study offers evidence of the influence of AI on undergraduate students' learning processes in tourism management education. Practically, the results offer useful insights for educators, universities, and government officials to support the effective integration of AI-assisted learning tools within higher education to enhance the learning process.

Keywords: Artificial intelligence; tourism management education; self-efficacy; learning motivation

1. Introduction

The growing adoption of Artificial Intelligence (AI) is driving substantial changes in higher education, influencing teaching methods, learning resource distribution, and teacher-student engagement. In recent years, AI has been extensively adopted across various educational disciplines, including mathematics (Awang et al., 2025; Hwang & Tu, 2021), medicine (Charow et al., 2021; Duffourc & Gerke, 2023; Ng et al., 2023), marketing (Soni, 2023), and computer science (Gaitantzi & Kazanidis, 2025; Tlili, 2024). This integration is supported by AI's ability to create personalized learning experiences, generate instructional content, offer timely feedback, and support student assessment. These functions may enhance the effectiveness of learning and improve academic outcomes.

Outside of schools, AI tools have been increasingly used in the tourism and hospitality industry for customer service, demand forecasting, pricing decisions, and marketing analysis (Dogru et al., 2024; Filieri et al., 2021; Kong et al., 2022; Samara et al., 2020). With the continued evolution of technology, more and more employers are concerned about the ability of graduates to understand and use AI-enabled tools. Because of this shift, those running tourism management education want to include AI knowledge and hands-on experience in their programs. This way, students can develop both technical skills and the ability to evolve in a fast-changing field.

Tourism management education is essential for preparing students for careers in the tourism industry. Along with providing subject knowledge, these programs are increasingly expected to equip students with skills to work with new technologies like AI. Despite the growing use of AI in tourism-related businesses, integrating AI into tourism management education has not received much

attention and is still developing (Ivanov et al., 2020). Current teaching methods mainly rely on traditional lectures and textbook-based instruction, with little depth and range in technology-assisted learning (Hsu, 2018; Ye & Law, 2021). This situation may lessen students' attention and interest in learning, weaken their confidence and motivation, widen the gap between theory and practical application, and ultimately cause a disconnect between students and relevant industry technologies. The existing literature has predominantly examined how AI is applied and what impacts it has in broad higher education environments (Crompton & Burke, 2023; Michel-Villarreal et al., 2023; Ouyang et al., 2022). However, empirical studies specifically examining AI utilization within tourism management remain limited, despite the discipline's strong industry relevance and practical orientation.

More importantly, existing studies tend to emphasize the general adoption and perception of AI technologies (Alyoussef et al., 2025; Granić, 2025; Lin et al., 2025; Sami et al., 2025), while limited attention and insufficient empirical evidence have been given to students' psychological learning processes, particularly self-efficacy and learning motivation, within environments supported by AI technologies. Besides, limited research has operationalized AI utilization through behavioral or frequency-based indicators, particularly in capturing students' learning-related engagement patterns in higher education contexts.

Therefore, this study attempts to bridge the identified research gap by exploring the association between AI utilization and undergraduate students' self-efficacy and learning motivation within tourism management education. In doing so, it makes three important contributions to the current knowledge. First, it expands AI research by focusing on tourism management education as a domain-specific context. Second, it enriches existing literature by providing empirical support for the association between AI utilization and students' learning processes. Third, it enhances understanding of how AI-supported learning environments influence students' confidence and motivation in higher education.

Based on the identified research gap and its expected contributions, here are the research questions:

RQ1: What is the Demographic Profile of the Participants and their AI utilization?

RQ2: Does the utilization of AI technology significantly enhance undergraduate students' self-efficacy in tourism management education?

RQ3: Does the utilization of AI technology significantly enhance undergraduate students' learning motivation in tourism management education?

The following null hypotheses are proposed:

H₀₁: The utilization of AI technology does not significantly enhance

undergraduate students' self-efficacy in tourism management education.

H₀₂: The utilization of AI technology does not significantly enhance undergraduate students' learning motivation in tourism management education.

2. Literature Review

2.1 Tourism Management Education

Tourism management education serves as a key foundation for developing future professionals. These graduates are expected to meet the demands of a rapidly changing and technology-driven industry. As global tourism grows, universities need to prepare graduates with theoretical knowledge and the ability to adjust to new technologies through digital skills (Sharma & Munjal, 2023). On the other hand, the more complex tourism markets and changes in service standards have led the industry to expect more from graduates, not only the acquisition of academic knowledge but also practical and applied competencies (McKercher et al., 2023).

From this perspective, tourism management education contributes significantly to the sustainable development of the tourism industry. The curriculum content and practical learning experiences provided by tourism education can significantly influence students' engagement, learning motivation, and confidence in performing industry-related tasks (Kunwar, 2018). However, existing studies on tourism management education have primarily focused on curriculum transformation and industry-oriented talent development (Hsu, 2018), teaching approaches and experiential learning methods (He & Zhang, 2025; Kim & Jeong, 2018), online and technology-enhanced education (Hsu, 2018; Kim & Jeong, 2018), together with embedding emerging technologies and digital competencies into tourism curriculum design (Başer et al., 2025).

Although these studies underscore the significance of technology in tourism education, relatively little empirical work has examined how AI-supported learning environments affect students' learning processes, particularly self-efficacy and learning motivation. Evidence on this relationship remains underdeveloped in tourism management education.

2.2 Artificial Intelligence in Higher Education

In recent years, AI has received growing attention as an effective technology for enhancing teaching and learning experiences across educational contexts. In higher education, AI is fast becoming a part of teaching and learning processes through intelligent tutoring systems (Fitria, 2021), adaptive learning environments, automated content generation tools, and systems for providing personalized feedback (Moreno-Guerrero et al., 2020). Technology can facilitate

more flexible learning pathways and timely instructional feedback, both of which have the potential to shape students' cognitive engagement and motivational states, including self-efficacy and learning motivation.

Challenges are many in the application of AI to enhance learning. Much concern has been raised over the output of AI models and how reliable they are to be contextually appropriate and accurate. Data privacy and security issues in student-related information are major concerns. Overreliance on AI tools that could hamper the creativity of students is also a concern. Lack of clear pedagogical models is another barrier to the use of AI in teaching practices (Mayorga et al., 2024). Such barriers only add complexity to the adoption of AI within institutional learning environments.

Most current studies on AI in education focus on mathematics (Awang et al., 2025), English language teaching (Landi Amos, 2025), and medical education (Schubert et al., 2025; Sorte et al., 2025). AI has been discussed in these contexts primarily in relation to its roles in instructional support, automated assessment, adaptive learning environments, curriculum design, and the enhancement of student learning outcomes.

However, far less attention has been given to tourism management education, particularly on how AI-supported learning environments shape the learning process of students. In particular, the effects of AI use on psychological and motivational factors such as self-efficacy and learning motivation are still underexplored. This would seem to suggest that empirical research in this area is still very much in its infancy. Accordingly, a more focused investigation is needed to better understand how the use of AI impacts the learning process of students in tourism management education.

2.3 Learning Process

The learning process is widely seen as a key factor in student development within educational research. In this study, it is conceptualized in terms of two key dimensions, namely self-efficacy and learning motivation, which are commonly used to reflect students' cognitive and motivational learning states.

2.3.1 Self-efficacy

Self-efficacy is the belief in one's own ability to organize and carry out the actions needed to handle future situations. It is a measure of perceived capability rather than actual performance (Waddington, 2023). Students in AI-based learning environments receive constant feedback from adaptive learning systems and tasks based on simulation. This kind of learning experience allows them to make slow but sure progress and gradually build a sense of attainment, which is translated

into confidence in their abilities. Self-efficacy is widely recognized within higher education as a key factor that influences student engagement and persistence in their learning tasks, and eventually, their academic achievements.

Most previous studies, conducted in technology-supported learning environments, have looked at the relationship between learning experiences, individual differences, digital tools, and how these factors contribute to students' confidence in achieving positive learning outcomes mainly in STEM disciplines and wider higher education settings (Bećirović et al., 2025; Duong, 2026; Power et al., 2025). Although there is more research being published, studies on self-efficacy in AI-supported learning environments are still limited. This is especially the case for tourism management education. More empirical research is required to understand how these environments affect students' self-efficacy in this field.

2.3.2 Learning motivation

Learning motivation is widely regarded as one of the strongest predictors of academic performance. According to expectancy-value theory, motivation is influenced by learners' expectations regarding their likelihood of success. It is also shaped by how important they perceive the learning outcomes to be. Motivated learners display stronger curiosity, persistence, and self-regulated learning strategies, contributing to improved academic performance (Derakhshan et al., 2021).

Apart from individual expectancy and value, motivation is widely recognized as a complex and contextually dependent construct. Learning motivation is gradually built through the interaction of learner traits, instructional support, course design, instruction techniques, and the whole learning environment. Motivation springs from the connection between personal factors and contextual condition (Xu, 2024). These views suggest that motivation should not be seen as a fixed internal trait. It develops and changes as learners interact with their learning environments. In AI-supported learning settings, motivation levels can be influenced by interactive learning systems, tailored learning paths, and timely feedback. These features help keep learners engaged, improve their sense of task relevance, and encourage ongoing effort.

Research on learning motivation has been widely conducted across various educational fields and settings. For example, earlier studies have examined the impact of immersive technologies on learning motivation (Jiang & Fryer, 2024), the role of motivation in linking cognitive load and learning performance (Poupard et al., 2025), and the effects of social and contextual factors on motivational development (Shao et al., 2024).

Though research on learning motivation has grown in recent years, studies focusing on AI-supported learning environments are still limited. Specifically, there is not enough evidence on how these environments affect students' learning motivation in tourism management education. This highlights the need for more empirical research on the impact of AI-based learning environments on students' motivation to learn.

2.4 Theoretical Foundations

2.4.1 Adaptive learning theory

Even though there is not one individual who can be credited with the establishment of the theory of adaptive learning, Peter Brusilovsky is widely recognized as one of the leading contributors to this field. He has been one of the major driving forces behind its evolution and growth since his initial research on adaptive hypermedia instructional systems contributed to the conceptual foundation of the field. The Adaptive Learning Theory focuses on customizing the instructional content, the pace at which learning occurs, the difficulty of tasks, and the feedback given based on the individual characteristics and needs of the learner (Jung et al., 2019).

In AI-enabled learning environments, adaptive systems operationalize this principle through actively altering learning pathways in response to student performance, supplying personalized learning materials, and giving immediate feedback. They are more flexible and learner-centered than the traditional one-size-fits-all pedagogical approaches, but their use in actual learning settings may still be constrained by realistic considerations (Shemshack & Spector, 2020). As learning is gradually scaffolded through adaptive support and mastery-oriented progression, students are more likely to experience incremental success, which in turn enhances their perceived competence and confidence in completing academic tasks.

Previous studies have used adaptive learning theory to account for the ways by which technology-enhanced instructional systems optimize learning through individualized instruction and feedback components (Isaeva et al., 2025; Shi & Liu, 2025). However, these have mostly been general technology-enhanced learning contexts and very little attention has been paid to domain-specific educational settings such as tourism management education. In this study, therefore, adaptive learning theory is used as the main framework to explain how the use of AI affects students' self-efficacy in tourism management education, particularly concerning personalized learning experiences and feedback.

2.4.2 Self-determination theory

Motivation can be defined as the degree to which basic psychological needs are satisfied, which leads to student engagement in learning activities. Autonomy, competence, and relatedness represent the basic needs. When these needs are satisfied, intrinsic motivation is enhanced. People who have satisfied these needs will willingly do something because it is interesting or enjoyable and will continue to be involved in the activity. Recent studies have further confirmed that the fulfillment of these psychological needs in modern learning environments continues to support students' motivation effectively (Bureau et al., 2022; Hsu et al., 2019).

In AI-supported learning environments, these psychological needs may be supported through personalized learning pathways, adaptive feedback, and interactive learning opportunities. For example, AI systems may promote learner autonomy by allowing students to regulate their learning speed. They can also improve competence through timely and personalized feedback. In addition, they foster relatedness through interactive or collaborative learning features. Therefore, AI-supported learning environments may serve as an important factor in shaping students' learning motivation.

Previous studies have widely applied Self-Determination Theory in educational contexts such as language learning, online learning, and technology-supported learning to explain learners' motivational development, learning behaviors, and learning outcomes (Alamer et al., 2025; Yang et al., 2025). However, existing studies have rarely explored how Self-Determination Theory is applied within AI-supported learning environments, especially in the context of tourism management education.

Therefore, Self-Determination Theory is adopted to guide the theoretical foundation of this study. It is used to explain how AI utilization may influence undergraduate students' learning motivation in tourism management education. The effect is closely linked to whether learners' basic psychological needs are satisfied.

3. Methodology

3.1 Research Design

The study used a quantitative design, focusing on how AI technology utilization is related to undergraduate students' self-efficacy and learning motivation in tourism management education. A cross-sectional survey approach was used in this research, with data collected at one specific point in time from students enrolled in three universities across different regions of China.

The use of a quantitative approach was justified by the study's objective of hypothesis testing and the statistical examination of relationships among variables in terms of their magnitude and direction. A structured questionnaire and quantitative data were used so that the main study variables could be measured in a consistent and systematic manner, including AI utilization, self-efficacy, and learning motivation.

The study also adopted a cross-sectional design since it was considered appropriate for research purposes. It will enable the researcher to capture the current perceptions and experiences of the students on AI-assisted learning without the need for long-term follow-up. This design is efficient for collecting data from a relatively large sample within a limited timeframe. Moreover, simple linear regression analysis was used. It was used to see how much the use of AI technology can forecast students' self-efficacy and learning motivation. The chosen research design is in line with the research questions and provides a solid basis for examining the relationships among the study variables.

3.2 Research Participants

This study includes 300 undergraduates who were learning tourism management courses, taken from three universities in eastern, central, and western China. They were chosen because they had previous experience with AI-assisted learning tools or AI-enabled applications in their studies, making their responses more useful for achieving the goals of this research.

Simple random sampling was used to guarantee the representativeness of the sample and reduce possible sampling bias. Respondents were drawn from the learning management systems of universities and web platforms for student communication. All students who met the criteria had an equal opportunity. This was to ensure fairness in the recruitment of participants and the applicability of the results to different instructional settings in China.

3.3 Research Instrument

A structured questionnaire was the main instrument used in data collection in this study. It consisted of two major sections: demographic information and the learning process variables (i.e., self-efficacy and learning motivation; see Appendix). All items were measured on a five-point Likert scale where 1 indicated 'strongly disagree,' and 5 indicated 'strongly agree'.

The self-efficacy items measured confidence in performing academic tasks and learning activities in the AI-assisted learning environment. The learning motivation items measured interest, willingness to participate, and persistence in learning in AI-assisted learning contexts. Meanwhile, AI utilization was the

weekly frequency of AI use for learning—a metric showing how much students engaged with AI-based learning tools.

The main analysis was done after the test for questionnaire reliability and validity. The Cronbach's Alpha values for self-efficacy (SE), learning motivation (LM), and the overall scale were 0.925, 0.929, and 0.962, respectively. Based on recommended reliability criteria (Kennedy, 2022), these values indicate good internal consistency. The KMO value was 0.958, and Bartlett's Test of Sphericity was significant at $p < 0.001$. The instrument had construct validity at an acceptable level as per the validity criteria set by (Shrestha, 2021) and therefore was considered appropriate for further statistical analysis.

The method of carrying out the questionnaire was online, with its distribution over university learning platforms and some well-known student social media. Participation was voluntary, and the respondents were told about the purpose of the study and the confidentiality of the data. The collection of data was done over a period of two weeks. No monetary or material incentives were given to avoid possible response bias.

3.4 Data Analysis Technique and Procedure

Data analysis used the Statistical Package for the Social Sciences (SPSS). First, descriptive statistical analysis was conducted to address RQ1. It examines the demographic profile of the participants and how often they use AI. This stage saw frequency distributions, percentages, means, and standard deviations calculated for summarizing gender, age, and weekly AI use.

To answer RQ2 and RQ3, simple linear regression analyses were performed to examine the effect of AI usage frequency on undergraduate students' self-efficacy and learning motivation in tourism management education. AI use frequency was the independent variable in the analysis, and separate regression models were estimated for self-efficacy and learning motivation.

Hypothesis testing was performed at a significance level of 0.05. The level of significance was accepted when the value was less than the level of significance. The analysis focused mainly on the standardized Betas, p-values, and R-squared to explore the direction, strength, and explanatory power of the relationships within the variables of AI utilization and the dependent variables. More generally, this approach provided empirical evidence on the effect of AI use on students' self-efficacy and learning motivation.

4. Findings

4.1 Participants' Demographic Profile and AI Utilization

The sample included 300 undergraduate students majoring in tourism management who answered the questionnaires correctly. The sample was fairly balanced with respect to gender, with 153 (51.0%) males and 147 (49.0%) females. Most of the participants were between 19 and 20 years old (33.0%), followed by 21 to 22 years old (26.3%). The remaining were 18 or below (20.0%) and 23 or above (20.7%), showing a fairly even spread of ages.

Regarding how often students used AI on a weekly basis, most reported at least occasional use of AI tools. Specifically, 42.7% reported frequent use, 30.7% used it sometimes, and 17.0% used it occasionally. Only 9.7% said they never used AI. Overall, the results suggest that students moderately to highly integrate AI tools into their learning activities (see Table 1).

Table 1: Demographic profile

Items	Option	Frequency	Percentage (%)
Gender	Male	153	51.00
	Female	147	49.00
Age	18 or below	60	20.00
	19–20	99	33.00
	21–22	79	26.33
	23 or above	62	20.67
	Never	29	9.67
weekly AI usage frequency	Occasionally (≤ 1 time)	51	17.00
	Sometimes (1–2 times)	92	30.67
	Frequently (≥ 3 times)	128	42.67
Total		300	100.00

Table 2 shows the descriptive statistics of AI usage frequency, self-efficacy, and learning motivation among the 300 respondents. It shows that AI usage frequency has a mean value of 3.06 (SD = 0.99), which means fairly high engagement with AI-supported learning tools.

The scores for self-efficacy ranged from 1.17 to 5.00, with a mean of 3.64 (SD = 1.03), showing that the students generally had positive levels of confidence in their ability to learn. The same trend was found for learning motivation with a mean of 3.67 (SD = 1.04), also above the midpoint of the scale. Generally, the respondents have relatively positive tendencies of self-efficacy and learning motivation. This suggests that the psychological responses to the AI-supported learning environment are positive. These results provide a solid basis for the regression analysis.

Table 2: Descriptive statistics of AI usage frequency, self-efficacy, and learning motivation

	N	Minimum	Maximum	Mean	Std. Deviation
Frequency	300	1.00	4.00	3.06	0.99
SE_mean	300	1.17	5.00	3.64	1.03
LM_mean	300	1.17	4.83	3.67	1.04

4.2 Influence of AI Utilization on Student's Self-Efficacy in Tourism Management Education

A simple linear regression analysis was performed to see the impact of AI usage frequency on the self-efficacy of students. It can be seen from Table 3 that AI usage frequency explains 44.5% of the variance in self-efficacy ($R^2 = 0.445$), which is quite high. The findings further show a highly significant positive relationship between AI usage frequency and self-efficacy ($\beta = 0.667$, $t = 15.442$, $p < 0.001$). In other words, using AI tools more often helps students feel more capable. Based on these results, the null hypothesis (H_{01}) is to be rejected. This means that AI use significantly influences the self-efficacy of students in tourism management education.

Table 3: Regression analysis results

Dependent Variable	Independent Variable	R^2	β	Std. Error	t	p	F
SE_mean	(Constant)	0.445					238.461
	Frequency		0.667	0.045	15.442	0.000	

4.3 Influence of AI Utilization on Students' Learning Motivation in Tourism Management Education

A regression analysis was conducted to test whether how often students use AI tools affects their learning motivation. As shown in Table 4, AI usage frequency explains 47.7% of the variation in learning motivation ($R^2 = 0.477$). This indicates a strong level of explanatory power. It also shows a significant positive link between AI usage frequency and self-efficacy ($\beta = 0.690$, $t = 16.471$, $p < 0.001$). In other words, using AI tools more often is associated with higher motivation to learn among students. Therefore, the null hypothesis (H_{02}) is rejected. This confirms that the use of AI significantly affects students' motivation to learn in tourism management education.

Table 4: Regression analysis results

Dependent Variable	Independent Variable	R ²	β	Std. Error	t	p	F
LM_mean	(Constant)	0.477					271.298
	Frequency		0.690	0.044	16.471	0.000	

5. Discussion

5.1 AI Usage Frequency and Self-Efficacy

The findings show that using AI more often within tourism management education is linked to greater levels of undergraduate students' self-efficacy. Generally, students who use AI-supported learning tools have greater self-efficacy. This indicates a strong link between using AI tools and learners' confidence in handling learning challenges.

The results also support previous findings on technology-based learning and self-efficacy. Studies have proven that learners' confidence and perceived ability have been increased by adaptive learning systems, personal feedback, and interactive learning environments (Lee et al., 2025; Li, 2025; Lyu & Salam, 2025; Shemshack & Spector, 2020; Waddington, 2023; Xu et al., 2025; Zhou et al., 2025). AI-supported learning platforms can greatly enhance the learning process, thus enhancing students' sense of competence (Triana-Vera & López-Vargas, 2025).

This pattern can be explained by adaptive learning theory. This theory suggests that the learner's confidence increases when the content, task difficulty, and learning paths are well aligned with the learner's levels of ability. AI-based systems allow this to happen by individualizing learning paths according to student progress and providing content and feedback specific to each user. As students succeed, their chances of being involved in continuous learning also increase, which helps build their self-efficacy.

In general, the regular use of AI-based learning environments seems to be linked to higher self-efficacy. Such environments improve the quality of learning experiences and increase students' confidence in their ability to complete tasks successfully. It also points to the need to incorporate AI tools more systematically into the teaching of tourism management to boost students' confidence in addressing complex academic and practical tasks. However, the information was collected with a cross-sectional design, so we cannot claim causal relationships. This limitation is offset by the fact that the study provides important empirical evidence for AI-based learning processes.

5.2 AI Usage Frequency and Learning Motivation

The results suggest that using AI more often in tourism management education may increase the learning motivation of undergraduate students. Students who used AI-supported learning tools frequently showed more interest in learning activities and were more willing to keep up their learning efforts. It means that AI is employed as a contextual factor that influences students' learning motivation by affecting their experiences and engagement patterns with learning.

The results are consistent with previous studies on learning motivation, indicating that technology-supported educational settings can enhance student engagement and promote learning behaviors (Li, 2025; Li & Alharbi, 2025). Previous studies have also emphasized that learning motivation is shaped by the interaction between learners and their learning environments (D'Souza & Maheshwari, 2010; Xu, 2024). Within these viewpoints, the current study contributes to the literature by highlighting the importance of AI usage frequency as a contextual factor for motivational development in technology-enhanced learning environments.

This can be explained by Self-Determination Theory, which posits that motivation is strengthened when learners' fundamental psychological demands are fulfilled. Among the most important are autonomy, competence, and relatedness. In AI-supported learning contexts, students are provided with flexible and self-paced learning pathways, which enhance their sense of autonomy. Competence is improved through timely feedback and optimally challenging tasks. In addition, interactive and collaborative features help support learners' sense of relatedness. These repeated experiences of control, progress, and interaction contribute to sustained motivation for learning over time.

Therefore, these findings imply that frequent interaction with AI-supported learning environments may strengthen students' learning motivation by improving their learning experience and sustaining their engagement. This emphasizes the role of the context of AI usage frequency as an important factor in explaining motivational development within the environment of technology-enhanced learning, especially in the discipline of education for tourism management. While data based on self-reports may carry with it a certain degree of response bias, the results still provide valuable empirical evidence of AI-supported learning environments' influence on students' motivation in higher education.

6. Conclusion

This study examined the impact of the utilization of AI on the learning process of undergraduates within tourism management education. The results show that using AI more often is strongly linked to higher levels of students' self-efficacy

and learning motivation and can be interpreted as a positive influence of AI usage support on learning processes. In addition, empirical results of this study contribute to the understanding of the link between AI utilization and its effect on self-efficacy and learning motivation and facilitate an understanding of AI utilization in tourism management education.

It also shows that educators and higher education institutions should think about how to systematically integrate AI tools to improve students' learning experiences and support their development. This implementation can boost the efficiency of the learning process by creating a more encouraging and adjustable learning environment for students in higher education.

7. Implications

This study offers insights for AI-supported learning in higher education from theoretical and practical points of view. Theoretically, it adds to the existing studies by offering empirical evidence of the linkage between the frequency of AI use, self-efficacy, and learning motivation. The results support existing educational and psychological theories, which suggest that interaction with AI tools can influence learning processes in technology-enhanced environments.

In practice, the results suggest that using AI tools in a structured and regular way can improve students' learning experiences by increasing their confidence and motivation. Therefore, higher education institutions may want to consider more systematically integrating AI-supported learning into their pedagogical practices, especially in digitally transforming learning environments.

Importantly, these findings are not limited to tourism management education. As self-efficacy and learning motivation are general psychological constructs, the findings are relevant to other disciplines where AI-supported learning is being implemented. This increases the applicability of the results across higher education contexts.

8. Recommendations For Future Research

Future research could employ longitudinal research designs in order to provide a longitudinal understanding of the impacts of AI utilization on students' self-efficacy and learning motivation. In addition, future research could examine different patterns or modes of AI utilization to develop a deeper understanding of AI's influence on students' learning processes in higher education.

9. Author Contributions

Chen Jiamin is the first author and conducted research under the supervision of Dr. Intan Farahana Kamsin.

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Appendix

QUESTIONNAIRE

Questionnaire Instruction

Dear student:

This questionnaire aims to understand your experiences using AI technologies in tourism management education, and how they influence your learning process. All responses are anonymous and used for academic research only. Kindly provide your responses based on your actual experiences. There are no right or wrong responses to these questions. Thank you for your time and support!

Part 1: Demographic Information and AI Tool Usage Frequency

1. Gender:

☐ Male

☐ Female

2. Age:

☐ 18 or below

☐ 19-20

☐ 21-22

☐ 23 or above

3. Frequency of using AI learning tools weekly in your tourism management education:

☐ Never

☐ Occasionally (≤ 1 time)

☐ Sometimes (1-2 times)

☐ Frequently (≥ 3 times)

Part 2: Learning Process Components (Likert Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

Self-Efficacy (SE) – – Adaptive Learning Theory

1. When encountering obstacles in tourism management studies, I am capable of using AI to achieve my learning goals.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

2. Even when facing challenges in tourism management studies, I can still stick to my learning plans.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

3. When faced with difficulties in tourism management studies, I can flexibly use AI tools to cope with them.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

4. When encountering problems in tourism management studies, I can use AI to find multiple solutions.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

5. With the help of AI technology, I can effectively handle complex learning situations in tourism management.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

6. With the support of AI technology, I am confident in solving most problems encountered in tourism management studies.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

Learning Motivation (LM) – – Self-Determination Theory

1. Learning new knowledge in tourism management with AI makes me feel excited.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

2. Exploring tourism management topics with the help of AI makes learning more interesting.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

3. I enjoy the process of learning tourism management more when AI is involved.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

4. I use AI to learn tourism management because it is efficient.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

5. The personalized feedback from AI tools motivates me to keep learning tourism management.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5

6. I use AI technology to achieve better academic performance in tourism management.

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5