

Educational Interventions to Enhance Learning Engagement: The Mediating Role of AI-Acceptance in Chinese Language Teaching for Foreign Students

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Abstract

The enhancement of learning experiences in Chinese language classes for foreign students has become a critical educational challenge, especially as artificial intelligence (AI) increasingly integrates into university instruction. This study explores the roles of teacher support and academic self-efficacy in driving student engagement, with AI-acceptance serving as a mediating factor. Based on the Social Cognitive Theory and Technology Acceptance Model, a quantitative survey was conducted with 528 foreign students across eight universities in Liaoning Province, China. Findings from this study may also inform higher education institutions in the Gulf region, where AI-driven education is emerging as a significant trend. Using Structural Equation Modeling (SEM), the study reveals that both teacher support and academic self-efficacy significantly enhance learning engagement. AI-acceptance plays a crucial mediating role, fully mediating the relationship between academic self-efficacy and learning engagement, while partially mediating the relationship between teacher support and learning engagement. These findings suggest that the effective use of AI in educational activities, combined with strong pedagogical and emotional support, can substantially improve student engagement. The research provides practical implications for educators, curriculum designers, and policymakers, particularly in the Gulf region, by recommending AI integration and teacher training to enhance the learning experiences of international students in culturally diverse environments.

Keywords: Educational Intervention, Teaching Practice, AI-Acceptance, Learning Engagement, Teacher Support, Academic Self-Efficacy.

1. Introduction

China is now a worldwide destination for international education, particularly in Chinese language programs. However, the growing population of international students has led to ongoing challenges regarding classroom attendance and teaching quality. According to Tian et al. (2020), many foreign undergraduates in China struggle with low engagement due to inflexible teaching methods, language barriers, and limited classroom interaction. These issues are especially significant in language classrooms, where communication and active participation are essential. As per Tian et al. (2021), engagement levels vary greatly among international students and depend on multiple factors such as the type of teaching approaches and the level of perceived teacher support. Without active involvement in learning, international students may struggle to stay motivated and achieve academic success. These challenges underscore the need for educational interventions and the reformation of teaching strategies to enhance student engagement, particularly in linguistically intensive contexts like Chinese language education.

The Gulf region, like China, is facing similar challenges in improving engagement and learning outcomes for international students, particularly in areas like language acquisition and adaptive learning technologies. The Chinese Ministry of Education has developed progressive policies to improve instructional quality, including initiatives like AI + Education and Smart Education. These initiatives aim to incorporate AI into classrooms, facilitating adaptive learning and student-centered pedagogies. As Huang, Spector and Yang (2019) state, AI applications such as intelligent feedback systems and personalized learning platforms contribute significantly to the personalization of education and have been shown to improve classroom engagement. However, the successful implementation of these technologies depends not only on educators' willingness to integrate them into their practices but also on students' readiness to engage with these new learning tools. Prior studies found that the effectiveness of tech-supported teaching in language education depends largely on the involvement of both teachers and students with digital technologies. These policy changes highlight the importance of studying the intersection of teacher support, academic self-efficacy, and AI-acceptance in fostering learning engagement, particularly for foreign students in Chinese language programs, and by extension, in the Gulf region where such innovations are gaining momentum.

According to Fredricks, Blumenfeld and Paris (2004), learning engagement can be defined as the psychological investment and active effort exhibited by foreign students in acquiring Chinese language knowledge and skills. Prior literature found that learning engagement accounts for approximately 17-25% of academic achievement, even surpassing the influence of family socioeconomic status. This research responds to the educational demands of the 21st century and aims to improve the academic performance of international students, fostering the development of independent learning skills and lifelong learning capabilities, while also promoting the global dissemination of the Chinese language. Moreover, enhanced classroom interaction has become a common focus among university Chinese language instructors, aligning with the educational reforms in China since the 1970s (Pei, 2019). In the Gulf region, where Arabic and English language education is prevalent, similar reforms are needed to integrate AI tools for personalized learning, particularly in languages, to meet the

demands of an increasingly globalized educational environment.

Simultaneously, the 21st century has ushered in the AI era, where AI technologies have begun to permeate all aspects of learning and daily life. University education is one of the primary areas where AI can be applied, and it is evolving into intelligent adaptive learning systems. Since 2010, China has increasingly integrated AI into higher education, with government policies promoting the use of AI tools such as intelligent teaching platforms and personalized learning systems. It is evident that AI can significantly enhance student engagement in Chinese language classes when used appropriately. For example, the AI classroom at Tsinghua University processed 42,000 hours of international students' pronunciation data (Chinese Ministry of Education, 2022), creating a model with 89.7% tonal accuracy. In writing classes, AI assistants such as Hanwang AI Teaching Assistant at Shanghai Jiao Tong University provide real-time grammar assessments (Sheng, 2024). However, it is essential to note that the introduction of AI does not imply the elimination of traditional teaching models, nor does it suggest that teachers will be replaced. AI should serve as an auxiliary tool in the Chinese language teaching process for international students. Therefore, AI-acceptance must be viewed as a mediating variable influencing learning engagement in this study.

At the same time, Social Cognitive Theory (Bandura, 1986) emphasizes the significance of both internal and external factors in the learning process. This study identifies academic self-efficacy as an internal factor and teacher support as an external factor, both of which influence learning engagement. Despite the growing integration of AI in education, Dai (2024) argues that current AI tools are still designed to assist teachers in fostering student engagement and critical thinking, rather than replacing traditional teaching methods. Teacher support remains a critical element for student performance, and previous studies indicate that timely and constructive teacher support significantly enhances students' sense of control over their learning and the perceived value of their tasks. This, in turn, leads to higher levels of engagement, particularly for international students who may be new to learning Chinese.

At the same time, Academic Self-Efficacy is also viewed as important and favourable to Learning Engagement as confidence in achieving academic tasks in students (Bandura, 1986). The study by Jiang et al. (2024) indicated that students who reported a high level of academic self-efficacy spend more time on learning, have more positive attitudes towards learning, and work harder. Thus, the research will address the question of the persistence of the positive role of teacher support and academic self-efficacy in learning engagement, in case AI combined with university Chinese language classes and the traditional form of teachers teaching and students learn did not cease. More so, it is on this premise that this study considers AI- AI-Acceptance as a mediating variable in these 2 relationships and takes it up to determine whether AI- AI-Acceptance can further enhance the positive effects of teacher support and academic self-efficacy on learning engagement of students.

1.2. Research Gap

Even though earlier studies have shown the personal contribution of teacher support and academic self-efficacy to student engagement, little focus has been on the working of these conventional education elements within an AI-infused

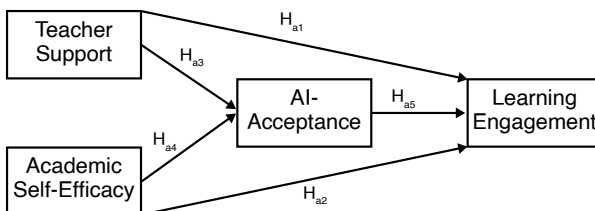
learning context. Particularly, the role of teacher support, as well as self-efficacy in the willingness to accept and use AI tools in formal classroom settings, has been insufficiently studied. In addition, little research has been conducted on how AI acceptance mediates the associations between these conventional constructs and learning engagement, particularly among international students who study Chinese. With the growing tendency of educational policies in China to support AI-enabled and smart education, a critical interest arises in determining the ways these psychological and pedagogical variables interact in technologically enriched classrooms. This paper aims to fill this gap by discussing the interaction between teacher support, academic self-efficacy, and AI-acceptance in their effects on learning engagement.

1.3. Research Aims and Hypothesis

The core objective of this study remains to examine the respective relationship between teacher support and academic self-efficacy towards learning engagement among foreign students in Chinese language classrooms at universities in Liaoning Province of China, as well as to examine the mediating effects of AI-Acceptance in those 2 relationships. Therefore, here are the research questions: What is the level of Teacher Support and Academic Self-Efficacy, AI-Acceptance, and Learning Engagement? Besides, what is the respective relationship between Teacher Support and Academic Self-Efficacy towards Learning Engagement among foreign students in International Chinese Language Education Lessons of Liaoning Universities in China? What is the mediating effect of AI-Acceptance on those 2 relationships above? And Figure 1 depicts the mediated chain model of relationships between the variables as well as hypotheses:

Figure 1: The Conceptual Framework of The Variables.

Independent Variable: Mediating Variable: Dependent Variable:



Source: Authors own work

The hypothesis of the study are given below:

Hypothesis Code	Statement
Ha1	There is a positive significant relationship between Teacher Support and Learning Engagement.
Ha2	There is a positive significant relationship between Academic Self- Efficacy and Learning Engagement.
Ha3	There is a positive significant relationship between Teacher Support and AI-Acceptance.
Ha4	There is a positive significant relationship between Academic Self- Efficacy and AI-Acceptance.
Ha5	There is a positive significant relationship between AI-Acceptance and Learning Engagement.
Ha6	AI-Acceptance mediates the relationship between Teacher Support and Learning Engagement.
Ha7	AI-Acceptance mediates the relationship between Academic Self- Efficacy and Learning Engagement.

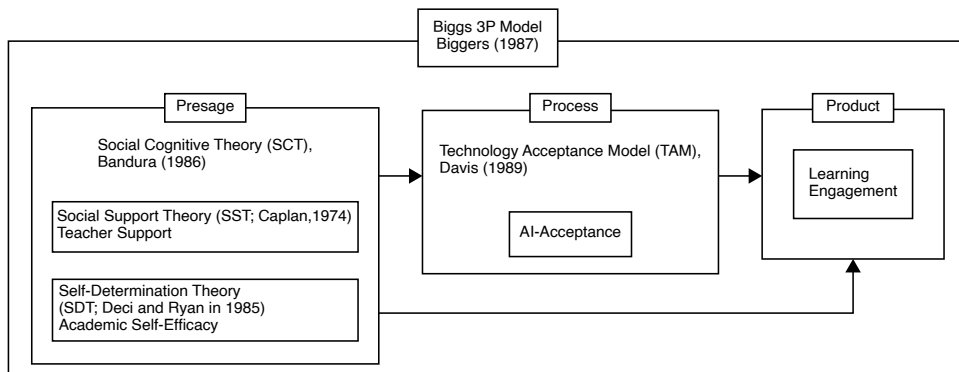
2. Literature Review

As mentioned above, this study is grounded in the theoretical framework of Social Cognitive Theory (SCT; Bandura, 1986) to examine the effects of Teacher Support and Academic Self-Efficacy on the dependent variable Learning Engagement. Since SCT emphasizes the dynamic interaction among individuals, their environment, and behavior, we conceptualize Learning Engagement as the behavioral outcome, with Teacher Support serving as the classroom environmental factor influencing it and Academic Self-Efficacy as the personal factor affecting it. Besides, Social Support Theory (Caplan, 1974) provides theoretical justification for incorporating Teacher Support as an independent variable and investigating its impact on Learning Engagement, defined by Cobb (1976) as a psychological state in which an individual perceives themselves as being cared for, respected, and accepted. While Self-Determination Theory (Ryan & Deci, 2000) supports the inclusion of Academic Self-Efficacy as an independent variable and explores its effect on Learning Engagement (Schunk & Pajares, 2002). In the context of teaching Chinese as a second language, although Zhang (2023) found that students' perceived teacher support and academic self-efficacy were positively correlated with classroom engagement respectively, given that few previous studies have explored these two sets of relationships in university Chinese language classrooms that integrate AI, this study was thus initiated accordingly.

This study adopts the framework of the Technology Acceptance Model for AI is essentially a form of technology. Although previous scholars have demonstrated a positive correlation between AI-Acceptance and learning engagement in Chinese language classrooms among foreign university students (Huang, 2025b; Sheng, 2024), there has been a scarcity of research treating AI-Acceptance as a mediating variable to examine its role in how other independent variables influence academic self-efficacy. The innovation of this study, building upon previous research, lies precisely here. As illustrated earlier, traditional teaching models still persist in university Chinese language classrooms, with AI merely serving as an auxiliary tool employed by foreign students.

Besides, this study adapts The Biggs 3P Model (Biggs, 1987) to investigate the mediating role of AI-Acceptance in the relationships between Teacher Support and Academic Self-Efficacy towards Learning Engagement, the theoretical foundation of which aligns with the emphasis on delineating indirect pathways between variables and divides learning into three stages: Presage variables, Process variables, and Product. Presage typically includes student characteristics and aspects of the instructional environment, as well as Process refers to students' learning strategies and motivation, including their acceptance of new technologies, while Product reflects learning outcomes, such as language performance and learning engagement. The 3P model has been widely applied in educational research and highlights that Presage influences learning outcomes indirectly through Process. Thereby, within this framework, processes often serve as mediators between Presage and Product. Therefore, because the stage division and theoretical assumptions of The Biggs 3P Model align well with the variable structure and research objectives of this study, the latter integrates the Mediation Model (Baron & Kenny, 1986) to construct the following theoretical framework, as Figure 2.

Figure 2: Theoretical Framework.



Source: Authors own work

3. Methodology

3.1. Research Design

The study utilizes a qualitative, correlational research design aimed at establishing the direct and indirect relationships that exist between the teacher, academic self-efficacy, AI-acceptance, and learning engagement among international students studying Chinese language courses in Liaoning Province, China. The primary goal was to evaluate a hypothetical mediation model where AI-acceptance mediates the role of teacher support and academic self-efficacy on the learning engagement of students. The quantitative method was considered to suit the measurement of latent variables and test statistically significant correlations between them. Structural Equation Modelling (SEM) was applied to test the hypothesised relationships. SEM is especially applicable to the analysis of complicated models comprising a mediator and various related latent variables. It is also possible to evaluate both the overall model fit and the causal direction and strength of the causal paths. This method has offered a strong platform for assessing both direct and indirect impacts in the proposed model.

3.2. Population and Sampling

The international undergraduate students in the study target population were located in Chinese language education programmes in public universities in Liaoning Province, China. This sample was chosen due to its direct connection to the context of the study, namely, the students who enrolled in formal language teaching and were forced to learn through a foreign curriculum in which the use of AI-based tools is becoming more and more common.

A random sampling process was followed in a multi-stage process to make the sample representative. To begin with, universities that had the highest number of international students were identified: Liaoning University, Dalian University of Foreign Languages, Shenyang Aerospace University, Northeastern University, Dalian University of Technology, China Medical University, Jinzhou Medical University, and Liaoning Normal University were chosen. Two Chinese language second-year classrooms were selected at random and took part in the survey at every institution.

Overall, the online platform Wenjuanxing was used to distribute 558 questionnaires. 287 invalid responses were eliminated after eliminating responses that were incomplete or had inconsistent patterns, and a response rate of about 94.6 was obtained. This was more than the recommended minimum size of sample needed to perform SEM analyses ($N \geq 300$), and this guaranteed the strength of the findings and their generalizability.

3.3. Instrumentation

The data were collected using a structured self-administered questionnaire composed of four key latent variables: Teacher Support, Academic Self-Efficacy, AI-Acceptance, and Learning Engagement. All items were rated using a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The questionnaire also included seven demographic items (e.g., gender, age, university, language level).

- Teacher Support was measured using the Perceived Teacher Support Scale for Undergraduates developed by Chi (2017), consisting of 13 items across three dimensions: academic support, emotional support, and instructional feedback.
- Academic Self-Efficacy was assessed using a 22-item scale adapted from Pintrich (1990), localized by Liang (2000), covering students' confidence in handling academic tasks, self-regulation, and problem-solving.
- AI-Acceptance was measured using 12 items adapted from the Handheld Technology Acceptance Scale developed by Huang (2025a), with dimensions reflecting perceived usefulness, ease of use, and intention to use AI tools in learning.
- Learning Engagement was measured using the scale adapted from Schaufeli (2002), revised by Luo et al. (2017), consisting of 13 items capturing behavioral, emotional, and cognitive engagement in academic settings.

All scales used in this study were selected based on their prior use in educational research and their demonstrated psychometric validity in similar populations.

3.4. Pilot Testing, Reliability, and Validity

To test the clarity, structure, and internal consistency of the questionnaire, a pilot study was done on 100 international students at Liaoning Normal University. The ease of understanding and the relevance of the items were confirmed by the participants. The mean time of completion was less than 20 minutes, and there were no significant revisions that had to be done following the pilot. The Cronbach alpha was used to determine the reliability of the full-scale questionnaire, and the total reliability of the questionnaire was 0.969, which is excellent internal consistency. Individual construct reliability scores were:

Teacher Support: $\alpha = 0.984$

Academic Self-Efficacy: $\alpha = 0.991$

AI-Acceptance: $\alpha = 0.921$

Learning Engagement: $\alpha = 0.987$

Tests for the constructs' validity were conducted using EFA and CFA, or Confirmatory Factor Analysis. Factor loadings are within acceptable ranges, structural validity is

good, and there is no significant cross-loading, according to the findings. The factor analysis could be conducted successfully since the Kaiser-Meyer-Olkin (KMO) value was more than 0.85 and the test of sphericity was significant ($p < 0.001$). Additionally, both the Composite Reliability (CR) and the Average Variance Extracted (AVE) values were above the suggested thresholds ($CR > 0.7$, $AVE > 0.5$), demonstrating that the constructs were valid in a convergent fashion. The whole technical information, like the loading of factors, rotation matrices, and model fit indices, has been presented in the Appendix below, and based on this, the instrument was considered reliable and suitable for the study.

3.5. Data Collection Procedure

The data gathered was between May and June 2025 through the Wenjuanxing online survey system, which is a common tool for conducting academic research in China. The survey contact was made via the international student offices of universities and course instructors. The involvement was purely voluntary, and informed consent was given electronically at the onset of the questionnaire. The anonymity and secrecy of the responses were guaranteed to respondents. No personally identifiable information was gathered. The study complied with the Ethical principles of the Declaration of Helsinki, and the academic review boards of universities gave ethical consent.

3.6. Data Analysis

SPSS version 26.0 and AMOS version 24.0 were used to analyse data. The means and standard deviations of each construct were calculated to determine the level of the constructs in general. The preliminary relationship between variables was analysed by Pearson correlation analysis. Structural Equation Modelling (SEM) was used to test the hypothesised model and mediation effects. The standard indices that were used to assess model fit included Chi-square/df, RMSEA, CFI, and TLI. The indicators of model fit were all acceptable. The bootstrap test based on 5,000 resamples was used to test mediation. They were analysed using a 95% confidence interval, and an indirect effect was considered important when the interval did not found to contain zero. This strategy guaranteed a strong test of the intermediary role of AI-acceptance amidst teacher support, academic self-efficacy, and engagement in learning.

4. Findings and Results

4.1. Descriptive Analysis

Table 1: Basic Indicators of Descriptive Analysis.

Basic Indicators						
Name	N	Mini	Max	Mean	SD	Median
Teacher Support	528	1.000	5.000	3.209	0.982	3.000
Academic Self-Efficacy	528	1.000	5.000	3.096	1.051	3.000
AI-Acceptance	528	1.000	5.000	2.874	0.928	2.670
Learning Engagement	528	1.000	5.000	3.003	1.228	3.000

Source: Author's own work

In this study, the mean score for Teacher Support was 3.209, with a standard deviation of 0.982 and a median of 3.000 as shown in Table 1 above. Numerically speaking, foreign university students generally perceived the teacher support they received as being at a moderate level, slightly higher than the midpoint of the scale. This implies that most students felt supported and guided by their teachers during the in-class Chinese Language learning process, including through classroom interactions, emotional care, academic guidance, and access to learning resources. The mean score for Academic Self-Efficacy was 3.096, with a standard deviation of 1.051 and a median of 3.000. The results indicate that foreign university students' confidence in their academic abilities was generally at a moderate level. In other words, students generally believed they possessed a certain level of ability to complete on-class Chinese Language learning tasks, overcome academic challenges, and achieve learning goals, but this self-belief did not reach a high level. The mean score for AI-Acceptance was 2.874, with a standard deviation of 0.928 and a median of 2.670. It can be observed that the mean score for this variable was lower than the midpoint of the scale, indicating that most foreign college students had a relatively low level of acceptance of AI assistance in their learning.

This result may stem from two aspects: on one hand, some foreign university students may not be sufficiently familiar with AI technology itself or lack experience in using it, leading to a conservative attitude in learning contexts; on the other hand, the practical application of AI technology in educational settings may not fully meet the personalized needs of students, resulting in insufficient acceptance. The mean score for Learning Engagement was 3.003, with a standard deviation of 1.228 and a median of 3.000. The results show that foreign university students' Learning Engagement was at a moderate level, but the large standard deviation (exceeding 1.2) reveals significant differences in engagement among different students. Some students demonstrated high enthusiasm in the learning process, including active participation in class and investing substantial time and effort in studying, whereas others may have shown lower engagement.

4.2. Correlation Analysis

Table 2: Pearson Correlation of Correlation Analysis.

Pearson Correlation						
	Mean	SD	Teacher Support	Academic Self-Efficacy	AI-Acceptance	Learning Engagement
Teacher Support	3.209	0.982	1			
Academic Self-Efficacy	3.096	1.051	0.299	1		
AI-Acceptance	2.874	0.928	0.248	0.350	1	
Learning Engagement	3.003	1.228	0.267	0.245	0.405	1
p<0.05, p<0.01						
Source: Author's own work						

According to statistical analysis, the mean value of Teacher Support is 3.209, with a standard deviation of 0.982, indicating a moderately high level, as shown in Table 2 above. After testing, a significant positive correlation is found between Teacher Support and Academic Self-Efficacy ($r = 0.299$, $p < 0.01$), suggesting a close relationship between the two. Teacher Support also shows a significant positive correlation with the AI-Acceptance ($r = 0.248$, $p < 0.01$) and Learning Engagement

($r = 0.267$, $p < 0.01$). The above data highlight the significance of Teacher Support in fostering foreign university students' academic confidence, promoting educational innovation, and improving classroom interaction in Chinese language classes for foreign university students in Liaoning Province.

The mean value of Academic Self-Efficacy ($M = 3.096$, $SD = 1.051$) is assumed to be a moderate value, and it is necessary to investigate the intrinsic relationship between it and AI-Acceptance and Learning Engagement. The analysis has shown that there is a significant positive correlation between Academic Self-Efficacy and AI-Acceptance ($r = 0.350$, $p < 0.01$), where the relationship between the two is stable ($r = 0.245$, $p < 0.01$). The research data show that those who have a higher self-efficacy tend to actively use AI tools to support their learning and have more curiosity and application skills. This not only indicates the importance of Academic Self-Efficacy as a predictor of Teacher Support but also the importance of Academic Self-Efficacy in explaining the behaviours of foreign university students in Chinese language acquisition.

According to the results of the research, the average of AI- AI-acceptance is 2.874 (Note: The initial text has erroneously given 874, and this should be changed to 2.874 to be consistent with the context), and the standard deviation is 0.928. The value is comparatively low, although its role in the model is an important mediating factor. Correlation analysis reveals that the correlation coefficient of AI- Acceptance and learning engagement is 0.405 ($p < 0.01$), indicating the strongest correlation in all variables. This implies that the more foreign university students embrace and utilise AI, the greater the level of participation in the classroom learning of the Chinese language. This supports the mediation effect of AI Acceptance to some degree. Also, there is a significant and positive correlation between Teacher Support and academic Self-Efficacy and AI-Acceptance, indicating the critical importance of AI-Acceptance in the correlation between these variables.

The research data suggest that the mean value of Learning Engagement is 3.003, and standard deviation is 1.228, and the level of Learning Engagement is moderately high. It has a large positive association with teacher support, academic self-efficacy, and AI- Acceptance with correlation coefficients $r = 0.267$, $r = 0.245$, and $r = 0.405$, respectively. The phenomenon is indicative of the complexity of Learning Engagement that is motivated by external facilitation, internal cognitive systems, and technological flexibility. The strongest correlation is observed between AI-Acceptance and Learning Engagement, indicating the important role of technological acceptance willingness in enhancing foreign university students' in-depth learning of the Chinese language.

4.3. Teacher Support and Academic Self-efficacy towards Learning Engagement

In this study, a model was established with Learning Engagement as the dependent variable and the levels of Teacher Support and Academic Self-Efficacy as the independent variables, followed by data analysis. According to empirical research, the coefficient of determination (R^2) is 0.101, and the adjusted coefficient of determination (Adjusted R^2) is 0.098, as shown in Table 3 above. This indicates that the two key variables, which are Teacher Support and Academic Self-Efficacy, can collectively explain 10.1% of the variance in Learning Engagement. This demonstrates that the model possesses a certain degree of predictive power, while also suggesting that Learning Engagement may be influenced by many factors not yet considered, such

as the level of acceptance of AI, cultural adaptability, intrinsic motivation, and social support, among others. Although the current model partially reveals characteristics of correlation, there is still room for improvement in its explanatory power. The results of the statistical tests show an F-test value of 29.612 (degrees of freedom: 2, 525) and a P-value less than 0.001, which strongly proves that the established regression equation is highly statistically significant as a whole.

Table 3: The Respective Impact of Teacher Support and Academic Self-efficacy on Learning Engagement.

Results of Linear Regression Analysis (N=528)							
	Non-Standardized Coefficients		Standardized Coefficients	t	p	Collinearity Diagnostics	
	B	SE	Beta			VIF	Tolerance
Constant	1.493	0.203	-	7.365	0.000	-	-
Teacher Support	0.266	0.054	0.213	4.906	0.000	1.098	0.911
Academic Self-Efficacy	0.212	0.051	0.182	4.194	0.000	1.098	0.911
R ²	0.101						
AdjustR ²	0.098						
F	F(2,525)=29.612,p=0.000						
D-W	2.044						
p<0.05 p<0.01							
Source: Author's own work							

Teacher support and academic self-efficacy are two independent variables that have been shown to significantly impact student involvement in learning. The established regression model has shown significant meaning after statistical testing, providing a solid foundation for subsequent research. The Durbin-Watson Test Value is 2.044, which is relatively close to the theoretically expected value of 2, indicating no significant autocorrelation among the residuals in the model. The model's results are thus more credible. According to the empirical research results, the non-standardized regression coefficient B for Teacher Support is 0.266, with a standardized regression coefficient beta of 0.213, a standard error (SE) of 0.054, and a t-statistic of 4.906 (p < 0.01). This shows that this variable is a strong predictor of Learning Engagement. The non-standardized regression coefficient B for Academic Self-Efficacy is 0.212, with a standard error (SE) of 0.051, a standardized regression coefficient Beta of 0.182, and a t-statistic of 4.194 (p < 0.01), indicating that this variable has a significant positive predictive effect on Learning Engagement. According to the Collinearity Diagnostics, the mean Variance Inflation Factor (VIF) for Teacher Support and Academic Self-Efficacy is 1.098, and the Tolerance is 0.911, both within the ideal range and far below the threshold of 10. This indicates that there is no significant multicollinearity between these two variables. Their relative independence in influencing Learning Engagement ensures the stability and explanatory strength of the regression model, despite their certain association.

4.4. Teacher Support and Academic Self-efficacy towards AI-Acceptance

The study found that AI-Acceptance is influenced by Teacher Support and Academic Self-Efficacy. The table shows that the individual coefficients of determination, R²,

were 0.145 and 0.142, respectively. This suggests that, when combined, Teacher Support and Academic Self-Efficacy account for around 14.5 percent of the variation in AI-Acceptance. Despite falling short of the mark for strong explanatory strength, this degree of explanatory power is nevertheless respectable in the social science community and shows that these two factors significantly affect AI-Acceptance behavior. Furthermore, an F-test was carried out, and the results showed that the complete regression equation has a highly significant statistical meaning ($F(2,525) = 44.458, p < 0.001$). The Durbin-Watson test result was 2.079, very close to the theoretically expected value of 2, indicating that there is essentially no significant autocorrelation in the residual sequence. This ensures that the fitting effect of our established model possesses a certain degree of reliability and stability.

Table 4: The Respective Impact of Teacher Support and Academic Self-efficacy towards AI-Acceptance.

Results of Linear Regression Analysis (n=528)							
	Non-Standardized Coefficients		Standardized Coefficients	t	p	Collinearity Diagnostics	
	B	SE	Beta			VIF	Tolerance
Constant	1.569	0.150	-	10.494	0.000	-	-
Teacher Support	0.149	0.040	0.157	3.722	0.000	1.098	0.911
Academic Self-Efficacy	0.267	0.037	0.303	7.157	0.000	1.098	0.911
R ²	0.145						
AdjustR ²	0.142						
F	F(2,525)=44.458,p=0.000						
D-W	2.079						
Note: The dependent variable is = AI-Acceptance							
p<0.05 p<0.01							
Source: Author's own work							

The regression analysis results show that the non-standardized regression coefficient B for Teacher Support is 0.149, with a standard error of 0.040 and a standardized coefficient Beta of 0.157. The t-test reveals that the t-value for this coefficient is 3.722 ($p < 0.01$), indicating its significance and suggesting that teacher support has a positive promoting effect on AI-Acceptance behavior. The non-standardized regression coefficient B for Academic Self-Efficacy is 0.267, with a standard error of 0.037 and a standardized coefficient Beta of 0.303. The t-test shows that the t-value for this coefficient is 7.157 ($p < 0.01$), also indicating its significance and suggesting that academic self-efficacy has an even greater impact on AI-Acceptance behavior, occupying a central position in explaining the relationships among the variables.

Through multiple Collinearity Diagnostic analyses, it was found that the VIFs for both Teacher Support and Academic Self-Efficacy are less than 1.098, with corresponding Tolerance of 0.911, respectively. These values are far below the general warning threshold of 10 and above the minimum tolerance value of 0.1, indicating that there is no significant multicollinearity between these two. Despite a certain degree of correlation, the information dimensions they encompass remain relatively independent, and there is no significant information redundancy when predicting AI-Acceptance.

4.5. The Impact of AI-Acceptance on Learning Engagement

Table 5: The Impact of AI-Acceptance towards Learning Engagement.

Results of Linear Regression Analysis (n=528)							
	Non-Standardized Coefficients		Standardized Coefficients	t	P	Collinearity Diagnostics	
	B	SE	Beta			VIF	Tolerance
Constant	1.465	0.159	-	9.202	0.000	-	-
AI-Acceptance	0.535	0.053	0.405	10.147	0.000	1.000	1.000
R ²	0.164						
AdjustR ²	0.162						
F	F (1,526)=102.970,p=0.000						
D-W	2.065						
Note: The dependent variable is = Learning Engagement							
p<0.05 p<0.01							
Source: Author's own work							

AI-Acceptance and learning engagement are highly correlated, and the coefficient of determination of the model, R², is 0.164, and the adjusted R² is 0.162, as observed in Table 5 above. This shows that AI- AI-Acceptance is the only factor that can be used to describe 16.4% of Learning Engagement, which is greater than the combined effect of Teacher Support and Academic Self-Efficacy (R² = 0.101). Moreover, according to the research, technological acceptance proves to be a good predictor in relation to traditional external support factors or intrinsic cognitive beliefs in the educational setting of foreign university students. The F-test indicates that $F(1, 526) = 102.970$, $p = 0.001$, which shows that the entire regression model is significant in terms of its statistical meaning, and AI- AI-Acceptance is also extremely significant in its ability to predict the learning engagement of students. The Durbin-Watson 2.065 indicates that no very significant autocorrelation in the sequence of residues can be detected; as a result, the degree of rationality of the model can be improved, and the conclusions made can be credible.

According to the statistical data on actual cases, we find that the non-standardised regression coefficient of AI- Acceptance = $B = 0.535$, and the standard error $e = 0.053$. Upon standardisation, the regression coefficient attains $Beta = 0.405$, with a significantly large t-value of 10.147 ($p < 0.01$). This shows that higher AI-Acceptance results in a high increase in Learning Engagement at about 0.535 units in practicable learning contexts. The data indicate that the more the participants accepted AI, the more they were engaged in the learning of the Chinese language in university classrooms. Having a standardised regression coefficient Beta of 0.405, which is considered to be moderately high, AI- Acceptance demonstrates a high explanatory power in relation to its effect on Learning Engagement, which is more important than many of the other influencing variables and even more important than such traditional core variables as teacher support and academic self-efficacy.

VIF and Tolerance to AI-Acceptance are both 1.000, which means that the selected variables do not have significant multicollinearity. This finding supports the reliability of the AI-Acceptance predictive ability to Learning Engagement regardless of other possible confounding aspects, thus indicating the validity of the regression analysis findings made are both scientifically and practically useful.

4.6. Analysis of Mediating Effects

Table 6: Analysis of Mediation Role Results.

Analysis of Mediation Role Results (n=528)															
	Learning Engagement				AI-Acceptance					Learning Engagement					
	B	SE	t	p	B	SE	t	p	β	B	SE	t	p	β	
Constant	1.493	0.203	7.365	0.000	-	1.569**	0.150	10.494	0.000	-	0.793	0.211	3.764	0.000	-
Teacher Support	0.266	0.054	4.906	0.000	0.213	0.149**	0.040	3.722	0.000	0.157	0.199	0.052	3.845	0.000	0.160
Academic Self-Efficacy	0.212	0.051	4.194	0.000	0.182	0.267**	0.037	7.157	0.000	0.303	0.093	0.050	1.858	0.064	0.080
AI-Acceptance											0.446	0.056	7.973	0.000	0.337
R ²	0.101				0.145					0.199					
AdjustR ²	0.098				0.142					0.194					
F	F(2,525)=29.612,p=0.000				F(2,525)=44.458,p=0.000					F(3,524)=43.285,p=0.000					
p<0.05 p<0.01															
Source: Author's own work															

Table 7: Summary of Mediation Effect Test Results.

Summary of Mediation Effect Test Results											
Item	c	a	b	a*b	a*b	a*b	a*b	a*b	a*b	c'	Inspect the Conclusion
	Ensemble			Intermediary Effect Value	(Boot SE)	(z)	(p)	(95% BootCI)	Direct Effect		
Teacher Support=>AI-Acceptance=>Learning Engagement	0.266	0.149	0.446	0.066	0.016	4.081	0.000	0.023 ~ 0.088	0.199	Some intermediaries	
Academic Self-Efficacy=>AI-Acceptance=>Learning Engagement	0.212	0.267	0.446	0.119	0.018	6.464	0.000	0.070 ~ 0.141	0.093	Full intermediation	
p<0.05 p<0.01											
Bootstrap Type = percentile bootstrap method											
Source: Author's own work											

Empirical evidence shows that Teacher Support and Learning Engagement have a significant positive correlation, the regression coefficient is 0.266 ($p < 0.01$), and the standardised coefficient is 0.213, as indicated in Table 7. This implies that academic guidance, emotional support, and resource allocation by teachers positively intervene to play a significant role in improving the academic engagement levels of foreign university students in classes involving the Chinese language. Additional discussion indicates that the regression coefficient of Teacher Support to AI-Acceptance is 0.149 ($p < 0.01$), with a standardised coefficient of 0.157 also indicating a significant positive relationship. This finding indicates that by the demonstration effect in the teaching process, the teachers can successfully encourage the foreign university students to identify AI tools and form an intention to use them. Once the AI-Acceptance has been removed, the regression coefficient of Teacher Support to Learning Engagement is increased to 0.446 ($p < 0.01$), and the standardised coefficient β is also increased to 0.337, which indicates higher explanatory and predictive power.

The research data indicate that the positive correlation between acceptance of AI technology and Learning Engagement is significant among foreign university students. Statistical tests indicate that the value of the indirect effect Teacher Support on Learning Engagement promotes AI-Acceptance is 0.066 (standard error: 0.016; z-value: 4.081; $p < 0.001$; 95% confidence interval [0.023, 0.088]), which is not equal to 0, which is enough to prove the statistical significance of this mechanism. In addition, when the mediating variable is eliminated as far as the total effect value of Teacher Support is concerned, the direct effect goes down to 0.199 ($p < 0.01$), though remaining significant. It indicates that AI-Acceptance partially mediates the Teacher Support -Learning Engagement pathway. The research shows that Teacher

Support can directly boost the involvement motivation of students and indirectly boost the level of their Cognitive Acceptance of AI tools, thus boosting their Learning Engagement even further.

The research data represent a high positive relation of Academic Self-Efficacy and Learning Engagement (regression coefficient $r = 0.212$, $p < 0.01$; standardised coefficient 0.182), meaning that the confidence in being able to complete academic tasks does actually influence the level of learning engagement. Moreover, the additional analysis demonstrates that Academic Self-Efficacy correlates with the desire to accept AI technology significantly (regression coefficient $r = 0.267$, $p < 0.01$; standardised coefficient 0.303), so the more self-efficacy students have, the more they are willing to use and actively apply new technological tools. Therefore, it can be summarised that Academic Self-Efficacy (independent variable) and Learning Engagement (dependent variable) have an important mediating variable of AI-Acceptance (with a significant mechanism of action, $B = 0.446$, $p = 0.01$). As per the data in the research, Academic Self-Efficacy has indirect control over Learning Engagement through its impact on the acceptance of AI technology. The statistical findings indicate that the effect value is 0.119 (Bootstrap standard error: 0.018; Z-statistic: 6.464; $P < 0.001$; 95% confidence interval: [0.070, 0.141]) and the null hypothesis can be rejected and, therefore, the result is that academic self-efficacy indirectly impacts Learning Engagement by increasing students' acceptance of AI technology. Further analysis shows that the overall impact of Academic Self-Efficacy is 0.212. When Academic Self-Efficacy has AI-Acceptance as a mediating variable, the direct effect is 0.093 ($P = 0.064$), which is not statistically significant.

4.7. Structural Equation Modeling (SEM)

Table 8: SEM.

Summary Table of Model Regression Coefficients							
X	→	Y	Nonstandard Regression Coefficients	SE	z	p	Standard Regression Coefficients
Teacher Support	→	AI-Acceptance	0.174	0.043	4.013	0.000	0.178
Teacher Support	→	Learning Engagement	0.156	0.055	2.814	0.005	0.119
Academic Self-Efficacy	→	AI-Acceptance	0.340	0.047	7.165	0.000	0.332
Academic Self-Efficacy	→	Learning Engagement	0.126	0.060	2.095	0.036	0.092
AI-Acceptance	→	Learning Engagement	0.455	0.064	7.140	0.000	0.341

Source: Author's own work

The following table displays the model pathways' regression results:

The impact of teacher support on student engagement in learning is statistically significant with a standardized coefficient of 0.119.

Learning Engagement and Academic Self-Efficacy: A statistically significant relationship ($\beta = 0.092$).

The effect of teacher support on AI acceptance is statistically significant with a standardized coefficient of 0.178.

The standardized coefficient $\beta = 0.332$ indicates a substantial impact of academic self-efficacy on AI-acceptance.

Learning Engagement and AI-Acceptance: A statistically significant relationship ($\beta = 0.341$).

The results of the empirical research indicate that Teacher Support and Academic Self-Efficacy are not only direct facilitators of the promotion of Learning Engagement but also indirect promoting factors through the increase in the willingness to accept AI. These findings validate the theoretical assumptions of this paper. The data indicate that Teacher Support and the acceptance of AI technology have a strong positive correlation with the regression analysis value of 0.174 (SE = 0.043, z-value = 4.013, $p < 0.001$) and a standardised regression coefficient of 0.178. This result shows that teacher support is an important factor that can determine student comprehension and readiness to embrace AI technology. This is especially true when foreign students at universities feel that they are being provided with academic guidance, emotional comfort, and resource allocation by their teachers. With the help of good examples and the mentorship of teachers, the resistance of the students can be minimised, and they can adjust to the new environment caused by new technologies more swiftly and work in it successfully. The empirical relationship between Teacher Support and Learning Engagement is clearly positive, and the regression analysis indicates a regression coefficient of 0.156 (SE = 0.055, $z = 2.814$, $p < 0.005$) and the standardised coefficient 0.119. Even though this effect is statistically significant, it is relatively small. The research also shows that Teacher Support directly fosters the students to be more engaged in Learning and indirectly raises the level of active involvement in the learning process through the increased acceptance of AI.

The regression analysis demonstrates that academic self-efficacy is positively correlated with AI technology acceptance, with a correlation coefficient of 0.340 (standard error SE = 0.047, z-value = 7.165, $p < 0.001$) and a standardised regression coefficient $r = 0.332$. This implies that the gains in Academic Self-Efficacy of the individuals are positive with respect to their intellectual acceptance and the practical use of AI technology. The research also shows that the foreign university students who have a higher academic confidence tend to have a higher openness and innovation consciousness, which makes them more ready to use the emerging technological tools to change their Chinese language Learning Engagements.

Learning Engagement also has a strong positive correlation with Academic self-efficacy, and the regression analysis shows that the standardised coefficient of 0.092 ($t = 2.095$, $p = 0.036$) is significant. This outcome is statistically significant, but its effect size is small. The research indicates that Academic Self-Efficacy is not only directly related to the motivation of the foreign university students to apply the Chinese language in on-class learning but also influences it indirectly through increasing their intention to use the AI technology. The research data indicate that the acceptance of AI has a strong positive correlation with the Learning Engagement, with a regression coefficient of 0.455 (SE = 0.064, $z = 7.140$, $p < 0.001$) and a standardised coefficient of 0.341. It means that there is a strong connection between the two, and AI-Acceptance is a significant influencing factor. It is this phenomenon that indicates that AI-Acceptance has a large positive predictive value in terms of investment in learning. The energy that is directed towards learning is enhanced when foreign university students embrace AI technology by choice and reasonably integrate the technology. AI tools can effectively clear cognitive barriers through individualised recommendation systems, real-time interactive feedback, and better reward systems, which will significantly increase the Chinese language on-class Learning Engagements of students.

5. Discussion

This research investigated the effect of teacher support and academic self-efficacy on learning engagement among foreign students in the classroom of the Chinese language, mediated by AI-acceptance. The outcomes validated that teacher support and academic self-efficacy have substantial positive impacts on engagement in learning, in line with the Social Cognitive Theory (Manjarres-Posada, Onofre-Rodríguez & Benavides-Torres, 2020) that focuses on mutual relationships among personal, environmental, and behavioural variables. Students who felt more teacher-supported and more self-efficacy were more engaged and motivated, which is consistent with the data provided by Cho, Levesque-Bristol and Yough (2023), who also found that positive learning environments facilitated the participation and persistence of international students. These findings highlight the fact that emotional and instructional teacher support is still at the centre of engagement, despite the growing integration of AI in the field of education.

The results also identified the relationship between teacher support and academic self-efficacy mediated by AI-acceptance and their relationship with learning engagement. This aligns with the Technology Acceptance Model (Singh, Sahni & Kovid, 2020) that assumes that the perceived usefulness and ease of use are the determinants of technology adoption behaviour within people. The students who perceived themselves as competent (self-efficacious) and supported by teachers were more inclined to perceive AI tools as beneficial and were more likely to make good use of them in their learning processes. This finding is not new and can be connected to the previous studies by Huang (2025b), who established that student readiness and confidence are what determine the success of AI-assisted learning. In this way, the role of psychological preparedness and the perception of support is vital to implementing the pedagogical potential of AI in language education.

These findings have a number of implications for teachers, institutions, and curriculum designers. When teachers are introduced to AI tools, they should be demonstrated with the help of guided instructions, contextual demonstrations, and frequent feedback that help students to see AI as their learning partners, not a substitute for human teaching. The first way through which teachers can increase the acceptance of AI is by introducing tools step by step and connecting them to purposeful classroom activities (Watted, 2025). In the case of schools, constant professional growth is the key; the organisations must create AI courses and digital laboratories where not only educators but also learners can test the language-learning technologies. To the curriculum designers, AI functions like pronunciation modelling, automated writing feedback, and adaptive vocabulary tasks need to be systemically integrated into the Chinese language curricula to encourage interaction and customization (Zhao, 2025). Such actions will not only raise the level of AI literacy but will also facilitate a vibrant incorporation of educational technology in such a way that it meets the Chinese approach of applying AI to Education as envisioned in the AI + Education strategy.

6. Conclusion

This study set out to investigate how AI acceptance mediated the relationships

between engagement with learning, academic self-efficacy, and teacher support for Chinese language learners studying abroad in Liaoning Province. This study sought to examine the interplay between more conventional psychosocial factors and more contemporary technological acceptance factors as they pertain to students' level of participation in class by applying the frameworks of Social Cognitive Theory and the Technology Acceptance Model. Taking these factors into account, the study contributes to the ongoing conversation about using AI in language classrooms around the world.

Data concerning 528 foreign university students that were collected using online surveys were analysed with a quantitative correlational design with Structural Equation Modelling (SEM). The reliability (= 0.969 in general) and validity of the instruments used were high. The results showed that teacher support and academic self-efficacy are significant predictors of learning engagement, and AI-acceptance mediates these associations- partially in the case of teacher support and completely in the case of academic self-efficacy. These results validate the fact that social and cognitive influences are essential in technology-based education, whereas openness to AI-based tools increases the engagement outcomes.

The results have significant implications for education. The use of AI resources should be purposeful and should be offered through scaffold, feedback, and exploration opportunities by teachers in lessons. The schools should create training and AI demonstration laboratories to improve technological confidence in teachers and students. The designers of the curriculum are expected to integrate AI-based activities, including real-time feedback and adaptive tests, into the organization of the Chinese language courses. In its turn, policymakers are expected to plan institutional strategies in tandem with the agenda of China to achieve Smart Education so that the integration of technology could be helpful in facilitating active, inclusive, and engaging learning environments. Altogether, this paper supports the notion that the successful implementation of AI requires not just technology, but also the quality of human services and confidence of students in their learning skills.

6.1. Research Limitations and Future Directions

There are many limitations associated with this study. One, the sample only included international students who study Chinese language programmes in Chinese universities in Liaoning Province, which could limit the extrapolation of the results. Other provinces can have a different cultural, institutional, and technological environment, which can affect the levels of teacher support, self-efficacy, and AI acceptance in students. It is advised that future research undertakings be cross-regional or nationwide-based comparative studies to confirm and elaborate on such findings under different settings in China. Second, the research design used in the present study was correlational research, which is constraining in terms of making causal assumptions between variables. Although Structural Equation Modelling showed a strong association and mediating effects, the direction of the relationships is tentative. To mitigate this, future studies can consider experimental or quasi-experimental designs, including intervention studies that apply AI-based learning tools in classroom learning, to determine their immediate effects on student engagement, as well as their effects on student engagement in the long term.

These methods would present more convincing arguments about the success of AI applications in international language learning.

References

- Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Prentice-Hall.
- Baron, R. M. & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), pp. 1173-1182. doi: <https://doi.org/10.1037/0022-3514.51.6.1173>
- Biggs, J. B. (1987). *Student Approaches to Learning and Studying*. ACER. Retrieved from <https://files.eric.ed.gov/fulltext/ED308201.pdf>
- Caplan, G. (1974). *Support Systems and Community Mental Health: Lectures on Concept Development*. Behavioral Publication.
- Chi, X. (2017). *A Study on the Influence Mechanism of Teacher Support on College Students' Learning Engagement Based on Self-Determination Motivation Theory* (Doctoral Dissertation, Tianjin University). doi: <https://doi.org/10.7666/d.D01769270>
- Chinese Ministry of Education. (2022). *Implementation Guidelines for AI-Empowered Education*. Retrieved from http://www.moe.gov.cn/jyb_xwfb/xw_zt/moe_357/2024/2024_zt05/mtbd/202403/t20240329_1123025.html
- Cho, H. J., Levesque-Bristol, C. & Yough, M. (2023). How autonomy-supportive learning environments promote Asian international students' academic adjustment: a self-determination theory perspective. *Learning Environments Research*, 26(1), pp. 51-76. doi: <https://doi.org/10.1007/s10984-021-09401-x>
- Cobb, S. (1976). Social Support as a Moderator of Life Stress. *Biopsychosocial Science and Medicine*, 38(5), pp. 300-314. doi: <https://doi.org/10.1097/00006842-197609000-00003>
- Dai, Y. (2024). Generative Artificial Intelligence Technology Empowers Teachers to Evaluate Classroom Teaching. *Advances in Education*, 14(6), pp. 1264-1271. doi: <https://doi.org/10.12677/ae.2024.1461071>
- Fredricks, J. A., Blumenfeld, P. C. & Paris, A. H. (2004). School Engagement: Potential of the Concept, State of the Evidence. *Review of Educational Research*, 74(1), pp. 59-109. doi: <https://doi.org/10.3102/00346543074001059>
- Huang, B. (2025a). The Development of Teacher-handheld Technology Acceptance Metrics. *Chinese Educational Technology Equipment*, (1), pp. 26-30,35. doi: <https://doi.org/10.3969/j.issn.1671-489X.2025.01.026>
- Huang, M. (2025b). Student engagement and speaking performance in AI-assisted learning environments: A mixed-methods study from Chinese middle schools. *Education and Information Technologies*, 30(6), pp. 7143-7165. doi: <https://doi.org/10.1007/s10639-024-12989-1>
- Huang, R., Spector, J. M. & Yang, J. (2019). *Educational Technology: A Primer for the 21st Century*. Springer. doi: <https://doi.org/10.1007/978-981-13-6643-7>

- Jiang, Y., Li, C., Wang, Y. & Zhang, S. (2024). Research Dynamics and Development Trends of International Chinese Education Under the Background of Artificial Intelligence in the Past Five Years (2019-2024). *International Chinese Language Teaching Journal, Krirk University, Thailand, 4*(2), pp. 126-142. Retrieved from <https://so04.tci-thaijo.org/index.php/ict/article/view/275919>
- Kohnke, L., Zou, D. & Zhang, R. (2023). Zoom Supported Emergency Remote Teaching and Learning in Teacher Education: A Case Study from Hong Kong. *Knowledge Management & E-Learning, 15*(2), pp. 192-213. doi: <https://doi.org/10.34105/j.kmel.2023.15.011>
- Liang, Y. (2000). *Study on Achievement Goals, Attribution Styles and Academic Self-Efficacy of Collage Students* (Master's Thesis, Central China Normal University). doi: <https://doi.org/10.7666/d.y378601>
- Luo, J., Shi, W., Zhang, P. & Hou, G. (2017). Study on Learning Engagement and Its Influencing Factors Among Sports Majors. *Journal of Nanjing Sport Institute (Natural Science Edition), 16*(5), pp. 99-105. doi: <https://doi.org/10.15877/j.cnki.nsin.2017.05.021>
- Manjarres-Posada, N. I., Onofre-Rodríguez, D. J. & Benavides-Torres, R. A. (2020). Social Cognitive Theory and Health Care: Analysis and Evaluation. *International Journal of Social Science Studies, 8*(4), pp. 132-141. doi: <https://doi.org/10.11114/ijsss.v8i4.4870>
- Pei, D. (2019). On the Chinese Characteristics of the Development of Curriculum and Teaching Theory. *Chinese Teachers, (10)*, pp. 5-8. doi: <https://doi.org/10.3969/j.issn.1672-2051.2019.10.002>
- Ryan, R. M. & Deci, E. L. (2000). Self-Determination Theory and the Facilitation of Intrinsic Motivation, Social Development, and Well-Being. *American Psychologist, 55*(1), pp. 68-78. doi: <https://doi.org/10.1037//0003-066x.55.1.68>
- Schunk, D. H. & Pajares, F. (2002). The Development of Academic Self-Efficacy. In A. Wigfield & J. S. Eccles (Eds.), *Development of Achievement Motivation* (pp. 15-31). Academic Press. doi: <https://doi.org/10.1016/B978-012750053-9/50003-6>
- Sheng, M. (2024). Hot Spots and Future Prospects of Generative Artificial Intelligence Intervention Applications in Education—Based on CiteSpace Visualization Analysis. *Operations Research and Fuzzy Theory, 14*(6), pp. 244-253. doi: <https://doi.org/10.12677/orf.2024.146527>
- Singh, S., Sahni, M. M. & Kovid, R. K. (2020). What drives FinTech adoption? A multi-method evaluation using an adapted technology acceptance model. *Management Decision, 58*(8), pp. 1675-1697. doi: <https://doi.org/10.1108/MD-09-2019-1318>
- Tian, M., Lu, G., Li, L. & Yin, H. (2021). International Undergraduate Students in Chinese Higher Education: An Engagement Typology and Associated Factors. *Frontiers in Psychology, 12*, pp. 680392. doi: <https://doi.org/10.3389/fpsyg.2021.680392>
- Tian, M., Lu, G., Yin, H. & Li, L. (2020). Student Engagement for Sustainability of Chinese International Education: The Case of International Undergraduate Students in China. *Sustainability, 12*(17), pp. 6831. doi: <https://doi.org/10.3390/su12176831>

- Watted, A. (2025). Teachers' Perceptions and Intentions toward AI Integration in Education: Insights from the UTAUT Model. *Power System Technology*, 49(2), pp. 164-183. Retrieved from <https://powertechjournal.com/index.php/journal/article/view/1759>
- Zhao, J. (2025). Advancing english language education: A mixed-methods analysis of AI-driven tools'impact on engagement, personalization, and learning outcomes. *Education and Information Technologies*, 30(15), pp. 21773-21813. doi: <https://doi.org/10.1007/s10639-025-13560-2>

Appendices

Table 1: Measurement and Scale Sources.

Part	Aspect	Variables	Items (67)	Dimensions	Scale Sources	Author	Reliability and Validity of Sources.
A	Demographic Profile	Demographic Profile	7				
B	Independent Variable	Teacher Support	13	3	Perceived Teacher Support Scale for Undergraduates	Chi (2017)	Cronbach's alpha coefficients=0.95 CFA(structural validity): $\chi^2/df=3.90$, RMSEA=0.058, SRMR=0.024, GFI=0.96, NFI=0.97, CFI=0.98, IFI=0.98
		Academic Self-Efficacy	22	2	Academic Self-Efficacy Scale for Undergraduates	Liang (2000) adapted from Pintrich (1990)	Cronbach's alpha coefficients=0.88 CFA(structural validity): $\chi^2/df=2.36$, RMSEA=0.06, SRMR=0.063, GFI=0.90, NFI=0.90, CFI=0.91
C	Mediating Variable	AI-Acceptance	12	3	Handheld Technology Acceptance Scale	Huang (2025)	Cronbach's alpha coefficients=0.925 CFA(structural validity): $\chi^2/df=1.938$, RMSEA=0.065, SRMR=0.045, GFI=0.901, IFI=0.965 CFI=0.965,PNFI=0.776,PGFI=0.662
D	Dependent Variable	Learning Engagement	13	3	Learning Engagement Scale for Undergraduates	Luo et al (2017) adapted from Schaufeli (2002)	Cronbach's alpha coefficients=0.914 CFA(structural validity): $\chi^2/df=2.966$, RMSEA=0.043, SRMR=0.063, GFI=0.938, NFI=0.916, CFI=0.942

Source: Authors own work

Table 2: Cronbach's alpha Result.

Part	Variable under Inverstigation	Items (67)	Cronbach's Alpha Coefficients
Personal Profile	Demographic Profile	7	
Independent Variable	Teacher Support	13	0.984
Independent Variable	Academic Self-Efficacy	22	0.991
Mediating Variable	AI-Acceptance	12	0.921
Dependent Variable	Learning Engagement	13	0.987

Table 3: KMO and Bartlett's Test.

KMO and Bartlett's Test			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.852	>0.8,excellent
Bartlett's Test of Sphericity	Approx. Chi-Square	58221.620	
	df	4095	
	Sig.	.000	<0.5,significant,suit EFA

Table 4: Total Variance Explained.

Component	Total Variance Explained								
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	23.291	38.819	38.819	23.291	38.819	38.819	18.373	30.621	30.621
2	11.234	18.724	57.542	11.234	18.724	57.542	11.224	18.706	49.327
3	7.998	13.330	70.872	7.998	13.330	70.872	11.010	18.350	67.678
4	4.824	8.039	78.911	4.824	8.039	78.911	6.740	11.234	78.911
5	1.689	2.815	81.727						
6	1.537	2.562	84.289						
7	1.212	2.020	86.309						
8	1.060	1.767	88.075						
9	.855	1.425	89.501						
10	.744	1.240	90.741						
11	.700	1.167	91.908						

Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
12	.627	1.045	92.952						
13	.571	.951	93.904						
14	.516	.861	94.764						
15	.486	.810	95.574						
16	.438	.731	96.305						
17	.415	.691	96.996						
18	.335	.558	97.555						
19	.303	.505	98.060						
20	.264	.439	98.500						
21	.193	.322	98.822						
22	.168	.280	99.101						
23	.112	.187	99.288						
24	.062	.103	99.392						
25	.058	.096	99.488						
26	.044	.074	99.561						
27	.035	.058	99.620						
28	.031	.052	99.672						
29	.026	.044	99.715						
30	.020	.034	99.749						
31	.018	.029	99.778						
32	.015	.024	99.803						
33	.011	.019	99.822						
34	.011	.018	99.840						
35	.010	.017	99.857						
36	.009	.015	99.872						
37	.008	.013	99.885						
38	.007	.012	99.897						
39	.006	.010	99.907						
40	.006	.010	99.917						
41	.005	.009	99.926						
42	.005	.009	99.935						
43	.005	.008	99.942						
44	.004	.007	99.949						
45	.004	.006	99.955						
46	.004	.006	99.961						
47	.003	.006	99.967						
48	.003	.005	99.972						
49	.003	.005	99.976						
50	.003	.004	99.981						
51	.002	.004	99.985						
52	.002	.003	99.988						
53	.002	.003	99.990						
54	.001	.002	99.993						
55	.001	.002	99.995						
56	.001	.002	99.996						
57	.001	.002	99.998						
58	.001	.001	99.999						
59	.000	.001	100.000						
60	.000	.000	100.000						

Extraction Method: Principal Component Analysis.

Table 5: Rotated Component Matrixa.

Rotated Component Matrix ^a				
	Component			
	1	2	3	4
Academic Self-Efficacy7	.914			
Academic Self-Efficacy2	.910			
Academic Self-Efficacy17	.909			
Academic Self-Efficacy22	.909			
Academic Self-Efficacy12	.907			
Academic Self-Efficacy6	.904			
Academic Self-Efficacy11	.904			
Academic Self-Efficacy14	.904			
Academic Self-Efficacy1	.903			
Academic Self-Efficacy16	.903			
Academic Self-Efficacy21	.902			
Academic Self-Efficacy4	.901			
Academic Self-Efficacy9	.900			
Academic Self-Efficacy8	.900			
Academic Self-Efficacy3	.898			
Academic Self-Efficacy13	.897			
Academic Self-Efficacy19	.896			
Academic Self-Efficacy18	.893			
Academic Self-Efficacy5	.881			
Academic Self-Efficacy20	.880			
Academic Self-Efficacy15	.878			
Academic Self-Efficacy10	.876			
Learning Engagement3		.966		
Learning Engagement9		.963		
Learning Engagement5		.962		
Learning Engagement4		.962		
Learning Engagement2		.962		
Learning Engagement1		.961		
Learning Engagement11		.960		
Learning Engagement8		.960		
Learning Engagement7		.958		
Learning Engagement12		.952		
Learning Engagement13		.679		
Learning Engagement6		.672		
Learning Engagement10		.671		
Teacher Support5			.911	
Teacher Support3			.907	
Teacher Support8			.902	
Teacher Support7			.902	
Teacher Support10			.900	
Teacher Support1			.897	
Teacher Support6			.895	
Teacher Support13			.894	
Teacher Support12			.893	
Teacher Support2			.890	
Teacher Support11			.879	
Teacher Support4			.857	
Teacher Support9			.847	

Rotated Component Matrix ^a				
	Component			
	1	2	3	4
AI-Acceptance1				.752
AI-Acceptance8				.743
AI-Acceptance5				.739
AI-Acceptance4				.734
AI-Acceptance3				.723
AI-Acceptance10				.715
AI-Acceptance12				.710
AI-Acceptance2				.694
AI-Acceptance6				.692
AI-Acceptance7				.688
AI-Acceptance9				.674
AI-Acceptance11				.649
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 5 iterations.				

Table 6: Model AVE and CR Indicator Results.

Model AVE and CR Indicator Results		
Factor	AVE	CR
Teacher Support	0.784	0.979
Academic Self-Efficacy	0.827	0.991
AI-Acceptance	0.511	0.921
Learning Engagement	0.849	0.986

Table 7: Confidence Intervals.

Confidence Intervals				
	Pearson Correlation	Sig. (2-tailed)	95% Confidence Intervals (2-tailed) ^a	
			Lower Limit	Upper Limit
Teacher Support - Academic Self-Efficacy	.337	.000	.208	.454
Teacher Support - AI-Acceptance	.256	.000	.121	.381
Teacher Support - Learning Engagement	.282	.000	.149	.405
Academic Self-Efficacy - AI-Acceptance	.163	.021	.025	.295
Academic Self-Efficacy - Learning Engagement	.251	.000	.117	.377
AI-Acceptance - Learning Engagement	.389	.000	.265	.501
a. Estimation is based on Fisher's r-to-z transformation.				
Source: Authors own work				