APJFES Vol. 5 No. 3 2026 pp. 91–106
Special Issue: Higher Education in the Age of AI: Transforming Learning for Sustainable Futures
eISSN 2811-3586

Research Paper

The Application of AI in Teaching Chinese as a Foreign Language: Improving Classroom Interaction and Student Engagement

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Abstract: Artificial intelligence (AI) technology has advanced rapidly in recent years, and its integration into language education has grown steadily, particularly in Teaching Chinese as a Foreign Language (TCFL). Within this context, this study aims to systematically explore how AI use correlates with classroom interaction, student engagement, and collaborative learning in TCFL. Three core research questions, and three key areas were examined: AI's role in boosting both teacher-student and student-student interaction; its influence on student engagement and motivation through personalised learning support; and its ability to foster environments that encourage collaborative learning. From an empirical standpoint, the findings suggest that greater AI use tends to align with more frequent classroom interactions (including teacher-student and student-student exchanges), higher levels of student engagement, and stronger outcomes in collaborative learning. Moreover, AI also helps to reduce language learning anxiety, support personalized learning pathways, and reinforce students' self-regulated learning capacities. This study highlights the value of AI in promoting student participation and cooperation and offers practical guidance for teachers seeking to better integrate AI tools into TCFL instruction. Finally, it underscores the complementary nature of AI tools and teaching approaches, emphasising that embedding AI into classroom practices can help create a more interactive and collaborative learning environment—insights that are relevant to future educational strategies in TCFL.

Keywords: Artificial intelligence, language teaching, classroom interaction, student participation, innovative teaching

Suggested citation: Dong, P., & Velarde, J. M. (2026). The application of AI in teaching Chinese as a foreign language: Improving classroom interaction and student engagement. *Asia-Pacific Journal of Futures in Education and Society, 5*(3), 91–106. https://doi.org/10.58946/apjfes-5.3.P6

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Introduction

As the Belt and Road Initiative advances and China's international influence expands, there is a growing global interest in learning Chinese. However, Chinese language education continues to face a number of restrictions. The lack of good teachers, limited use of advanced teaching tools, and insufficient teaching materials for students with varied learning styles (Ma & Li, 2021), are some of the issues that diminish the overall quality of Chinese as a Foreign Language (CFL) education.

In recent years, X Polytechnic University — one of the institutions from which participants of this study were recruited — has seen a marked rise in the number of international students, growing from just five students representing two countries last year to 26 students representing eight countries at present. These international students vary considerably in their Chinese proficiency levels, learning objectives, and personal interests. Thus, traditional teaching methods are insufficient to help these students learn quickly.

Traditional CFL teaching relies heavily on face-to-face classroom instruction, an approach that supports cultural transmission and enables direct interaction between teachers and students. That said, classroom interaction can often become repetitive and overly teacher-focused, especially in larger classes. In such scenarios, student engagement typically remains low (Shen, 2024). Moreover, teachers may find it difficult to track each learner's progress and respond to individual differences in a timely way.

In addition, traditional classrooms often provide limited teaching approaches, such as lectures and paper-based assignments (Nuong & Ragavan, 2023). Interactive learning opportunities are also insufficient. Outside the class, many learners lack timely guidance and feedback. This lack of support can reduce their learning efficiency and impede learning outcomes (Wang, 2026).

AI not only provides real-time feedback and error correction in the classroom, to help students practice their language skills effectively, but also integrates technologies like virtual reality to create a more immersive language learning environment and enhance student engagement and interactivity (Shen, 2024).

Based on this, the "online + offline hybrid" teaching model is commonly proposed. This model combines traditional teaching methods with modern information technology, that can overcome the time and space constraints of the former methods. The model effectively promotes student autonomy while also enhances classroom interactivity and engagement. More specifically, with the support of AI technology, this teaching model can offer a more personalised learning experience, thereby improving students' participation and learning outcomes (Vieriu, 2025).

Consequently, AI can be extensively utilized in teaching the Chinese language to foreigners. One of the key advantages is that, whether in the classroom or

online, AI can provide adaptive learning and immediate feedback through a digital platform (Wang, 2020). This enables students to review their work and practice whenever and wherever they wish, in a schedule tailored to their individual needs. Such a flexible learning approach effectively fosters students' interest and bolsters their engagement.

While past studies have looked at the application scope of AI technology in CFL teaching, the context in which they are applied need to be studied further, especially how AI can be used in classroom teaching, including its effect on classroom interactions and participation (Wang, 2024). Along with the development of "online + offline" hybrid teaching, AI not only provides a more flexible learning method in the classroom by bringing interactive and personalised learning into play, but also addresses any existing shortcomings of traditional teaching methods.

Although challenges such as shortage of teaching resources and learners with different backgrounds, are both present in general language education and in CFL teaching, they differ in a number of ways. For example, CFL learners are typically from a very diverse range of linguistic backgrounds (including both character based and non-character based languages), which means their tones, characters or grammar vary significantly. The current standardized approach to CFL instruction often uses available teaching materials that cater neither to specific language needs nor individual learner differences. Accordingly, a gap in CFL pedagogy is evident in the provision of differentiated instruction and individualized support for Chinese learning, considering the specific nature of language characteristics in Chinese as well as relatively diverse profiles among CFL learners.

Set against this background, this research's three objectives are as follows:

1. Investigate how AI technologies can improve classroom interaction in CFL teaching– Focus on AI's role in enhancing teacher-student and student-student interaction in the classroom.
2. Examine the impact of AI on student engagement and motivation in CFL teaching– Investigate how AI personalises learning to increase student interest and involvement.
3. Analyse AI's role in fostering collaborative learning environments in CFL teaching – Focus on how AI can be used to encourage student collaboration and peer learning in the classroom.

Although it is commonly acknowledged that AI is increasingly being incorporated in language teaching and learning, very few studies have explored the impact of AI on classroom interaction and student engagement in the context of CFL teaching. In addition to filling this gap, the study also contributes to the emerging area of research on EdTech in Second Language Acquisition (SLA). The findings provide empirical evidence that AI use is associated with personalised learning

support and higher levels of student engagement, thereby strengthening the rationale for the pedagogically appropriate integration of AI tools into CFL classrooms (Marín et al., 2023).

This research also offers new insights into AI technologies (i.e., speech recognition, personalised learning systems, and collaborative AI platforms) which can foster an environment of collaboration and engagement for learning.

Based on the research objectives, the following hypotheses were derived and tested:

H1: AI tools will significantly increase classroom interaction by facilitating real-time communication and feedback between students and teachers.

H2: AI-driven personalized learning pathways will positively impact student engagement, with higher levels of engagement linked to increased use of AI-supported learning tools.

H3: The integration of AI in the classroom will create a more collaborative learning environment, leading to improved student motivation, higher levels of participation, and better overall language learning outcomes.

Literature Review

Given the rapid advancements of science and technology, artificial intelligence (AI) has now infiltrated almost all sectors, including the educational sector (Li, 2019). AI is increasingly becoming the transformational force behind instructional change, affecting instructional model and learning experiences (Bo, 2021). In English language learning, AI is associated with enhanced efficiency and increased opportunities for individualized learning, because it can assist learners with automatic feedback, adaptive content presentation, as well as interactive practice, even when out of the classroom.

AI implementation is generally found in speech recognition, Natural Language Processing (NLP), intelligent assessment, and real-time feedback systems in the educational world (Lee, 2025). Computers can understand and produce language with the help of NLP, and this in turn, facilitates automated evaluation and feedback in language learning (Cukurova, 2025). Speech recognition allows learners to practice orally and receive feedback related to pronunciation while intelligent assessment systems evaluate the performance of the learner continuously. Combined, these capabilities can lead to a more personalized learning pathway in CFL.

CFL Learning Shortcomings

While AI has only recently come under discussion in second language education, Chinese as a Foreign Language (CFL) teaching poses unique problems, which should be addressed with specific pedagogical and technological tools. Various challenges faced by CFL learners are related to the tonality of the spoken Chinese language and written form of logographic systems (Chinese characters) as well as acquisition of pragmatics competence (speaking Chinese appropriately in various cultural and social contexts). These difficulties become more pronounced in heterogeneous classes with students having dissimilar linguistic contexts, levels of proficiency, as well as learning objectives and, thus, the non-individual, one-size-fits-all instruction is less effective.

The conventional CFL instruction is also commonly based on the teacher explanation and restricted practice formats. Although this type of instruction can offer systematic punctuation and aid in the passing of the culture, a teacher might not be in a position to offer persistent individualized instruction due to time and financial constraints, especially in settings with a high population of students (Ghimire et al., 2024). This is a crucial weakness of CFL since students often need repetition and corrections in real time (e.g., in pronunciation, sentence construction, and correctness of usage). Thus, it is not a simple question of whether AI is helpful in general, but how AI tools can be related to the learning requirements of CFL.

Artificial Intelligence Tools and Mechanisms of CFL Learning

With the help of AI-driven educational services and applications, learners would have more opportunities to learn interactively, in particular, with flexible access and real-time feedback (Giannakos, 2024). Further, AI-powered platforms and smart language assistants allow learners to practice at any given time and receive feedback that can help them improve. This shifts the practice component out of the conventional teacher-centred approach, and boosts the independence of learners.

AI-based systems also support adaptive learning paths. AI can adjust the level of difficulty of the learning materials and suggest personalized ones by tracking the progress and mistakes of learners. Personalised learning is important because in large or diverse classrooms, teachers are not always able to address the needs of every learner (Ghimire et al., 2024). Moreover, real-time feedback that is supported by speech recognition and NLP can enhance learning efficacy and motivation, especially if the feedback is accurate and task-focused (Sun, 2023). These advantages however, should not be regarded as automatic. The efficacy of AI in supporting learning is generally determined by the tools applied, the quality of the feedback, and the ability of learners to understand and utilize the feedback provided by AI accordingly.

The Relationship between AI and CFL Classroom Learning

The learning of a second language revolves around classroom interactions since meaning is built from communication, negotiations and collaborations. The concept of interaction implies sharing of ideas and getting feedback, as well as acquiring understanding through social interactions (Ma & Li, 2021). Interaction in CFL classrooms supports the linguistic development, pragmatic competence and communicative confidence of learners. Therefore, the application of AI in CFL classrooms should take into account the quality and amount of interactions that it affords.

The use of AI tools should also mediate teacher-student and peer interactions as well, including the provision of feedback and facilitation of tasks. For example, AI can be tasked to analyse the output of learners (e.g., pointing out inaccuracies or inconsistencies in written work); this reduces the workload of teachers and allows them to provide more specific guidance to the learners. Intelligent speech recognition, virtual assistants, and other tools can be used to give instant feedback about pronunciation, which can motivate learners to engage in speaking-related activities (Marín et al., 2023). Certain learning systems can organise interactive group activities with use of AI-supported peer systems and cooperative learning functionalities.

Meanwhile, an increase in turn-taking should not be mistaken for genuine communication. In CFL learning, the quality of interaction is important. Learners must receive corrective feedback, practice with the real use of forms, and build pragmatic adequacy. AI-generated responses are not always contextually appropriate, and learners may become overly reliant on automated feedback. However, when AI becomes the main communication partner, this will lead to a decrease in meaningful communication between humans. As such, the notion that AI enhances interaction ought to be construed critically, especially in regard to the design of classrooms, mediation by teachers, and how authentic the interactions are.

Artificial Intelligence, Active Learning, and Motivation

There is a widespread claim that AI-assisted learning environments will produce multiple positive effects such as student engagement and motivation (Klimova & Pikhart, 2025). AI might suggest content based on the progress and interests of learners with the appropriate degree of difficulty and feedback to potentially keep them interested and decrease frustrations (Plata et al., 2023). This applies to CFL learning as well where learners can advance at their own pace of competencies (e.g., comprehension gains power when speaking accuracy gets worse and character learning lags behind).

Studies have shown that learner participation and engagement can be augmented with immediate feedback and interactive learning environments (Shen, 2024). Learning activities can proceed without long gaps or the learner getting stuck when the learner is provided with prompt responses. In addition to the availability of the right tools, learner engagement also relies on the quality of AI feedback, digital literacy of learners, and the organization of learning activities. While their motivation may grow as learners become more independent and competent, these psychological gains can become compromised if they become over-reliant on AI or if the results provided by AI are not accurate. Thus, the effects on engagement should be studied in regard to how learners actually utilize AI tools in CFL learning activities and how such patterns correlate with interaction and motivation.

Applications and Constraints of Using AI in CFL Instruction

The use of AI in CFL instruction has grown in recent years (Tang & Wei, 2019). Some of the common applications are Chinese voice intelligence, Chinese proficiency testing, and virtual learning settings. Voice assistants support speech recognition in CFL as the vocation makes interaction possible and gives instant feedback, in terms of pronunciation correction or language form checking (Vieriu, 2025). These resources can extend speaking practices beyond the classroom which is beneficial in cases where teacher feedback is insufficient.

Virtual learning systems are capable of providing relevant learning tools and practices according to the levels and objectives of the learners (Liu, 2019). The recommendations made by AI might be more effective than the one-size-fits-all instruction as this allows learners to advance at their own speed and attend to the needs relevant to them (Walter, 2024). Proficiency evaluation can also be done with the help of AI. Certain AI systems can assess listening, speaking, reading, and writing, offer feedback and provide scoring that can be more effective and more reliable than that of humans (Wang, 2020).

Nevertheless, AI in the teaching of CFL also has significant limitations. Technical feasibility is an issue because in certain areas, lack of computing devices and reliable networks will limit AI application in CFL teaching. Further, AI usage might be ineffective without the proper training of educators, and the willingness of learners to use AI (Ma & Li, 2021). These limitations imply that the use of AI in CFL teaching is not guaranteed but contingent.

Synthesis and Research Gap

The existing literature on AI-based language learning is focused on individualization, automation, and instant feedback. Nevertheless, CFL learning has its own peculiar issues connected with tones, character-based literacy and pragmatic competence

which requires an explicit synthesis of the alignment between particular AI tools and CFL challenges. Although previous studies indicate that AI can be useful in terms of enhancing interaction, engagement, and motivation when it comes to providing feedback and engaging with learners in practice (Marin et al., 2023; Shen, 2024), barriers in terms of access, training, and acceptance by the learners still factor in (Ma & Li, 2021). In short, it is clear that more empirical research on connecting the actual tendencies of AI use among learners in the context of CFL classroom communication and student engagement remains necessary. The current research is a response to this gap as it addresses the connection between AI tool applications and the CFL classroom.

Methodology

This study employed a quantitative approach to examine the role of artificial intelligence (AI) technology in classroom interaction and student engagement in Chinese as a Foreign Language (CFL) teaching. A correlational research design was used to explore the effect of AI (independent variable) on student interest and engagement in the CFL classroom (dependent variables). Quantitative data were collected using questionnaires, and the correlation between the identified variables was analysed statistically. The purpose was to examine the relationship between AI tool use and classroom interaction, engagement, and learning motivation in the CFL contexts and to investigate the influence of AI on students' learning motivation.

The study participants were Chinese learners—specifically, students studying Chinese as a foreign language—at several universities in Xi'an, China. The targeted sample size was 200 to 250 as this range was deemed sufficient to ensure adequate statistical power for subsequent data analysis. Participation was open to any students who have studied Chinese as a foreign language for at least one semester and have used AI tools, like AI-powered voice assistants or personalised learning platforms. To ensure the external validity of the results, participants were selected using random sampling, which helped ensure a balanced distribution of participants across different genders, academic years, and Chinese language proficiency levels.

Data were collected through an online survey (Wen Juan Xing) to examine how AI affected learners' interactions and engagement in the CFL classroom. The survey focused on the frequency and extent of student interactions, engagement levels, and motivation when using AI tools such as intelligent voice assistants and personalised learning platforms to learn Chinese. Further, the survey also examined if AI assistance increased learner interaction or engagement. The survey used a 5-point Likert scale (1 = never, to 5 = very often) to collect responses.

SPSS (Statistical Package for the Social Sciences) was used to analyse the data, to determine the relationship between AI (independent variable) and classroom

interaction and student engagement (dependent variables). The statistical methods employed to analyse the data are shown in Table 1.

Table 1. Statistical methods used for data analysis

Analysis Type	Description
Descriptive Statistics	Presented means (M) and standard deviations (SD) for the distribution of classroom interaction patterns and student participation. Such data is valuable for gaining deeper insight into how students generally use and interact with AI tools in CFL learning.
Pearson Correlation Analysis	Examined if there is a relationship between students' AI usage skills and their levels of classroom interaction and engagement. It also tests whether more frequent AI use is associated with increased classroom interaction and higher student engagement.
Regression Analysis	Investigated whether the use of AI can predict how often students would contact the instructor and their peers, feel engaged, as well as motivated in learning CFL.

The results of these analyses provided empirical evidence on whether AI influences students' classroom interaction and engagement, and to what extent.

Findings

Descriptive Statistics

A total of 213 valid questionnaires were distributed to Chinese-learning students to test the effect of AI in CFL teaching. The participants were diverse in gender, academic level and self-perceived Chinese proficiency. Tables 2 provides a demographic overview of the participants while Table 3 presents the descriptive statistics for the main study variables.

Table 2. Participant demographics

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	121	56.7
	Female	92	52.3
Academic Year	Short-term Exchange	96	45
	Long-term	117	55
Chinese Proficiency	Low	137	64
	Moderate	55	26
	High	21	10

Table 3. Descriptive statistics of key variables

Variable	Mean (M)	Standard Deviation (SD)
AI use frequency	4.1	0.8
Classroom interaction	3.9	1.1
Student engagement	4.2	0.7

The "AI Use Frequency" variable generated a mean value of 4.1 as well as a standard deviation value of 0.8; this indicates a moderate variation in the responses regarding how often participants used AI on a daily basis.

For "Classroom interaction", a mean value of 3.9 and a standard deviation value of 1.1 suggests that perception of classroom interactions is not consistent, based on the variations in the responses.

Finally, "Student Engagement" produced the highest mean score of 4.2 and a rather small standard deviation of .7, meaning that students tend to be very engaged with a low variation among responses.

Correlation Analysis

Table 4 shows the results of the Pearson correlation analysis to investigate the link between AI usage and classroom interaction as well as student engagement. The purpose of the analysis is to see if a higher use of AI-based tools correlates with more interactions in class and as a result, higher student engagement.

Table 4. Correlation results on the frequency of AI tool usage and students' classroom interaction and engagement

Variable	AI Use Frequency
Classroom Interaction	0.62**
Student Engagement	0.55**
Collaborative Learning	0.51**

Results show that AI use frequency is positively and significantly related to all three major output measures: class interaction, student engagement, and collaborative learning. The highest connection was observed between the frequency of using AI and classroom interaction ($r = 0.62$, $p < 0.01$), indicating that the more times AI tools are used, the greater the feedback, thus facilitating better classroom interaction.

A significantly moderate correlation was derived between AI use frequency and student engagement ($r = 0.55$, $p < 0.01$), inferring that high AI usage can be a facilitating means to enhance students' motivation in learning.

Moreover, AI use frequency was also positively associated with collaborative learning ($r = 0.51$, $p < 0.01$), indicating that AI supports the creation of more collaborative learning space for peer interaction and shared learning experience.

Regression Analysis

A simple regression analysis was conducted to determine whether the frequency of AI use could significantly predict changes in classroom interaction, student engagement, and collaborative learning.

Table 5. Results of regression analysis of AI tool usage and students' classroom interaction and engagement

Predictor Variable	β	t	p
Classroom Interaction	0.42	4.31	< 0.01
Student Engagement	0.38	5.35	< 0.01
Collaborative Learning	0.36	4.75	< 0.01

Results show that the frequency of AI use can predict classroom interaction, student involvement, and collaborative learning significantly. The R^2 of the model was 0.44, meaning that frequency of AI use explains 44% of the variability in these variables.

Of the variables considered, classroom interaction had the largest regression coefficient ($\beta = 0.42$, $p < 0.01$), indicating that greater use of AI tools is associated with more student–teacher interaction. Additionally, both student engagement ($\beta = 0.38$) and collaborative learning ($\beta = 0.36$; both $p < 0.01$) had statistically significant positive coefficients, indicating that AI use is positively associated with increased degree of student engagement and greater peer collaboration in the CFL classroom.

Discussion

Results demonstrate a positive correlation between the regular use of AI tools and self-reported higher classroom interaction, engagement, and collaborative learning in CFL classrooms. That is, learners who reported more frequent use of AI tools also reported greater participation in interactions with teachers and peers. The regression results also indicate that the application of AI contributes a significant portion of variance in these learning outcomes. In spite of these findings not showing any causality, they provide empirical evidence that the use of AI has a significant positive relationship with interactive and participative learning behaviours in CFL classrooms.

This relationship can be attributed to the unique learning requirements of CFL. Some of the common areas that CFL learners need to practice and get timely feedback

are pronunciation of tonal accents, speech fluency, and propensity of appropriateness. Conventional classrooms may face constraints in terms of individualised feedback since teachers have to handle and cater to various learner requirements within a specified time period. On the contrary, AI tools, including voice assistants and AI-based platforms, are able to offer real-time feedback, feedback repetition, and customised scaffolding outside the classroom. As a case in point, learners can train speaking, sort out feedback related to pronunciation, or attempt sentence expansion and responses to conversation prior to participating in classroom exercises. This pre-class preparation helps learners to participate in classroom activities with more ease, thus more willing to engage and cooperate with other learners.

Another reason for the positive relationship between AI usage and engagement is motivation. AI tools offer easy access and low-pressure practice opportunities; this helps CFL learners who are hesitant about the tone and language of their speech and fear making mistakes in front of an audience to practice in advance and prepare themselves. By being able to practice and get feedback to improve in their own space and time, without an audience, learners will perceive better competence and autonomy, which in turn, becomes their source of motivation. Besides, AI-enhanced platforms or systems can support active learner engagement by offering adaptive assistance (e.g., adjustment of difficulty level or provision of explanations) that is not possible in classroom instructions in a large group. This aligns with the existing theory, which indicates that technology-based learning environments facilitate engaging learning activities and collaborations (Shen, 2024).

The results also reveal how AI tools can differ from conventional instruction in influencing interactions and collaboration. In traditional CFL classrooms, the teacher is the sole authority of knowledge, while absence of individualized practice, and delays in feedback on speaking or writing assignments are quite common. These limitations can be overcome with the help of AI tools offering flexible practice sessions and providing immediate feedback, which can enhance the preparedness of learners to interact in the classroom. In collaborative learning, AI can also be used as a common support tool when completing group tasks. For example, AI helps learners with vocabulary recovery, sentence restructuring, or the provision of alternative expressions, which enriches peer discussion. Thus, AI can promote or prevent collaboration or peer interaction, depending on the way teachers assign tasks and direct the learners.

Based on these findings, a number of pedagogical implications for CFL teaching is evident. One, AI can be incorporated into guided systems of interaction by teachers, instead of being used freely. As an example, teachers can create AI-based group tasks whereby learners can use AI to provide a variety of options to convey a communicative intention, and these are then discussed and compared to see which fits best in the Chinese language. Second, AI can help with pre-class preparation

(e.g. pronunciation drill or dialogue training), which allows classroom hours to be devoted to more effective human-human interactions and communicative activities. Third, educators are encouraged to guide learners about the productive and critical applications of AI, like checking work output, including tones and pronunciation problems as well as thinking about pragmatic worthiness, while not becoming over-dependent on AI and simply mimicking its output without genuine understanding.

This study has a number of limitations that should be taken into account. To begin with, the sample represented one institutional environment, and hence restricts the overall transferability of the results to other CFL institutions or programs. Second, since the study used self-reported data in the form of questionnaire responses, the data can be biased due to recall bias or social desirability. Nevertheless, this opens up avenues for future studies to continue the work. For instance, the scope of sampling can be expanded to include various institutions and cultural settings. Further, longitudinal studies can explore how the correlation of AI usage with interaction and engagement evolves over time. Also, qualitative data (e.g., interviews, classroom observations, or think-aloud protocol) might further help illuminate the actual use of certain AI tools to learn tones, speaking, learning characters, or performing tasks pragmatically by CFL students. Future studies can also examine the connection between particular use patterns and their effect on higher levels of learner engagement and collaboration.

Conclusively, the research demonstrates a strong positive relationship between the use of AI tools and some critical learning outcomes of CFL teaching and learning such as classroom interaction, classroom engagement, and collaborative learning. Instead of considering AI as a substitute of conventional instruction, the results imply that AI can be a supportive tool, which can support practice, feedback, and preparation of learners, hence boosting their readiness and desire to engage in classroom interaction. Pedagogical integration and guidance of teachers are also critical towards ensuring meaningful learning and effective communication in CFL-based classrooms that incorporate AI.

Conclusion and Recommendations for Future Research

This study explored the relationship between AI use and classroom interaction, student engagement and collaborative learning in CFL teaching in a systematic way. Empirical results demonstrate that AI use is positively correlated with more classroom interactions, higher level of student engagement and better collaborative learning; to be more precise, the interactions between teachers and students as well as between students were more frequent, and students were found to be more willing to participate in classroom activities (Hypothesis 1 (H1) is supported). Frequent users of AI tools were associated with more interactions with teachers and peers, and students' self-reported willingness to participate in classroom activities (Research

Hypothesis 1 (H1) is supported). Regression analysis showed that the frequency of AI tool usage could explain 44% of the variance in dependent variables and had the greatest impact on classroom interaction. In addition to revealing how AI can promote learner engagement and cooperation in CFL teaching, the study also offers suggestions on optimising AI towards more efficient CFL teaching, and in general, other language teaching as well.

Overall, the study demonstrates the value of AI from the perspective of classroom interaction, student participation and cooperation. In doing so, it demonstrates the importance of embedding AI in teaching to support more effective learning for students, by providing a more interactive and collaborative teaching environment. Future educational strategies should leverage on this complementary relationship between AI instruments and conventional instruction, in which the role of technology collaborates with that of human capital to support language learning and other academic outcomes.

Recommendations for Future Research

Based on these results, teaching practices can be enhanced in multiple ways through the effective use of AI in the classroom. First, educational institutions should focus on the adoption of AI tools to support active learner participation including their response and interactive learning technologies. This kind of software can help to facilitate richer interactions between students and teachers. In addition, AI-supported collaborative learning environment with group tasks and pair/ group activities can enhance students' participation and motivation. Teachers can provide continuous feedback to students using AI which can help them acquire a higher level of confidence and participation in learning.

In addition, it is important to create a culture where the strain of learning languages is minimised, particularly by encouraging the use of AI tools which support personalised learning paths. These tools help learners to self-regulate their learning and monitor their learning, which can take the "heat" off learning in group-based activities. Finally, modules for self-regulated learning (SRL) might be included in the design of the course to help students engage in reflection about their own learning. AI-supported technology, which could increase students' motivation and adherence, could be used to support this process.

Acknowledgements

I would like to express my sincere gratitude to all the students who participated in this study. Their willingness to engage in the survey and share their experiences provided invaluable support for the data collection process. I am also deeply grateful to my supervisors for their continuous guidance, insightful feedback, and academic

support throughout the research. Their expertise and encouragement were essential in shaping this study and its outcomes.

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