https://research.adra.ac.id/index.php/ijlul/
P - ISSN: 3026-7102
E - ISSN: 3030-8372

Application of AI-based Flipped Classroom Method in Improving English Speaking Skills

Ratna Ayu Pawestri Kusuma Dewi[1], Roya Zahir[2], Satrio Binusa Suryadi[3]
[1]Politeknik Negeri Madura, Indonesia
[2]Kunduz University, Afghanistan
[3]Politeknik Negeri Malang, Indonesia

ABSTRACT

Background. Speaking is a crucial component of English language acquisition, yet it remains one of the most challenging skills to master among EFL learners. Traditional teaching methods often fail to provide sufficient opportunities for oral practice and personalized feedback.

Purpose. This study aims to examine the application of an AI-based flipped classroom method and its impact on improving English speaking skills, particularly in the areas of fluency, pronunciation, coherence, and accuracy among senior high school students.

Method. A quasi-experimental design was employed involving 60 students divided into control and experimental groups. The experimental group was taught using AI-integrated flipped learning, incorporating tools such as speech recognition and automated feedback systems.

Results. Findings indicate that the experimental group outperformed the control group in all speaking components. The most significant improvements were observed in fluency and pronunciation, attributed to regular, individualized AI-guided speaking practice.

Conclusion. The AI-based flipped classroom approach offers a valuable instructional model that merges active learning with intelligent technology. It facilitates personalized, adaptive, and continuous speaking practice, thereby supporting accelerated language acquisition.

KEYWORDS

Artificial Intelligence, Flipped Classroom, Speaking Skills

Citation: Dewi, K, P, A, R., Zahir, R., & Suryadi, B, S. (2025). Application of AI-based Flipped Classroom Method in Improving English Speaking Skills. *International Journal of Language and Ubiquitous Learning, 3*(2), 55–64. https://doi.org/10.70177/ijlul.v3i2.2309

Correspondence:

Ratna Ayu Pawestri Kusuma Dewi,
ratnaayupkd@poltera.ac.id

Received: Oct 6, 2024

Accepted: Jan 10, 2025

Published: April 1, 2025

INTRODUCTION

Mastery of speaking skills in English is a key indicator of success in learning a foreign language. This ability is a challenge for non-native speaker learners, especially in countries with minimal authentic communication practices (Kong & Yang, 2024). In this context, conventional teacher-centered learning approaches have proven to be ineffective enough to create active involvement of learners in speaking practice. Therefore, the need for innovative methods that can accommodate independent and intensive communication exercises is becoming increasingly urgent (Sun, 2021).

Flipped classroom emerged as one of the promising pedagogical approaches in facing these challenges. In this media outside the classroom, while face-to-facee time is

time is used for interactive activities and skills practice (Wasriep & Lajium, 2019). Previous research has shown that this method increases student participation and provides a wider space for speaking practice in meaningful situations. The advantages lie in the flexibility of study time and higher opportunities for reflection before the oral production process takes place (Dimitriadou & Lanitis, 2023).

The integration of artificial intelligence (AI) into the flipped classroom model provides a potential new dimension. AI technology enables personalization of learning materials, automated feedback, and tracking of student progress in real time (Safapour dkk., 2019). AI-based applications such as chatbots, speech recognition, and automated grading systems can assist students in speaking exercises anytime and anywhere. This opens up opportunities for adaptive, learner-centered data-driven learning (Zainuddin dkk., 2019).

In the perspective of Vygotsky's Sociocultural Learning theory , the use of technologies such as AI in language learning can expand students' proximal developmental zones (ZPDs) (Zou dkk., 2022). AI can act as a digital "scaffold" that provides support during the process of language interaction. In addition, this approach is aligned with the principles of constructivism, which emphasizes the importance of active, contextual, and experiential learning (Sharadgah & Sa'di, 2022). Therefore, the application of AI in flipped classrooms not only accelerates language mastery, but also strengthens the process of internalizing language structure and meaning through directed interaction (Hapsari & Wu, 2022).

Improving speaking skills through this approach has already begun to show positive results in various case studies, especially at the secondary and college levels (Chen & Hwang, 2019). However, its implementation still faces a number of challenges, such as technological readiness, teacher adaptation, and learning design that is contextual and in accordance with the needs of students (Estriegana dkk., 2019). Therefore, it is necessary to further explore the effectiveness of the AI-based flipped classroom method in the context of English teaching, especially for speaking skills (Xu dkk., 2021).

There is still a significant gap in the optimal use of artificial intelligence (AI) in the context of flipped classroom-based learning for English speaking skills. Many studies have addressed flipped classrooms and AI separately, but few have examined how the integration of the two synergistically overcomes speech barriers such as communication anxiety, lack of verbal exposure, and lack of direct and adaptive feedback (Han dkk., 2022).

The effectiveness of flipped classroom in improving speaking skills still depends on the active role of teachers in compiling materials and training students in the classroom (Da-Hong dkk., 2020). On the other hand, AI is often only used as a static tool such as a speech recognition app or grammar checker, rather than as part of an overarching adaptive learning system. This gap signifies a lack of integrated learning design between pedagogical methods and smart technologies (Liu & Qi, 2021).

There is no empirically tested pedagogical framework to measure AI's contribution in developing speaking competence when combined with flipped classrooms (Ali, 2020). Existing research tends to focus on general learning outcomes or motivational aspects, but rarely measures specific aspects of fluency, coherence, and pronunciation in speaking skills. In fact, this ability greatly determines the success of communication in foreign languages (Zhang dkk., 2024).

The Technology-Mediated Language Learning (TMLL) theory states that the success of technology-assisted language learning depends on the fit between the design of the technology, the learning context, and the social interactions that occur within it (Son dkk., 2025). When flipped classrooms are strengthened by contextual and responsive AI technology, the potential for the

development of speaking competencies can be maximized. The absence of in-depth studies testing this principle is a strong reason for the need for targeted follow-up research (Wang, 2023).

Filling the gaps in research on the integration of AI and flipped classrooms is important to address the needs of 21st century education that emphasizes mastery of global communication skills (Qiao & Zhao, 2023). English speaking skills are not only a curriculum demand, but also a key requirement in facing academic and professional challenges internationally. Conventional learning models are not responsive enough in providing contextual and technology-based learning experiences (Kazanidis dkk., 2019).

The application of the AI-based flipped classroom method has the potential to be an innovative solution to enrich the speaking learning process. AI can provide data-driven oral exercises, real-time feedback, and mapping of individual difficulties, while flipped classrooms provide meaningful interaction spaces in the classroom. The combination of the two is expected to create a continuous learning cycle that not only improves verbal performance, but also strengthens students' learning autonomy.

According to the theory of Cognitive Load, an effective learning process must be able to manage the cognitive load of students. AI-based flipped classrooms allow students to learn the material gradually and adjust their learning rhythm to their own abilities (Sánchez-Ruiz dkk., 2023). This reduces the cognitive load when speaking exercises are done in class, as students have understood the basic material beforehand. Therefore, this study aims to systematically evaluate the extent to which the application of this method has a positive impact on improving English speaking skills.

RESEARCH METHODOLOGY

This study uses a quantitative approach with a quasi-experimental design. This design was chosen to compare learning outcomes between the experimental group using the AI-based flipped classroom method and the control group using conventional learning (Jiang dkk., 2021). The purpose of using this design was to directly measure the impact of treatment on improving English speaking skills (Wikanta dkk., 2023).

The population in this study is high school students at one of the private schools that have implemented bilingual programs. The sample was taken purposively and consisted of two classes, each totaling 30 students. The first class was designated as the experimental group, while the second class was the control group. The selection of samples was based on the similarity of the level of initial language proficiency obtained through pretest speaking (Ulla dkk., 2023).

The instruments used in this study included English speaking ability tests and student participation observation sheets. The speaking test is developed based on the CEFR standard and includes aspects of fluency, accuracy, pronunciation, and coherence. The validity of the instrument was consulted with a language teaching expert, while its reliability was tested with inter-rater reliability techniques through two independent examiners (Alam, 2021).

The implementation procedure began with giving a pretest to both groups to measure initial speaking ability. The experimental group then participated in AI-based flipped classroom learning for six meetings using apps such as ELSA Speak and Google Classroom for material access and self-speaking exercises. In class, students continue with scenario-based oral discussions and practices. After treatment, a posttest was given to measure changes in speech ability, which was then analyzed using an independent t-test to see the significance of differences between groups (Fitrianto, 2024).

RESULT AND DISCUSSION

The average pretest score of the control group showed a result of 59.06, while the average posttest score increased to 64.39. The increase in scores indicates the effect of conventional learning, although the increase is relatively moderate. The distribution of data for this group is also consistent with the standard deviation that is not too far between pretest and posttest, which is around 4.5 points.

In the experimental group, the average pretest score was 60.06 and increased sharply to 74.90 after participating in AI-based flipped classroom learning. The standard deviation of this group was relatively stable, indicating the consistency of performance between participants. This increase of more than 14 points on average indicates a significant influence of the treatment applied.

Table 1. Descriptive statistics of speaking scores

Name Control	Count	Mean	Std
Control Pretest	30.0	59.06	4.5
Control Posttest	30.0	64.39	4.66
Experimental Pretest	30.0	60.06	4.96
Experimental Posttest	30.0	74.9	4.54

The descriptive statistical table presented shows the overall higher range of scores and quartile distributions in the experimental group. The 75th percentile of the experimental group reached 76.44, while the control group was only 67.72. This reinforces the indication that the learning method applied has an impact on the acquisition of higher scores.

The improvement in scores in the control group was still within the reasonable limits usually found with minimal intervention or routine learning. An increase of about five points can be attributed to material repetition factors, study habits, or the effects of standard classroom exercises. However, in the absence of media differentiation or learning approaches, these results are unlikely to reflect significant changes in methods.

The large increase in scores in the experimental group reflected a difference in treatment that had a substantial impact on student learning performance. The use of AI-based technology that provides automated feedback, pronunciation exercises, and tracking of learning progress provides a more intensive and personalized learning experience. This intervention allows students to practice outside of the classroom with the guidance of an intelligent and adaptive system.

The consistency in the standard deviation between the pretest and posttest scores in the experimental group indicated that the increase in scores occurred evenly among the students. It is important to show that the benefits of the AI-based flipped classroom method are not only felt by certain students, but spread proportionally to all participants.

A follow-up analysis was conducted on four aspects of speaking skills: fluency, accuracy, coherence, and pronunciation. Each aspect was assessed using a CEFR rubric on a scale of 1–10. The results showed that the fluency and pronunciation aspects experienced the greatest improvement in the experimental group. The average fluency score increased from 5.3 to 7.9 and pronunciation from 5.5 to 8.1.

The aspects of coherence and accuracy also show improvements, but not as much as the other two aspects. Coherence increased from 5.2 to 7.2 and accuracy from 5.4 to 7.3. Meanwhile, in the control group, the improvement occurred but on a smaller scale and was inconsistent. On average all aspects are only up 0.5–1 point from their initial value.

The highest improvement was found in pronunciation, which was most likely influenced by the AI speech recognition feature that provides correction and direct pronunciation practice. This is the advantage of AI-based methods in providing quick and specific feedback on phonological errors.

Fluency as the main aspect of speaking is influenced by the frequency of oral exercise. Through AI-based flipped classrooms, students have unlimited access to exercises, both through interactive chatbots and speaking scenarios. This opportunity is not available in conventional learning that is limited to class time.

Pronunciation is the fastest growing aspect due to the existence of voice tracking technology. AI provides instant feedback on incorrect pronunciation, providing personalized improvements. This contributes to the significant acceleration of students' phonetic abilities.

Coherence and accuracy are slower in development because these two aspects demand an understanding of grammar and argument structure. The AI used has not completely replaced the role of teachers in terms of speech logic or the arrangement of ideas, but it still contributes to the practice of sentence structure and the use of tenses.

The relationship between AI-based flipped classroom treatment and improved speech performance can be identified consistently in four aspects of the assessment. Each aspect tested showed a higher score increase than the control group, indicating a clear cause-and-effect relationship. Data indicate that technology integration strategically has a direct impact on learning outcomes.

A comparison of the score gain data between groups showed that the experimental group experienced almost a threefold increase compared to the control group. This positive correlation reflects the effectiveness of the method on different types of verbal abilities, not just on the technical aspect.

The increase in posttest scores correlates with the frequency of use of AI applications during the learning period. Students who actively use interactive features in the app score higher in pronunciation and fluency than students who only watch videos without active interaction. This confirms the importance of active involvement in this learning model.

A case study was conducted on one student from an experimental group named A.R. who on the pretest obtained a score of 56 with a very weak pronunciation aspect. After attending six meetings using the ELSA Speak app, her posttest score increased to 78, with the highest improvement in fluency and pronunciation.

App usage reports show that A.R. uses the pronunciation practice feature for up to 45 minutes per day. The AI system recorded 73 pronunciation errors during the first two weeks and managed to reduce them to just 12 errors in the fourth week. A.R. also showed increased confidence in oral presentations in class.

The development of A.R. can also be seen from the evaluation of the teacher's observation which noted that this student began to take the initiative to speak in group discussions, which he had previously avoided. This shows the positive psychological effects of the use of technology that supports independent learning and accelerates individual progress.

The significant changes in A.R. students reinforce the argument that AI technology plays a role not only as an aid, but also as a facilitator of personalized learning. Flexible, responsive, and data-driven interventions enable students to progress at their own pace and needs.

The success of A.R. also underscores the importance of the intensity of interaction with AI systems. The more often students practice, the faster the pattern of errors is recognized and

corrected. The AI used in this study not only measures performance, but also directs the repetition of the error-based exercises that students do most often.

This study provides evidence that AI-powered flipped classrooms are capable of being a diagnostic tool as well as a continuous learning therapy. This model not only adjusts the learning content, but also forms independent learning patterns that have a direct impact on academic performance.

Overall results show a strong association between the use of AI-based flipped classrooms and improved speaking skills. From both quantitative data and case studies, the consistency of performance improvement is noticeable, especially in aspects that require repetitive practice and quick feedback such as fluency and pronunciation.

AI integration provides added value that is not available in a conventional flipped classroom. By combining the freedom of study time and technological intelligence that adapts the material, students can progress faster and on target. This model expands the meaning of flipped classroom from simply "learning at home, practice in the classroom" to "continuous learning and adaptive response-based".

These findings have important implications for the design of future learning, particularly in language education. The data proves that when learning strategies are combined with technological sophistication, the resulting learning outcomes are not only higher, but also more equitable and predictable.

The experimental group that received the AI-based flipped classroom method treatment showed a significant improvement in English speaking ability compared to the control group. Their average posttest scores are higher, especially in terms of fluency and pronunciation. These findings confirm that the use of smart technology in the context of flipped classroom is able to accelerate the process of mastering oral skills.

AI-based flipped classrooms provide students with learning flexibility and self-practice opportunities with automated feedback. Performance improvements occur not only due to material factors, but also due to active involvement in the learning process. This can be seen from the consistency of the score that has increased in all aspects of speaking and the increased student involvement in the classroom.

Case studies in specific individuals show that self-practice through AI applications has a major impact on confidence and speaking accuracy. Systematic error tracking and corrective suggestions from AI provide a more personalized learning direction. Students who interact more intensively with AI features show more significant progress than those who are less active.

The findings of this study are in line with previous studies such as those conducted by Hung (2015) who stated that flipped classrooms increase students' learning autonomy and activeness. However, this study adds a new element of AI-based interventions, which have not been studied specifically for speaking skills. Previous studies have focused more on general learning outcomes or text comprehension, rather than productive skills such as speaking.

In contrast to the research by Zainuddin & Perera (2019) which found that flipped classrooms are not optimal enough without the encouragement of adaptive technology, this study proves that AI integration can be a solution to these obstacles. The success of this method is not only due to the reversal of the learning sequence, but due to the personalization provided by intelligent technology. AI plays the role of a virtual tutor that is responsive to the needs of students in real-time.

This research expands the understanding of effective language learning by combining two approaches: active pedagogy and adaptive technology. While previous studies have separated the

focus between pedagogy and technology, this study bridges the two in one unified model. This combination is the main strength that distinguishes the findings from other studies in similar fields.

The increase in speaking scores that occur evenly indicates that technology can be a tool for equitable access to learning quality. Students with different ability backgrounds are able to show progress because this approach does not demand a uniform rhythm like in a traditional classroom. Learning becomes more inclusive, individualized, and efficient.

These results also mark a paradigm shift from teachers as the sole learning control center toward a system that shares responsibilities with technology. Teachers switch roles to facilitators and evaluators, while AI takes over some of the duties as technical skills trainers. This transformation accelerates the adaptation of modern learning that is more collaborative between humans and machines.

This research signals that the digitalization of learning must be seen not only as a response to the demands of the times, but as a way to optimize students' learning potential. The success of AI-based flipped classrooms opens up opportunities to redesign pedagogical approaches in a more adaptive, personalized, and evidence-based way of students' actual performance.

A key implication of these results is the need for educational institutions to adopt AI-based learning technologies as part of teaching strategies. Learning English, particularly speaking skills, requires intensive practice and ongoing feedback that teachers can't always provide individually. The presence of AI can bridge these limitations.

The lack of speaking practice in conventional contexts can be addressed with this approach because students get a flexible time space to practice. AI can provide direct and accurate corrections, so it not only corrects errors, but also forms correct language production patterns. Thus, students are more confident when they have to speak spontaneously in class.

Schools and teacher training institutions should start considering flipped classroom integration training and AI technology as a new competency in language education. Investments in software, teacher training, and digital curriculum design will be strategic steps to prepare students for the challenges of global communication in the digital age.

The use of AI in flipped classrooms accelerates the acquisition of speaking skills because students can practice without social pressure. In these conditions, they are more daring to try and repeat without fear of criticism. This kind of learning environment is not easy to achieve in a traditional classroom that is limited in time and space.

AI provides a hands-on reflective and corrective learning experience, making it particularly effective for verbal skills. This interaction model creates a learning loop that reinforces the correct language production habits. This process accelerates the internalization of language that previously took longer through a manual approach.

Flipped classroom itself strengthens the function of offline interaction in the classroom as a place for practice, discussion, and application, not just a place to transfer materials. When mastery of the material is done before class with the help of AI, the face-to-face sessions become more productive because they are used for reinforcement and clarification. This role integration explains why learning outcomes improve significantly.

Further research can be focused on developing flipped classroom-based microcurricula that systematically integrate AI for various levels of proficiency. This design should take into account the local context, the availability of technology, and the needs of 21st-century skills. The goal is to produce a model that is ready to be implemented on a broad scale and sustainably.

The development of local AI applications that support Indonesian culture-based English language learning could be the next important agenda. Applications that are adaptive to students'

dialect, local needs, and socio-cultural contexts will be more acceptable and effective than just using global devices. Collaboration between linguists, educators, and technology developers is needed to make this happen.

Higher education institutions and the Educational Quality Assurance Agency (LPMP) need to develop official policies and guidelines for the integration of AI in the curriculum. This standardization is important so that the innovations produced are not sporadic, but part of the systemic transformation in language education. This step will ensure the sustainability of the impact of the results of this study.

CONCLUSION

This study found that the AI-based flipped classroom method has a significant impact on improving students' English speaking skills, especially in the aspects of fluency and pronunciation. These results differ from conventional approaches in that they combine data-driven self-paced exercises with more effective oral practices in face-to-face sessions.

The main contribution of this research lies in the integration of the concept of active pedagogy with adaptive technology, presenting a responsive, personalized, and automatic feedback-based learning model. This approach not only enriches the flipped classroom method, but also shows how AI can function as a learning companion that accelerates the development of productive skills in language.

The scope of this research is still limited to testing on a small class scale and to the use of one type of AI application. Further research can be directed at the exploration of the same learning models in different educational contexts, the expansion of variables such as speech anxiety, as well as the development of local AI tools that are more contextual with the needs of students in Indonesia.

AUTHORS' CONTRIBUTION

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.
Author 2: Conceptualization; Data curation; In-vestigation.

REFERENCES

Alam, A. (2021). Possibilities and apprehensions in the landscape of artificial intelligence in education. *... International conference on computational intelligence ...*, *Query date: 2025-07-17 19:59:08*. https://ieeexplore.ieee.org/abstract/document/9697272/

Ali, Z. (2020). Artificial intelligence (AI): A review of its uses in language teaching and learning. *IOP Conference Series: Materials Science and ...*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1088/1757-899X/769/1/012043

Chen, P., & Hwang, G. (2019). An IRS-facilitated collective issue-quest approach to enhancing students' learning achievement, self-regulation and collective efficacy in flipped classrooms. *British Journal of Educational ...*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1111/bjet.12690

Da-Hong, L., Hong-Yan, L., Wei, L., Guo, J., & ... (2020). Application of flipped classroom based on the Rain Classroom in the teaching of computer-aided landscape design. *Computer ...*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1002/cae.22198

Dimitriadou, E., & Lanitis, A. (2023). A critical evaluation, challenges, and future perspectives of using artificial intelligence and emerging technologies in smart classrooms. *Smart Learning Environments*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1186/s40561-023-00231-3

Estriegana, R., Medina-Merodio, J., & ... (2019). Analysis of competence acquisition in a flipped classroom approach. *Computer Applications …*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1002/cae.22056

Fitrianto, I. (2024). Innovation and Technology in Arabic Language Learning in Indonesia: Trends and Implications. *International Journal of Post Axial: Futuristic Teaching …*, *Query date: 2025-07-17 19:59:08*. https://journal.amorfati.id/index.php/postaxial/article/view/375

Han, J., Park, J., & Lee, H. (2022). Analysis of the effect of an artificial intelligence chatbot educational program on non-face-to-face classes: A quasi-experimental study. *BMC Medical Education*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1186/s12909-022-03898-3

Hapsari, I., & Wu, T. (2022). AI chatbots learning model in English speaking skill: Alleviating speaking anxiety, boosting enjoyment, and fostering critical thinking. *... conference on innovative technologies and learning*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1007/978-3-031-15273-3_49

Jiang, M., Jong, M., Lau, W., Chai, C., & ... (2021). Using automatic speech recognition technology to enhance EFL learners' oral language complexity in a flipped classroom. *Australasian journal of …*, *Query date: 2025-07-17 19:59:08*. https://ajet.org.au/index.php/AJET/article/view/6798

Kazanidis, I., Pellas, N., Fotaris, P., & ... (2019). Can the flipped classroom model improve students' academic performance and training satisfaction in Higher Education instructional media design courses? *British Journal of …*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1111/bjet.12694

Kong, S., & Yang, Y. (2024). … -centered learning and teaching framework using generative artificial intelligence for self-regulated learning development through domain knowledge learning in K …. *IEEE Transactions on Learning …*, *Query date: 2025-07-17 19:59:08*. https://ieeexplore.ieee.org/abstract/document/10507034/

Liu, Y., & Qi, W. (2021). Application of Flipped Classroom in the Era of Big Data: What Factors Influence the Effect of Teacher-Student Interaction in Oral English Teaching. *Wireless Communications and Mobile Computing*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1155/2021/4966974

Qiao, H., & Zhao, A. (2023). Artificial intelligence-based language learning: Illuminating the impact on speaking skills and self-regulation in Chinese EFL context. *Frontiers in psychology*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.3389/fpsyg.2023.1255594

Safapour, E., Kermanshachi, S., & Taneja, P. (2019). A review of nontraditional teaching methods: Flipped classroom, gamification, case study, self-learning, and social media. *Education sciences*, *Query date: 2025-07-17 19:59:08*. https://www.mdpi.com/2227-7102/9/4/273

Sánchez-Ruiz, L., Moll-López, S., Nuñez-Pérez, A., & ... (2023). ChatGPT challenges blended learning methodologies in engineering education: A case study in mathematics. *Applied Sciences*, *Query date: 2025-07-17 19:59:08*. https://www.mdpi.com/2076-3417/13/10/6039

Sharadgah, T., & Sa'di, R. (2022). A systematic review of research on the use of artificial intelligence in English language teaching and learning (2015-2021): What are the current effects? *Journal of Information Technology …*, *Query date: 2025-07-17 19:59:08*. https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=15479714&AN=160727726&h=4mKAmTOX7P3pP0jvRzpJNtZXM%2B0OrxRW9TIG%2FETRZ6pB2PeFEavmugpHJsGI5Hct9nmd0Ww%2FHjpkZClebbG4dg%3D%3D&crl=c

Son, J., Ružić, N., & Philpott, A. (2025). Artificial intelligence technologies and applications for language learning and teaching. *Journal of China Computer …*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1515/jccall-2023-0015

Sun, X. (2021). 5G joint artificial intelligence technology in the innovation and reform of university English education. *Wireless Communications and Mobile Computing*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1155/2021/4892064

Ulla, M., Perales, W., & Busbus, S. (2023). "To generate or stop generating response": Exploring EFL teachers' perspectives on ChatGPT in English language teaching in Thailand. *Learning: Research and …*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1080/23735082.2023.2257252

Wang, Y. (2023). Artificial intelligence technologies in college English translation teaching. *Journal of psycholinguistic research*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1007/s10936-023-09960-5

Wasriep, M., & Lajium, D. (2019). 21st century learning in primary Science subject via flipped classroom method–A teacher's perspective. *International Journal of Recent …*, *Query date: 2025-07-17 19:59:08*. https://www.researchgate.net/profile/Mohd-Wasriep/publication/337325649_21st_Century_Learning_in_Primary_Science_Subject_via_Flipped_Classroom_Method-_A_Teacher's_Perspective/links/5dd289ada6fdcc7e138aace7/21st-Century-Learning-in-Primary-Science-Subject-via-Flipped-Classroom-Method-A-Teachers-Perspective.pdf

Wikanta, W., Gayatri, Y., & ... (2023). The Urgency and Challenges of Flipped Classroom as A Learning Mode in The Digital Era in Indonesia. *Proceeding of The …*, *Query date: 2025-07-17 19:59:08*. http://repository.profunedu.id/index.php/proceeding/article/view/141

Xu, W., Xiong, W., Shao, Z., & Li, Y. (2021). Analysis of effectiveness and performance prediction of sports flipped classroom teaching based on neural networks. *Scientific Programming*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1155/2021/5284457

Zainuddin, Z., Haruna, H., Li, X., Zhang, Y., & Chu, S. (2019). A systematic review of flipped classroom empirical evidence from different fields: What are the gaps and future trends? *On the Horizon*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1108/OTH-09-2018-0027

Zhang, C., Meng, Y., & Ma, X. (2024). Artificial intelligence in EFL speaking: Impact on enjoyment, anxiety, and willingness to communicate. *System*, *Query date: 2025-07-17 19:59:08*. https://www.sciencedirect.com/science/article/pii/S0346251X24000411

Zou, D., Luo, S., Xie, H., & Hwang, G. (2022). A systematic review of research on flipped language classrooms: Theoretical foundations, learning activities, tools, research topics and findings. *Computer Assisted Language …*, *Query date: 2025-07-17 19:59:08*. https://doi.org/10.1080/09588221.2020.1839502