

An Analysis of Educational Technology Application in English Second Language Teaching Empowered by Artificial Intelligence

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Abstract: English as a Second Language has restrictions in terms of tailored advice, timely feedback and real-life settings. Progress in natural language processing, speech recognition and large language models offer promising solutions to these problems. Today, smart speech tools can identify pronunciation problems, writing aid systems can spot grammar and text-level problems, adaptive platforms may provide tailored material based on behaviour data, and generative AI mixed with augmented reality can build immersive communication environments. Obviously, the country's policies have implied the profound integration of artificial intelligence and education. The study blends second language learning and educational technology, and discusses the specific application of AI tools in 5 aspects, including oral instruction, written correction, path planning, context design and evaluation diagnosis. The investigation reveals that artificial intelligence can make up for the flaws of traditional education, but its efficacy depends on the control of educational goals for the use of technology and the intervention of the instructors' professional judgement. Simply adding tools is unlikely to bring about real changes. The paper evaluates the constraints including data security, algorithm bias, instructor capacity adaptability, and advises that human-machine cooperation should be the key route for the transformation of second language education.

Keywords: Artificial Intelligence; English as a Second Language Teaching; Educational Technology; Speech Recognition; Personalized Learning.

1. Introduction

Applied linguistics research typically has been focused on the teaching of English as a Second Language (ESL). There are a lot of common challenges faced at the front line of teaching, whether it is the exam-oriented classrooms of East Asia or the language training of adult immigrants in Europe and America: The class-based method makes it impossible for teachers to attend to the cognitive types and the beginning levels of each student. In the case of output-oriented exercises, there is relatively little time left for constructive practice for pupils after a large length of lecture time. By the time the written assignments are returned, the learners' intended expressions will have already been blurred. In fact, learners rarely have the opportunity to engage in real-life interactions beyond the classroom setting, making it difficult to continue the "input—interaction—output" cycle. Until now, there were no technology solutions scaled to these hurdles.

AI has grown incrementally, which has permitted these constraints. Educational technology has begun to play an auxiliary role with feedback and adaptive capabilities, from early rule-matching programs to modern generative deep neural network-based systems. And policy levels have also given clear signals. 2025 "Artificial Intelligence+" Action Plan Fully execute the State Council "Opinions" in all elements, integrating artificial intelligence across the full process of education and instruction. The "General High School English Curriculum Standards" revised at the same stage also indicated that teachers should appropriately employ information technology, and let intelligent instruments play a considerable part in teaching and evaluation. These regulations are congruent with the country's strategic goal for digital transformation of education, and also operate as a reference for grass-roots practice.

But policy direction is not directly translated into classroom success. Most of English teachers do not employ artificial intelligence (AI) tools systematically and even if some of them have knowledge, it is difficult for them to match them correctly with the objectives of the course. This article covers the common use of AI educational technology in ESL and the theoretical adaptation of various tools to the major principles of second language learning and their theoretical limitations, hoping to give a reference for further teaching and research[1].

2. The Technical Path and Pedagogical Adaptation of Intelligent Voice Assessment and Oral Training

The development of competence for oral output has long been a problematic subject in second language training. The Swain's Output Hypothesis states that language acquisition depends on two variables. First, intelligible input is undoubtedly important, but if learners could not recognise the flaws in their language forms in their output, it would still be difficult to acquire the acquisition. The instructor to student ratios in traditional classrooms indicate that youngsters receive very little time for speech practice. The arrival of smart voice evaluation technology has been a game changer in this situation.

The architecture at the heart of current popular voice recognition systems is deep neural networks. When learners practise reading aloud or free conversations, the system deconstructs phoneme pronunciation, word stress, sentence intonation and rhythm patterns layer by layer and provides feedback via visual waveforms or scores. When users record an English passage in oral practice applications, the system will label the improper sounds and define the types of faults

such as inaccurate vowel articulation, poor differentiation between voiced and voiceless consonants or deletion of liaison. This kind of fine-grained feedback is hardly possible in ordinary classes, and even experienced teachers cannot catch the little errors of each student at the same time. The technique provides access to relatively limited personalised resources for repair.

Some systems even simulate dialogues between humans and computers. The engagement is a lot of dialogue rounds with AI virtual characters on a given theme. The system examines from different perspectives: fluency, grammaticality, vocabulary richness and semantic response suitability. The rationale behind this design is similar to the Long's Interaction Hypothesis—corrective feedback during negotiation of meaning is precisely the important mechanism driving acquisition. The computer's non-judgmental nature considerably reduces the stress of the learners and once the fear is reduced, they are more willing to try out complex expressions [2]. Of course, there are limitations to voice assessment. The recognition accuracy rate may be affected by the surrounding noise and the variety of non-native accents. Existing system evaluation on pragmatic methodologies and conversation structure is likewise somewhat rough [3]. Under the aforesaid limits, teachers should not utilise automatic scoring as the only basis, and a more equitable alternative is to employ the system report as a reference to learning circumstances, and combine classroom observations to produce a comprehensive judgement. The advantages of the intelligent voice technology are usually to extend the coverage of practice and to cut down the feedback loop. Its stance should be to assist teachers to concentrate their efforts on higher-level pragmatic coaching.

3. AI-Assisted Writing Teaching and Automatic Correction: From Form Correction to Text Construction

English writing is often regarded as a comprehensive measure of the second language proficiency. The development of teaching has long been frustrated by a contradiction: students have no timely guidance when writing, and often find out problems after finishing their writing, and teachers are tired of correcting grammatical and spelling errors and other superficial mistakes in a lot of students' writing, no time to focus on the text structure and deeper content. Programs that help you write using artificial intelligence are beginning to ease the situation.

Grammar checkers. Programs of this kind, trained on huge corpora, are capable of marking in real-time misspellings, subject-verb agreement, tenses, articles, etc. and suggesting how to rectify them. This fast response retains correction in the expressive state of learners rather than looking up dictionary or waiting for teacher's annotation, which is in full accord with the teaching philosophy of "Focus on Form" [4]. AI functions are more than correction. Current systems already recognise the unity of paragraph topics, consistency of arguments and the appropriateness of transition words. The multi-dimensional feedback system is based on the Transformer architecture, which can provide multi-level revision ideas from words to paragraphs within 1.8 seconds. Such technologies can be used by teachers to demonstrate in class the analysis findings of a number of anonymous works, and aid students in deciding which alterations can make the text more fluid, so as to turn the abstract ideals of "cohesion"

and "coherence" into operational modification strategies.

It is more advantageous to its use for task layering. Artificial intelligence can be used by teachers to generate writing prompts of different levels of complexity to suit students' abilities. Some work has employed large language models to provide examples with typical errors included for students to correct. This segmentation does not impair the criteria but allows to challenge every student modestly around the ability level [5]. Meanwhile, note that the judgements of AI in content development and cultural adaptability are problematic at present. It was noted in a study that ongoing writings generated by AI often build up intricate sentence patterns, but lack cultural meanings, and even support "native-speakerism", marginalising local words. Another study found that AI feedback was more effective at the grammatical and lexical levels, but was not very useful for the organization of material and paragraph cohesion. So the allocation of responsibility in teaching writing should be explicit. The basic correction should be done by AI at language level. Teachers should develop advanced skills such as depth of thinking, logical thinking, and consciousness of the reader. Only in this approach, the automatic grading can genuinely get an enhancing effect.

4. Generating Personalized Learning Paths: How Data-Driven Instruction Based on Individual Differences Can Be Realized

The purpose throughout education is to teach in accordance with individual variances. But in the real world of classroom education this has always been a difficult goal to achieve. The differences among individual second-language learners of English are particularly striking. Some children have large vocabularies but are poor speakers, some have good listening abilities but disordered grammar systems, some are good at visual memory or have to repeat listening and reading to retain their knowledge. Some kids are bound to be understimulated and others overloaded. The same textbooks and development for all. To address this challenge, the AI-enabled learning system aims to track behavioural data [6].

Such systems operate through three main mechanisms. The profiling first: the system watches the right and bad answers, reaction speed, help request frequency, browsing habits and links these traces together to create a dynamic map of capabilities. Then the map is used to match the most appropriate assignments for the present level from the resource library to make intelligent recommendation. If a learner keeps making mistakes in subjunctive mood, the system will push relevant micro-lessons and specialist activities and will automatically increase the difficulty level after mastery and move on to other knowledge points. Finally, adaptive modification, the following path is altered in real time based on performance. There are tools available to acquire vocabulary for a time. They apply an interval repetition technique to schedule review nodes at the proper time which has considerable impact on long term memory.

It's not simply the accuracy of the answers, personalised pathways in education are good for that too. What is more important is to help the learners manage their cognitive load in an acceptable level, not too easy so as to slack off, nor too demanding so as to retreat. Studies showed that adaptive pathways were more effective than teaching technique with uniform development in promoting language competency and

learning motivation [7]. However, one should emphasise that present-day systems still show substantial shortcomings in the treatment of the emotional dimension. Motivation, efficacy and readiness to cooperate are hardly to be completely quantified characteristics. Systems have a tendency to distill people into a set of measurable metrics, and the factors that genuinely impact the learning process are often not part of those metrics. Teachers should not treat system-generated paths as prescriptions but as the basis for judgement. Ongoing calibration using classroom observations is still required. The primary purpose of personalised education is not to force students to the screen, but rather to give teachers a stronger basis for data-based judgement and to make guidance more targeted.

5. Virtual Situations and Immersive Language Environments: From Simulation Practice to Meaning Negotiation

Research in second language acquisition has shown over and over that the best learning effect is achieved by learners when they have real communicative needs and actively use the target language. But the majority of second language learners are in non-English circumstances, and rarely get to experience real English scenarios outside of the classroom. The classroom role-playing and situational dialogues with a fixed script and foreseeable direction terminate when the pupils have completed the prepared sentences, because there is no unanticipated response in genuine talks and rapid feedback, which result in limited affects. The convergence of AI and VR/AR technology is changing this predicament [8].

The early virtual scenarios were programmed. The algorithm was built on pre-determined branching, so if a student spoke something not on the script, it could not understand the sentence. Generative AI has flipped this rigid way of engagement on its head. The system is able to understand the natural language input by the learner and to produce reasonable responses based on the context. It is also able to automatically adjust the level of discussion difficulty in line with the setting of instructional goals. For example, in a virtual airport situation, the role of the student is a passenger checking in, and the function of the system is a ground worker. The system will generate transient unexpected occurrences such as flight delay, overweight baggage and the learner must answer immediately, including normal questions and answers. These exercises include some improvisation in them, so they simulate the unpredictability of real talks. The language learner becomes more flexible in how they use the language.

Another advantage of virtual situations is the possibility for the user to define the scenarios. The teacher or student selects a theme (job interview, academic report, medical consultation) and the system generates visual settings and spoken content accordingly. The students are more involved in the task when the topic of practice is related to the students' professional speciality or life experiences. Another feature of the machine environment is that the social cost of error is practically nil. Students will employ new terminology and sentence structures even when they are not sure. The process of experiment, feedback and correction is important for language development [9].

However, the existing virtual systems are still not accurate enough to handle pragmatic correctness and cultural implicit knowledge. Sometimes they use the polite languages which

are not suitable to the communication scenario or they cannot grasp the usage patterns of some cultural backgrounds accurately. So these tools are more suitable to be utilised as an extension of the classroom. Having introduced the concept and fundamental training in the classroom, students perform extension exercises in the virtual environment, and then the teacher makes concentrated remarks on the problems that arise in the exercises.

6. Reflections on the Application of AI Educational Tools in Second Language Teaching

The use of AI tools in teaching second language was studied in five directions, such as oral language, writing, tailored instruction, virtual circumstances, and intelligent evaluation. Considering the five factors, following overall understandings may be formed.

First, artificial intelligence (AI) technology does overcome a number of long-standing issues in second language education. Oral practice is not enough, the cycle of feedback writing is long, tiered teaching is hard to implement, authentic communication scenarios are few, and process-based evaluation is not easy to operate in traditional classrooms. The intervention of AI gives new valid solutions to these challenges [10]. But the benefits of the technology don't always result in good teaching. The success depends on the teacher's integration of the tool in the correct teaching segments and its alignment with the course goals. Tools without a purpose tend to be shallow.

Second, the power of the technology is not the algorithm, but the user's ability to construct instruction with it. For instance, some teachers just utilise the same speech evaluation software as a pronunciation grading tool, while others are able to diagnose students' common issues and design targeted training accordingly. It's not the instrument that's unusual, but the way of using it. That is, teacher training should not only be restricted to operational processes, but also help instructors to understand the teaching logic of the tool, learn to evaluate the quality of the system output, and make fair trade-offs between the technical ideas and personal experience [11]. Systematic training in this respect is still rather insufficient in teacher education.

This improvement of teachers' competencies requires institutional guarantees. In most schools, there is no regular mechanism for research on AI instruction, and teachers have no platforms for peer contact and case discussions. It's a struggle to maintain, because there is sometimes little technical help and time assurances, and the appetite to try new tools. If this scenario persists for a long time, it is likely to widen the gap of technology use between teachers and schools.

Thirdly, artificial intelligence systems now tend to favour measurable indicators. The design orientation is computationally convenient, but it might hide aspects of language training that are harder to quantify, such as emotional experience, aesthetic judgement, and cultural knowledge. If we are not aware of this tendency, we may be reduced to skill practice in language education. Therefore, "human-machine collaboration" should not just be a phrase, but should have specific operation guidelines: all the standardised tasks that can be efficiently completed by the system should be handed over to the system; all parts involving value judgement, creative guidance and emotional

communication should still be led by the teacher.

7. Conclusion

This paper analyses the application of AI in English second language teaching from five angles including voice evaluation, writing aid, path planning, scenario design and intelligent diagnosis. A few things to remember.

First, AI tools can provide new ideas for current problems in second language teaching. Intelligent evaluation of speech extends coverage of oral practice, writing aid systems minimise the feedback cycle, adaptive platforms achieve the matching of difficulty, and virtual scenarios provide a low-cost space for trial and error. But having the technology is not the same as having effective technology right away. The same instrument has quite different effects in different parts of education. The key is not the technology, but where it is located in the school system.

Second, the technical operation is easy, but the instructional judgement is complicated. Teachers need to grasp what AI tools can do, but also be able to judge the truth of its outputs by blending computer reports with their knowledge of learners. However, the training of teachers is not systematic in this respect, and most of them are still at the level of introducing the functions of tools, and the training at the decision-making level of teaching is insufficient.

Third, artificial intelligence systems are biased toward quantitative indications, but emotions, aesthetics and cultural knowledge cannot be programmed into the algorithm framework. Blind dependence on system feedback could result in a change of instructional focus to those tasks that are easy to score by robots. Machines can accomplish repetitive tasks, but value judgements and emotional interactions require an educator. This is not to say that technology is less important but rather that artificial intelligence may realise its greatest value in quantitative respects only by explicitly outlining their limits.

The paper did not take into account the variations in individual grade levels and did not cover the hardware and monetary implications of the implementation of the conventional artificial intelligence (AI) systems. This analysis can be used by English teachers and further research will be carried out in the future in specific teaching contexts. Artificial intelligence is growing quickly but people are still vital to the education. The issue for the future is to discover ways to accept the shift in technology and to stay true to the essential ideals of education.

References

- [1] Zhu, M., & Wang, C. (2025). A systematic review of research on AI in language education: Current status and future implications.
- [2] Ding, D., & Yusof, M. B. (2025). Investigating the role of AI-powered conversation bots in enhancing L2 speaking skills and reducing speaking anxiety: a mixed methods study. *Humanities and Social Sciences Communications*, 12(1), 1223. <https://doi.org/10.1057/s41599-025-03647-4>.
- [3] Cámara-Arenas, E., Tejedor-García, C., Tomas-Vázquez, C. J., & Escudero-Mancebo, D. (2023). Automatic pronunciation assessment vs. automatic speech recognition: A study of conflicting conditions for L2-English.
- [4] Ngo, T. T. N., Chen, H. H. J., & Lai, K. K. W. (2024). The effectiveness of automated writing evaluation in EFL/ESL writing: A three-level meta-analysis. *Interactive learning environments*, 32(2), 727–744. <https://doi.org/10.1080/10494820.2023.2297801>.
- [5] Barrot, J. S. (2023). Using ChatGPT for second language writing: Pitfalls and potentials. *Assessing writing*, 57, 100745. <https://doi.org/10.1016/j.asw.2023.100745>.
- [6] Peña-Acuña, B., & Corga Fernandes Durão, R. (2024). Learning English as a second language with artificial intelligence for prospective teachers: a systematic review. *Frontiers in education*, 9, 1490067. <https://doi.org/10.3389/educ.2024.1490067>.
- [7] Wu, X. Y. (2024). Artificial intelligence in L2 learning: A meta-analysis of contextual, instructional, and social-emotional moderators. *System*, 126, 103498. <https://doi.org/10.1016/j.system.2024.103498>.
- [8] Yan, W., Li, B., & Lowell, V. L. (2025). Integrating artificial intelligence and extended reality in language education: A systematic literature review (2017–2024). *Education Sciences*, 15(8), 1066. <https://doi.org/10.3390/educsci15081066>.
- [9] Peixoto, B., Pinto, R., Melo, M., Cabral, L., & Bessa, M. (2021). Immersive virtual reality for foreign language education: A PRISMA systematic review. *Ieee Access*, 9, 48952–48962. <https://doi.org/10.1109/ACCESS.2021.3068444>.
- [10] Lo, C. K., Yu, P. L. H., Xu, S., Ng, D. T. K., & Jong, M. S. Y. (2024). Exploring the application of ChatGPT in ESL/EFL education and related research issues: A systematic review of empirical studies. *Smart Learning Environments*, 11(1), 50. <https://doi.org/10.1186/s40561-024-00313-1>.
- [11] Laoha, R., Chomthong, W., & Pongpanich, W. (2025). Artificial Intelligence and English as a Foreign Language (EFL) Teachers' Competencies: A Systematic Review. *Higher Education Studies*, 15(3), 262–292.