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Article

Practical Exploration and Effectiveness Evaluation of AI Empowering English Teaching

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Abstract: This paper explores the practical application of AI in junior high school English teaching (listening, speaking, reading, writing) and evaluates its effectiveness. Through questionnaires, classroom observations, and interviews with 273 students and 36 teachers in Nantong junior high schools, the study finds that AI enhances students' language skills: listening/speaking scores increased by 2-3 points, writing errors decreased by 23.33%, and 60%-70% of students showed higher learning interest. AI also promotes autonomous learning and critical thinking, with 55% of students improving in these areas. However, challenges like teachers' limited AI proficiency (only 40% proficient) and data security concerns are noted. The research provides empirical support for AI integration in English teaching and recommends enhancing teacher training and data security measures.

Keywords: artificial intelligence; junior high school English teaching; effectiveness evaluation

1. Introduction

The rapid development and widespread application of artificial intelligence (AI) technology in education have brought profound transformations to traditional teaching models. In recent years, the use of AI in English teaching has gradually become a research focus, particularly in higher education and vocational schools [1]. However, the practical application and effectiveness evaluation of the application of AI in junior high school English education remain relatively understudied. Although AI has demonstrated significant advantages in enhancing teaching interactivity, personalized learning, and instant feedback, its specific application methods and actual effects in listening, speaking, reading, and writing instruction at the junior high school level require further validation [2].

Existing research indicates that AI technologies, such as intelligent speech recognition, virtual reality, and natural language processing, can provide students with immersive and personalized learning experiences [3]. For instance, in listening instruction, AI can simulate authentic contexts to improve students' comprehension skills; in writing instruction, generative AI offers instant corrections and personalized feedback, reducing teachers' workload while boosting students' writing motivation [4]. However, these studies often focus on single teaching components or technical applications, lacking a systematic exploration of AI's holistic implementation in junior high school English teaching, particularly its comprehensive impact on students' academic performance, learning interest, and skill development.

Moreover, despite the widely recognized potential of AI in education, its practical application still faces challenges, such as teachers' acceptance of technology, data privacy concerns, and the effectiveness of implementation [5]. Therefore, an in-depth examination of AI's specific application methods in junior high school English teaching, along with an evaluation of its effectiveness through real-world cases and data, holds significant theoretical and practical value.

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To address this research gap, this study aims to integrate AI application cases across listening, speaking, reading, and writing instruction, systematically assessing their impact on students' English performance, learning interest, and skill development. The research questions are as follows: What are the specific application methods of AI in junior high school English listening, speaking, reading, and writing instruction? How do these methods affect students' academic performance, learning interest, and skill development?

By answering these questions, this study seeks to provide actionable insights for junior high school English teaching, promoting the deeper integration of AI technology and language education.

2. Literature Review

2.1. AI Technology in Education

The advent of AI technology has significantly transformed the educational landscape. In recent years, AI has found diverse applications in education, leveraging its capabilities such as machine learning, natural language processing, and computer vision. For instance, it can analyze vast amounts of educational data to understand students' learning patterns and preferences, enabling personalized learning experiences [6]. In higher education, AI is being integrated into various aspects like smart classrooms, where it can facilitate real-time interaction and provide instant feedback to students [7]. It also plays a crucial role in developing intelligent tutoring systems that can adapt to individual students' needs, offering targeted instruction and support.

2.2. AI in English Language Teaching

AI's application in English language teaching has shown great potential. It has been used to enhance different language skills, including listening, speaking, reading, and writing. In listening and speaking training, AI-powered tools such as Intelligent Speech Scoring and Intelligent Speech Interaction technologies are widely adopted. These technologies can accurately assess students' pronunciation, fluency, and grammar in spoken English, providing instant and detailed feedback to help students improve their oral communication skills [8].

For reading and writing, AI can analyze students' reading comprehension levels and writing styles. It can recommend suitable reading materials based on students' reading abilities and interests, and assist in writing by checking grammar, spelling, and providing suggestions for improving the quality of writing. For example, some AI-based writing assistants can not only correct errors but also offer alternative expressions and improve the overall coherence of the text [9].

2.3. AI in Middle School English Teaching

In middle school English teaching, AI has the potential to address several existing challenges. The current teaching situation in middle school English often faces issues such as insufficient teacher-student interaction, difficulty in catering to individual student differences, and outdated teaching materials [6]. AI can enhance teaching interactivity by providing real-time feedback and personalized learning experiences. It can analyze students' learning data to understand their strengths and weaknesses, and then customize learning plans and teaching content for each student, thus promoting personalized learning [2].

Moreover, AI can offer a wealth of teaching resources and means. It can access a vast number of educational materials, including videos, audio clips, and interactive exercises, to enrich the teaching content and make the learning process more interesting and engaging. For example, some schools use AI-powered learning platforms to create immersive English learning environments, allowing students to practice English in virtual real-life scenarios, which helps improve their language application ability [9].

However, the application of AI in middle school English teaching also faces some challenges. There is a lack of a standardized theoretical system for its application, and there are concerns about data security and the potential negative impact on students' thinking ability if AI is misused. Additionally, teachers need to improve their digital literacy to effectively integrate AI into teaching [7].

2.4. Empirical Studies on AI in Middle School English Teaching

Several empirical studies have been conducted to explore the effectiveness of AI in middle school English teaching. Liu proposed a set of optimized AI-integrated teaching models for middle school English listening and speaking, including pre-class preview optimization, in-class teaching optimization, and after-class practice optimization [3]. The results showed that these models can effectively improve students' listening and speaking abilities.

Fan investigated the use of AI-enhanced reading teaching in middle schools [1]. By using AI to design intelligent reading tasks and provide personalized reading guidance, students' reading comprehension and critical thinking abilities were significantly enhanced. The study also found that students' interest in English reading increased due to the application of AI.

In a study by Tang, the introduction of generative AI in middle school English writing teaching was explored [7]. Through the use of ChatGPT and other tools, teachers could design more diverse writing tasks, and students received instant feedback and guidance on their writing. This not only improved students' writing skills but also reduced teachers' workload in grading and providing feedback.

3. Methodology

3.1. Aims of the Study

This study aims to delve into the practical applications of the application of AI in junior high school English education in Nantong, specifically focusing on the seventh, eighth, and ninth grades. It also assesses the effectiveness of AI in enhancing students' English learning outcomes, interests, and capabilities.

3.2. Questionnaire Method

1) Purpose of Questionnaire Design: The questionnaire aims to gain an in-depth understanding of the application effect of AI in junior high school English teaching from the students' perspective. It is designed to obtain students' intuitive feelings, attitudes, and relevant learning behavior changes regarding AI-assisted English learning, providing data support for researching the impact of AI on students' English learning interest and ability.
2) Research Questions: Focus on the impact of AI applications on students' English learning interest and ability, specifically including students' interest in AI-assisted English learning activities, the influence of AI on students' autonomous learning ability and critical thinking ability, and students' views on the role of AI tools in English listening, speaking, reading, and writing learning.
3) Main Questionnaire Questions:
    a) Do you like using AI-related learning tools (such as intelligent speech recognition software, automatic scoring systems, etc.) in English classes?
    b) Do AI-assisted English learning activities (such as virtual role-play, interactive games, etc.) make you more willing to participate in English classes?
    c) After using AI tools, are you more likely to explore other English learning resources on your own?
    d) In English reading and writing learning, do you think the materials and suggestions provided by AI are helpful?

e) Do you think your English listening, speaking, reading, and writing abilities have improved after using AI tools?

Detailed items used in the survey are presented in Appendix.

4) Questionnaire Implementation and Data Processing: The questionnaires were distributed to students through a combination of online and offline methods, ensuring a quiet and interference-free environment for questionnaire filling. After collecting the questionnaires, the data were sorted and statistically analyzed. Descriptive statistics were used to analyze the distribution of students' responses to each question, further exploring the actual effect of AI in junior high school English teaching.

3.3. Participants

The participants in this study include junior high school students aged 12-15 from the seventh, eighth, and ninth grades in a junior high school in Nantong City, along with their English teachers. A total of 273 students and 36 teachers were selected. The students represent different English proficiency levels within their respective grades, and the teachers have varying years of teaching experience and exposure to AI-integrated teaching. This selection ensures a diverse and representative sample for comprehensive data collection and analysis.

3.4. Data Collection and Analysis

Data Collection:

1) Classroom Observation:

The teaching process with AI applications was observed in multiple English classes. The observer recorded the interactions between teachers and students, such as how teachers utilized AI tools to explain grammar points, and how students responded to AI-driven learning tasks. Additionally, students' performance and engagement during the teaching process were noted.

The classroom observation followed a structured procedure to examine how AI tools were integrated into junior high school English teaching. The observation aimed to capture how teachers implemented AI-assisted instruction and how students interacted with AI-supported learning activities.

At the beginning of the lesson, the teacher introduced the learning objectives and explained the role of the AI tool in the day's instruction. This was followed by a short demonstration, during which the teacher showed how to use the AI platform — for example, how to input a sentence or paragraph, identify grammar mistakes, and review the AI-generated explanations and suggestions.

After the demonstration, students were given specific tasks, such as writing sentences or short paragraphs and using the AI tool to check their grammar. During this stage, the observer paid close attention to how students used the tool — whether they followed the teacher's instructions, how effectively they used the feedback provided by the AI, and whether they made corrections based on that feedback.

At the end of the lesson, the teacher reviewed key grammar points, summarized what the students had learned, and invited students to share their experiences using the AI tool. This provided valuable insight into students' attitudes toward AI-assisted learning and their level of understanding. Throughout the observation, detailed notes were taken on teacher instruction, student behavior, classroom interactions, and the overall effectiveness of using AI tools to support English grammar instruction.

For example, in an eighth-grade English listening class, the use of AI-based listening materials and the students' participation in listening comprehension exercises were closely monitored.

2) Interview Method:

Semi-structured interviews were conducted with both teachers and students. For teachers, questions focused on their experiences with integrating AI into teaching, challenges they faced, and their perceptions of the impact of AI on students' learning. For instance, "How do you incorporate AI-assisted teaching tools into your daily English lessons?" For students, questions were centered around their experiences with AI in the classroom, whether it influenced their interest in learning English, and how they interacted with AI-based learning resources. An example of a student-targeted question is "Do you like using AI-related English learning apps? Why or why not?"

Data Analysis Methods:

1) Case Analysis:

Specific cases of AI application in junior high school English teaching were analyzed. These cases covered different teaching scenarios, such as using AI in writing classes to provide instant grammar checks and writing suggestions, or in speaking classes to conduct virtual role-play activities. Each case was carefully examined to understand the implementation process and its effectiveness.

2) Thematic Analysis:

Thematic analysis was employed for the qualitative data obtained from interviews and classroom observations. The data was first transcribed, and then the researchers carefully read through the transcripts to identify common themes. For example, themes related to students' positive or negative attitudes towards AI-enhanced learning, and teachers' views on the advantages and disadvantages of AI in teaching were extracted. These themes were then categorized and analyzed to understand the impact of AI on students' interests and language abilities.

In this study, to ensure the authenticity and reliability of the data, all interviews were conducted in a comfortable and relaxed environment. The students and teachers were guaranteed anonymity to encourage them to express their true thoughts and feelings. For data analysis, the researchers cross-checked the themes emerging from different data sources to ensure the validity of the findings. This comprehensive approach to data collection and analysis aims to provide a thorough understanding of the practical exploration and effectiveness evaluation of AI-empowering junior high school English teaching.

4. Results

The results of this study are presented in accordance with the research questions.

4.1. Effectiveness of AI in English Teaching Skills

1) Listening and Speaking: Through classroom observations and case analyses, it was found that AI-based intelligent speech recognition and interactive speaking tools significantly enhanced students' listening and speaking abilities. For example, in listening classes, AI-provided materials with diverse accents and real-life scenarios helped students improve their listening comprehension. In speaking practice, instant feedback on pronunciation and fluency from AI systems motivated students to practice more. Data from student performance assessments showed that students' average scores in listening and speaking tests increased by 2-3 points after a semester of AI-integrated teaching. Approximately 70% (about 191 students) of the students showed interest in AI-related English learning activities, which contributed to their enhanced engagement in listening and speaking practice.
2) Reading and Writing: AI-assisted reading platforms recommended appropriate reading materials according to students' reading levels, which improved their reading comprehension. In writing classes, AI writing assistants not only corrected grammar and spelling errors but also provided suggestions for better vo-

cabulary usage and text coherence. Analysis of students' writing samples indicated that the average number of grammar errors decreased by 23.33%, and the quality of writing, evaluated by holistic scoring, improved by 2 levels. Among them, around 60% (about 164 students) believed that AI had enhanced their interest in reading and writing, which in turn promoted the improvement of their skills in these two aspects.

4.2. Impact on Students' Learning Interest and Ability

1) Learning Interest:

According to the results of student questionnaires and interviews, about 70% (191 students) of the students showed a more positive attitude towards English learning after the application of AI. They found AI-related learning activities, such as virtual role-play and interactive games, more interesting and engaging. For example, some students mentioned that they were more willing to participate in English classes because of the novelty brought by AI. Moreover, around 60% (164 students) of the students believed that AI had effectively enhanced their interest in English learning.

2) Learning Ability:

Teachers reported that students' autonomous learning ability improved with the help of AI. Students were more likely to explore English learning resources on their own and actively correct their mistakes based on AI-provided feedback. Additionally, students' critical thinking ability was enhanced through AI-guided reading and writing tasks that required in-depth analysis and creativity. Roughly 55% (about 150 students) of the students demonstrated an improvement in their learning abilities under AI-assisted learning.

5. Discussion and Conclusions

5.1. Effectiveness of AI in English Teaching

The study confirmed the effectiveness of the application of AI in junior high school English education. AI's application in listening, speaking, reading, and writing aligns with the constructivist learning theory, as it allows students to actively explore and construct knowledge through personalized learning experiences. For example, the fact that about 70% of students showed interest in AI-related learning activities reflects their active participation in the learning process enabled by AI, which promotes self-directed learning. Moreover, the intelligent education technology theory is also reflected in the way AI provides customized learning content according to students' performance and needs. This not only improves students' language skills but also makes the learning process more efficient and effective. The improvements in students' listening, speaking, reading, and writing skills, as evidenced by the assessment data, further validate the positive impact of AI in line with these theories.

5.2. Impact on Students' Learning Interest and Ability

AI has a positive impact on students' learning interest. The novelty and interactivity of AI-based learning activities, which attracted about 70% of students' interest and were considered to enhance the interest of around 60% of students, break the monotony of traditional teaching methods and provide a more engaging learning environment. Regarding learning ability, AI enables students to receive timely and targeted feedback, which helps them identify and correct their weaknesses. The improvement in autonomous learning and critical thinking abilities of about 55% of students shows that AI can effectively promote the development of students' comprehensive language abilities.

5.3. Educational Significance and Recommendations

1) Educational Practice Significance:

The results of this study provide valuable practical experience and an operation guide for junior high school English teachers. Teachers can refer to the successful cases in

this study to better integrate AI into their teaching, such as using AI-assisted teaching tools in different teaching modules. As for education administrators, this research offers a decision-making basis for the promotion and popularization of AI in English education. It shows that investing in AI-related educational resources can effectively improve the quality of English teaching. Approximately 80% (about 29 teachers) of the teachers believed that AI was helpful for teaching, which also emphasizes the practical value of AI in the educational context.

2) Recommendations:

To further promote the application of the application of AI in junior high school English education, it is recommended that teachers receive more professional training on AI-integrated teaching to fully utilize the potential of AI tools. Considering that only around 40% (about 14 teachers) of the teachers were proficient in AI teaching tools, such training is crucial. At the same time, schools and educational institutions should pay attention to the construction of relevant data security systems to ensure the safe use of AI in teaching. Additionally, continuous research and improvement of AI-based teaching models are needed to better adapt to the diverse needs of students.

In conclusion, this study demonstrates that AI has great potential in junior high school English teaching. By understanding and applying AI technology based on relevant learning theories, we can create a more effective and interesting English learning environment for students, which is conducive to the improvement of students' English proficiency and overall development.

Appendix. Questionnaire Items.

Question Number	Question Content	Answer Options
1	Which AI tools have you used in the process of English learning?	A. Intelligent speech recognition software B. Automatic scoring system C. Intelligent reading recommendation platform D. Writing assistant software E. Others (please specify)
2	How often do you use AI tools to learn English?	A. Multiple times a day B. Once a day C. 3-5 times a week D. 1-2 times a week E. Seldom use
3	Do you think AI tools are helpful for improving your English listening ability?	A. Very helpful B. Somewhat helpful C. Not very helpful D. Not helpful at all
4	In English speaking practice, how important is the feedback on pronunciation and fluency provided by AI to you?	A. Extremely important B. Relatively important C. Moderately important D. Not important
5	Do the English reading materials recommended by AI match your reading level?	A. Perfectly match B. Fairly match C. Basically match D. Do not match
6	Are AI writing assistant tools helpful for you to	A. Very helpful, it can find and correct most mistakes B. Helpful, it can find some mistakes

	correct grammar and spelling mistakes?	C. Slightly helpful, it can only find a few mistakes D. Almost no help
7	How has AI-assisted English learning activities changed your interest in English learning?	A. Greatly increased my interest B. Slightly increased my interest C. No change in my interest D. Decreased my interest
8	Due to the application of AI, how has your participation in English classes changed?	A. Significantly increased B. Slightly increased C. No change D. Decreased
9	After using AI tools to learn English, has the time you spend on autonomous English learning changed?	A. Obviously increased B. Slightly increased C. No change D. Decreased
10	Will you actively correct your English learning mistakes according to the feedback provided by AI?	A. Always B. Often C. Occasionally D. Almost never
11	Are AI-guided reading and writing tasks helpful for your critical thinking ability?	A. Very helpful B. Somewhat helpful C. Not very helpful D. Not helpful at all
12	Do you hope to use AI tools more in English learning?	A. Definitely B. Relatively hope C. It doesn't matter D. Don't hope
13	What do you think is the biggest advantage of AI in English teaching?	A. Provide personalized learning content B. Increase learning fun C. Improve learning efficiency D. Help better understand knowledge E. Others (please specify)
14	What difficulties have you encountered when using AI tools to learn English?	A. Complicated operation B. Inaccurate feedback C. Unsuitable content D. Technical failures E. Others (please specify)
15	What do you think of the school's and teachers' efforts in promoting AI-assisted English learning?	A. They did a great job, making full use of the advantages of AI B. They did a good job, with certain promotion and guidance C. Just so-so, there is still room for improvement D. They did a poor job and need to be improved

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