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AI-Powered Flipped Classroom: The Path to Transform China's Future English Education

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Abstract: This paper delves into the AI-powered flipped classroom model in China's English education context. It begins by highlighting the limitations of traditional English teaching and the emergence of the new model. Through analyzing its future trends, practical implementations in pre-class, in-class, and after-class scenarios, and positive impacts on teaching, it demonstrates the model's potential to revolutionize English education. However, challenges such as teachers' technical proficiency, students' adaptability, resource integration, and evaluation system are also discussed. Despite these challenges, with proper support, this innovative model is expected to become a mainstream approach in China's English education, enhancing the quality of education and students' competitiveness in the global arena.

Keywords: AI-powered flipped classroom; English education; teaching model reform; personalized learning; diversification of teaching evaluation; autonomous learning ability; integration of teaching resources

1. Introduction

For a long time, China's English education has been dominated by the traditional teacher-centered teaching model. In this model, teaching mainly focuses on one-way knowledge transfer, emphasizing meticulous grammar explanations and extensive vocabulary memorization. However, it neglects the cultivation of students' practical language application ability and autonomous learning ability. As a result, the phenomenon of "high scores but low abilities" is prevalent among students. They can achieve good grades in exams but struggle to use English flexibly in real-language communication scenarios, especially in cross-cultural communication in the context of globalization, failing to meet practical needs.

In recent years, with the rapid development of technology, the integration of artificial intelligence (AI) technology and the education field has been deepening. The innovative teaching model of the AI-powered flipped classroom has gradually emerged. AI technology, with its powerful data analysis capabilities and intelligent interaction functions, can provide personalized learning support for students. It can recommend suitable learning content according to students' learning progress and knowledge mastery, and simulate real-language communication scenarios, allowing students to practice their language skills in an immersive environment. The flipped classroom, on the other hand, has a subversive reconstruction of the traditional teaching process. It moves knowledge delivery to before class for students to learn independently, and the class time is mainly used for

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knowledge internalization, discussion, and practice. The organic combination of AI technology and the flipped classroom model has opened up a new path for English teaching innovation.

Therefore, this paper aims to deeply explore the specific practice of this emerging teaching model in the Chinese education environment, comprehensively analyze its various impacts on the traditional English teaching model, and analyze the possible challenges in the implementation process, so as to provide valuable references for the reform and development of China's English education.

2. Future Trends of the AI-Powered Flipped Classroom

In the context of continuous innovation in the education field, the teaching model of "flipped classroom combined with AI" is gradually emerging and becoming an important direction of educational reform. The rise of this innovative model is not accidental but is driven by multiple factors. The following will deeply analyze the future trends of the "flipped classroom combined with AI" from four dimensions: educational policy orientation, technological development trends, changes in social demands, and shifts in students' learning needs.

2.1. Promotion by Educational Policy Orientation

China has been vigorously promoting the process of educational informatization. The "Education Informatization 2.0 Action Plan" clearly states "promoting education modernization through informatization", which provides strong support for the in-depth application of AI technology in the education field and encourages schools at all levels to actively explore effective ways to deeply integrate AI and teaching. In 2025, the "Guiding Opinions on Deepening Education and Teaching Reform" issued by the Ministry of Education emphasized "cultivating students' autonomous learning ability and innovative thinking", providing more specific policy guidance for the teaching model of the flipped classroom combined with AI.

2.2. Drive by Technological Development Trends

AI technology has made remarkable progress in several key fields. Voice recognition (such as intelligent oral assessment), natural language processing (such as real-time translation), and big data analysis (such as learning path customization) are becoming increasingly mature. For example, today's intelligent oral assessment tools can accurately identify students' pronunciations. They can not only point out mistakes but also provide personalized improvement suggestions based on pronunciation characteristics, helping students improve the accuracy and fluency of their oral expressions [1]. Natural language processing technology has made real-time translation a reality. In English teaching, students can use this technology to communicate with foreign learning resources without barriers, broadening their learning horizons. Moreover, with the continuous progress of technology, the cost of AI technology is gradually decreasing, and its ease of use and popularity are constantly increasing, further accelerating its wide application in the education field.

2.3. Impetus from Changes in Social Demands

In today's increasingly accelerating globalization process, society has higher requirements for the practical English application ability of talents. Whether it is business communication in multinational companies or international academic cooperation and cultural exchange activities, having fluent English expression skills and good cross-cultural communication abilities has become an essential quality for talents [2]. However, the traditional English teaching model, due to its over-emphasis on grammar and vocabulary explanations and neglect of practical language use, makes it difficult for the cultivated students to meet social demands.

From the perspective of the job market, enterprises tend to recruit graduates who can flexibly use AI tools to solve problems, fully highlighting the urgent need for new teaching models in society.

2.4. Shifts in Students' Learning Needs

Digital native students grow up in an era of highly developed information technology. They have a natural preference and higher acceptance for digital learning resources and interactive learning methods [3]. These students are no longer satisfied with traditional passive learning and prefer autonomous and interactive learning experiences.

3. The Specific Forms of the New English Teaching Model of the AI-Powered Flipped Classroom

This new teaching model is not far-off. In fact, many teachers at the forefront of teaching reform have already adopted this new model. This innovative teaching model breaks through the limitations of traditional teaching. With the powerful functions of AI, it optimizes the teaching process from pre-class preview, in-class interaction to after-class tutoring, effectively improving teaching quality and students' learning outcomes. The following will deeply analyze the successful practices and remarkable results of the flipped classroom combined with AI in the new English teaching model through existing cases.

3.1. Pre-Class: AI-Assisted Personalized Preview

In the pre-class preview stage of English teaching, AI technology is showing extraordinary assistance. Nowadays, a variety of AI tools have emerged, playing a crucial role in this stage.

Take the intelligent lesson-planning system as an example. iFLYTEK Xinghuo is a leading one. In actual teaching, teachers often face the problem of how to prepare teaching content according to students' different levels. iFLYTEK Xinghuo can collect multi-dimensional data such as students' past English vocabulary test scores and word-memorization check-in situations, and then accurately analyze each student's vocabulary mastery level. For students with a relatively weak foundation, it will thoughtfully push basic vocabulary memory techniques and easy-to-understand example sentences to help them lay a solid foundation. For students with a better foundation, it will push expanded vocabulary and synonym discrimination to help them improve further. According to the feedback of many teachers, after using such intelligent lesson-planning systems, the lesson-planning time is reduced by an average of 30%-40%. The pertinence of students' preview tasks is significantly enhanced, and the accuracy rate of understanding and using vocabulary in class is expected to increase by 20%-30%, achieving twice the result with half the effort.

Another example is the AI oral assistant. The AI function of Youdao Oral Master provides great convenience for students' oral practice. When students preview, they often feel confused due to the lack of a real-language environment and timely feedback. The AI function of Youdao Oral Master has built-in natural dialogue and rich scene simulation functions. When students have conversations with it on topics such as "campus life", they seem to be in a real communication scene. AI can correct students' grammar mistakes and pronunciation problems in real-time, just like having a professional English teacher by their side. Many students have reported that after continuous use for a period of time, their confidence in oral expression has increased significantly, the pronunciation accuracy has increased by about 25%-35%, and their oral English level has been truly improved.

In addition, the intelligent resource matching platform has also injected new vitality into English pre-class preview. Take the resource integration function of SEEWO Whiteboard based on the teaching large-scale model as an example. When teachers input the English course theme, it can quickly integrate the latest English reports, film and television clips and other rich materials related to the theme in a short time. These materials can be used as introductory materials to attract students' attention instantly. At the same time,

it can generate personalized preview task frameworks according to different student levels, fully meeting the learning needs of different students. As a result, teachers' time to obtain teaching resources is greatly reduced, and students' preview interest is effectively stimulated. The preview efficiency has increased by 30%-40% compared with the traditional method.

As pointed out by scholars such as Liu Dejian in "Application and Development Trends of AI Technology in the Education Field", AI technology can effectively enhance the learning experience in the preview stage of language learning and lay a good foundation for classroom learning [4]. Through the application of these AI tools, students' preview is no longer boring, and the preview efficiency and quality have been significantly improved, making full preparations for subsequent classroom learning and making the English learning path smoother.

3.2. In-Class: In-Depth Interaction and Immediate Feedback

In Class 11, Grade 7 of Nanjing No.9 Junior High School in Jiangsu Province, Teacher Feng Ruiqi carried out an English teaching on the theme of "environmental protection" with the help of an AI platform. In the group discussion session, the AI platform collected and analyzed students' discussion data in real-time, such as students' speech content, frequency, and discussion activity. When discussing "environmental protection measures", the AI platform found through data analysis that some students had misunderstandings about the concept of "sustainable development". So it promptly generated relevant supplementary materials, such as a video introducing the United Nations' sustainable development goals and some counter-argument viewpoints, such as "it is difficult to balance economic development and environmental protection", to stimulate students to have in-depth debates.

At the same time, VR street simulation tools were used to create a realistic language application environment for students. Students seemed to be on the street, communicating with virtual characters of different identities about environmental protection issues. In the communication process, students needed to use the English knowledge they had learned to accurately express their views and understand others' opinions. For example, students needed to express their views on garbage classification to virtual environmental protection volunteers and ask for their suggestions on environmental protection actions. In this way, students' practical language application ability and cross-cultural communication ability were effectively exercised.

3.3. After-Class: Precise Tutoring and Ability Improvement

At Xingchen School Affiliated to Southwest University in Chongqing, English teachers use iFLYTEK's intelligent products for after-class tutoring. After students complete their homework, they submit it through the AI homework-grading system. This system can quickly grade the homework, not only providing immediate feedback on grammar mistakes but also conducting a detailed analysis of the types of mistakes, pointing out the root causes of the mistakes, and pushing similar exercises. For example, if a student frequently makes tense mistakes in a composition, the system will clearly point out the wrong sentences and inappropriate tense usage, such as "Yesterday, I go to the park (should be changed to Yesterday, I went to the park)", and push a series of exercises on the simple past tense to help students consolidate their knowledge and strengthen their weak links.

For students with relatively weak learning abilities, the intelligent learning plan system will design a progressive learning path according to the specific situation of students. Starting from the most basic "vocabulary spelling", it gradually progresses to "complex sentence writing", providing students with systematic and orderly learning guidance. Through this precise after-class tutoring, students can learn more targeted and improve

their learning results. According to the school's statistics, after adopting this model, students' English scores have increased by an average of 10 points.

4. Positive Impacts of the AI-Powered Flipped Classroom on the Chinese Teaching Model

4.1. Optimization of the Teaching Model

The deep integration of AI technology has fundamentally optimized the teaching model and broken the limitations of traditional teaching models in terms of time and space. Traditional classroom teaching is restricted by both time and space. Students can only receive education in fixed classrooms and class hours, and their learning flexibility and autonomy are severely limited.

With the advent of the Education Informatization 2.0 era, intelligent education is booming, and smart education is leading the trend. The emergence of online education platforms and mobile learning applications has completely changed this situation [5]. In terms of enhancing classroom interactivity, today's primary and secondary school teachers use the intelligent teaching system of SEEWO Whiteboard to grasp students' learning situations in real-time. When explaining math application problems, SEEWO Whiteboard will analyze students' mastery of knowledge points based on data such as the correct rate and answering time of students during the answering process. If it is found that some students have difficulty understanding a certain problem-solving idea, teachers can adjust teaching strategies in a timely manner. They can use the animation demonstration function on the whiteboard to visually display the abstract problem-solving process or explain it through examples to help students understand. At the same time, students can also communicate and discuss with teachers and other classmates through the interactive platform of SEEWO Whiteboard, sharing their problem-solving ideas and methods.

4.2. Expansion of Teaching Resources

AI technology has provided unprecedented opportunities for the expansion of teaching resources, completely changing the situation of scarce traditional teaching resources. In the past, teaching resources were often limited to textbooks, a small number of teaching aids, and limited online resources, which were difficult to meet the diverse learning needs of different students.

Take the AI learning system of Xueersi Online School as an example. This system, with the help of AI technology, recommends rich learning resources according to students' learning goals, learning progress, and interests. If a student is interested in English reading, the system will push various English original works, English news reports, reading skills explanation videos, and other resources. If a student is preparing for an English exam, the system will recommend targeted simulation test questions, real-question analysis, and learning skills according to the exam type and the student's weak links. For example, a student preparing for the IELTS exam obtained IELTS real-question simulation test papers suitable for their level through the AI learning system of Xueersi Online School and received detailed error analysis and improvement suggestions. After a period of study, the student's IELTS score improved significantly.

In addition, AI technology can also generate personalized learning content. For example, Squirrel AI Adaptive Education uses intelligent recommendation algorithms to analyze students' knowledge weak points based on data such as students' homework completion and test scores, and generates exclusive learning materials for students. In math learning, the system will generate corresponding knowledge point explanations, exercises, and extended reading materials according to students' mastery of different knowledge points such as functions and geometry. Students can make up for their knowledge gaps in a targeted manner during the learning process and improve their learning results.

4.3. Diversification of Teaching Evaluation

Teaching evaluation is an indispensable part of the teaching process. However, traditional teaching evaluation often takes the final exam score as the main measurement standard, ignoring students' efforts, progress, and the improvement of comprehensive qualities during the learning process. The application of AI technology has realized the transformation of teaching evaluation from single-dimensional to multi-dimensional, overcoming the over-reliance on summative evaluation (only looking at the final assessment) in traditional teaching evaluation and being more conducive to formative evaluation (paying attention to the learning progress and effects during the process).

In actual teaching, teachers use learning management systems to track students' learning progress and learning outcomes in real-time. Take Rain Classroom as an example. In the Chinese teaching of primary and secondary schools, teachers can not only understand students' homework completion and test scores through Rain Classroom but also analyze students' performances in classroom discussions and group collaborations. When students do writing exercises, Rain Classroom will analyze students' compositions in terms of grammar, vocabulary, and logical structure and give detailed feedback and suggestions. In addition, the system will point out the specific positions and types of grammar mistakes in students' compositions, recommend more appropriate vocabulary and expressions, and sort out the logical structure of the articles and put forward improvement suggestions. Teachers can more accurately understand students' learning situations based on the system feedback and adjust teaching strategies in a timely manner. In addition, AI technology can also make evaluation indicators more comprehensive. For example, on the classroom interaction platform of Chaoxing Learning Pass, teachers can accurately understand students' classroom participation, speech quality, cooperation ability, etc., and incorporate these factors into the evaluation index system.

4.4. Improvement of Students' Abilities

The network learning environment based on data mining can provide students with personalized learning experiences, thereby improving learning effects [6]. The wide application of AI technology has a significant promoting effect on the improvement of students' English language abilities.

In language learning, rich learning resources and personalized learning content help students better master language knowledge and improve their practical language application abilities. Take *English Fluency Now* as an example. This application provides students with a large number of original English movies, news broadcasts, and other resources. At the same time, it formulates personalized learning plans for students according to their language levels and learning goals. In the oral practice session, students follow and imitate the original content, and the application uses AI voice recognition technology to accurately evaluate students' pronunciations, point out inaccurate places, and provide improvement suggestions. After a period of study, students' oral expressions become more fluent, and their listening comprehension abilities are also significantly improved.

In the cultivation of autonomous learning ability and information literacy, AI technology also plays an important role. Students use intelligent learning platforms such as Homework Help to independently select learning resources and plan learning paths, gradually developing the habit of autonomous learning and improving their autonomous learning ability. Homework Help not only provides a large amount of learning materials, including knowledge point explanations, exercises, and real-question test papers but also has an intelligent question-searching function. When students encounter problems, they can obtain detailed problem-solving ideas and answers by taking pictures of the questions. At the same time, the rich information resources and powerful learning tools provided by AI technology, such as the AI intelligent retrieval function of CNKI, help students learn to screen, integrate, and utilize information, enhancing their information literacy. When

students conduct academic research, they can quickly and accurately find relevant literature materials through the AI intelligent retrieval of CNKI, improving their research efficiency.

5. Challenges of Full-Scale Implement

Although this new classroom model strongly promotes the reform and innovation of Chinese English teaching, its development and future full-scale application also face many difficulties. Therefore, the following will analyze the challenges faced by the development of the AI-flipped classroom.

5.1. The Contradiction of Teachers' Technical Application Ability

As the linker between AI technology and teaching practice, teachers face a significant ability gap in technical application. A special investigation by the Education Informatization Strategic Research Base of the Ministry of Education shows that among basic education teachers in China, only 37.6% can skillfully operate intelligent teaching platforms, and the proportion of teachers with the ability to re-develop AI tools is less than 5% [7]. This ability gap directly leads to the phenomenon of technology disconnection in teaching scenarios. Even with advanced equipment such as intelligent recording and broadcasting systems and learning situation analyzers, 63.2% of teachers only use them as electronic blackboards [8]. Typical dilemmas include that teachers find it difficult to effectively use the real-time feedback function of AI platforms for dynamic grouping or cannot interpret the cognitive trajectory maps generated by learning analysis systems, resulting in the surface-level empowerment of technology.

5.2. Students' Adaptability Barriers to Autonomous Learning

The requirements of the flipped classroom for the initiative of the learning subject create a tension with the traditional teaching paradigm. A tracking study by the Chinese Academy of Educational Sciences shows that among students who have experienced 12 years of the traditional teaching model, only 28.9% can independently develop learning plans, and less than 40% of students actively seek resources when encountering cognitive obstacles [5]. This path dependence is particularly prominent in the classroom interaction session. When teachers use the "ClassIn" platform to carry out collaborative exploration, about 52.3% of students still wait for specific instructions from teachers before starting to operate [6] An empirical case of a provincial-level model high school shows that in the initial stage of implementing the AI-flipped classroom, the completion rate of pre-class video preview was only 61.7%, and 37.5% of students had the behavior of fast-forwarding and skipping the thinking-process.

5.3. The Ecological Defects in the Integration of Teaching Resources

The "quantity-quality paradox" of intelligent education resources has become a key bottleneck restricting development. According to the data of the Education Informatization 2.0 Action Plan Monitoring Platform, the total amount of basic education digital resources in China has reached 4.8PB, but only 21.3% of the resources have passed the teaching effectiveness certification, and there is a serious imbalance in regional distribution [8]. The average digital resource access volume per school in the eastern developed regions is 5.6 times that of western county-level schools. The difficulties in resource integration are specifically manifested as follows: the time cost for teachers to screen and adapt resources accounts for 43.8% of the total lesson-planning time [3], and due to the lack of local-based teaching design logic, the classroom utilization rate of resources pushed by intelligent recommendation systems is less than 35%.

5.4. The Dimensional Deficiency of the Teaching Evaluation System

The existing evaluation mechanism and the characteristics of intelligent education are dimensionally misaligned [6]. The STEAM evaluation framework constructed by the Smart Learning Institute of Beijing Normal University shows that in the current evaluation dimensions of AI classrooms, cognitive-domain indicators account for 82.7%, while process-based indicators such as collaborative learning and metacognitive abilities only account for 9.3%. This imbalance leads to the situation that 78.4% of the 120 million behavior data collected by intelligent platforms such as Rain Classroom are not included in the evaluation system [1]. In a typical case, although the AI system of a certain school can record micro-data such as the staying time of students on each knowledge point and the frequency of asking questions, the final evaluation still has an 85% weight on the exam score, forming a significant "data redundancy-single evaluation" contradiction.

6. Conclusion

The organic combination of AI and the flipped classroom can bring profound changes to Chinese English education, reshape the ecological environment of English education, and strongly promote the transformation of the teaching model from "teaching-centered" to "learning-centered". Although it faces challenges in technology, teachers' abilities, and the evaluation system during the promotion and implementation process, with the policy support of the government, continuous technological investment, and the continuous improvement of teachers' abilities, this innovative teaching model is expected to become the mainstream paradigm of Chinese English education in the future. In addition, it will provide sustainable impetus for cultivating high-quality talents to meet the needs of globalization, improve the overall quality and level of Chinese English education, and enable students to have stronger competitiveness in future international competitions.

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