

The Role of AI Technology in Constructing Digital English Classrooms in Underdeveloped Areas

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Abstract. As a key part of basic education, English education in primary schools is of great significance to the personal development of students and the construction of society and has received extensive attention from society. However, primary English education in underdeveloped regions of China is still relatively backward. In recent years, the rapid development of AI technology has realized information communication in education, which has become the key force in promoting the digital transformation of English classrooms in underdeveloped regions and the potential to bridge the education gap between areas. This paper is based on the teaching characteristics of the current primary school English subject, combined with the current development of AI technology applied to English teaching, for building the digital classroom of primary school English in underdeveloped areas puts forward the following relevant recommendations. China should accelerate the implementation of infrastructure construction and technology introduction in underdeveloped areas, and strengthen the training of digital literacy and media awareness for primary school English teachers. Primary schools in underdeveloped areas should use AI technology as a teaching aid to build a "double-teacher" English classroom teaching mode and a curriculum feedback platform based on this technology, to effectively promote the digital transformation of English classrooms in underdeveloped areas.

Keywords: Primary English education, AI technology, underdeveloped areas, digital transformation of education, optimal allocation of educational resources.

1. Introduction

Educational equity is a key link to achieving social equity and a core dynamic for the promotion of sustainable development. Achieving regional equalization of fair educational resources and accelerating the construction of a high-quality education system in underdeveloped regions are the top priorities for comprehensively promoting the cause of educational equity.

China has been actively building a new model of fair and high-quality education development, and implementing the construction strategy of education power. To this end, China has long attached importance to the improvement and enhancement of education services in underdeveloped areas and has carried out a precise assistance model with Chinese characteristics according to the actual problems and defects of the education system in underdeveloped areas [1]. However, with the rapid economic and social development of China and the uneven distribution of resources inherent in the dual economic structure of urban and rural areas, children of school age in underdeveloped regions are faced with the problems of unequal opportunities to receive education and uneven access to quality educational resources. As a core subject in primary school teaching, the high demands for teachers' professional quality and teaching level constrain the development of English teaching in underdeveloped areas.

In recent years, AI technology has achieved explosive development, and through information and communications technology promotes the process of digital transformation of education. The digital platform constructed by AI technology breaks through time and space limitations and successfully shapes the personalized teaching platform and smart classroom that can address the different needs and characteristics of students, becoming a key force in accelerating the digital transformation of the English classroom in underdeveloped areas.

At present, there have been many studies on the construction of digital classrooms in underdeveloped regions, but the number of studies on the construction of English digital classrooms

in this region is relatively small. Exploring the role of AI technology in constructing digital English classrooms in underdeveloped regions and its feasible ways, can improve the knowledge framework about the operation mode of digital English classrooms and its feedback mechanism built by scholars in the existing literature in this field. At the same time, by understanding the role of AI technology in the mechanism, goals, and direction of improvement, it can provide a certain theoretical basis for solving the problems of uneven distribution of high-quality English education resources in underdeveloped areas, and difficulties in carrying out in-depth teaching of English subjects.

2. Analysis of the Characteristics and Current Situation of English Teaching in Primary Schools

2.1. Characteristics of English Teaching in Primary Schools

English learning in primary school is not only the enlightenment stage for students to learn English but also the foundation and key stage to learn English well. At present, most schools in China have transferred the primary school English teaching from the starting point of third grade to the starting point of first grade, which also reflects the society's attention to the primary school English teaching.

The construction of primary school English subjects and the development of teaching work cannot be separated from the analysis of pupils' English learning psychology. The average age of primary school students is 6 to 12 years old, and children in this stage are the strongest stage of language learning. Cognitive development psychology proposed that the primary school students in this period are curious, like to use the brain, lively and active, and good at actively imitating the surrounding things, with a strong perception ability. However, primary school children are in the initial stage of developing behavior habits, with strong plasticity and easy to be affected by external intervention. However, in the face of a strange language learning environment, they will also produce fear, tension, and other psychological [2]. Therefore, English teaching in primary schools should explore the beneficial part of students' learning psychology, and transform the potential negative factors and psychological obstacles into positive learning momentum and enthusiasm.

According to the summary of the psychological characteristics of primary school students, the current characteristics of primary school English teaching can be summarized as follows:

The first is to create an interest-oriented language learning environment. Childhood is the starting point of life cognition. What is reflected in English teaching activities is students' acceptance and absorption of different teaching contents. For the content they are interested in, students' learning initiative and enthusiasm are significantly higher than those they are not interested in. Therefore, English teaching in primary schools should fully stimulate students' interest in learning English, encourage students to experience and perceive language in a pleasant environment, and use language in real situations. In addition to general teaching procedures, various incentive mechanisms such as interactive mechanisms, reward mechanisms, and feedback mechanisms can also help teachers stimulate students' interest and desire to learn English [3].

The second is to construct intuitive, specific, and flexible language learning situations. In his theory of stages of cognitive development, Piaget put forward the concept of cognitive development and the theory of stages of development. The concept of cognitive development emphasizes the interaction between the individual and the environment, while the language ability of the individual develops gradually from the interaction between the individual and the environment. The stage theory of cognitive development divides the development process of individuals from birth to maturity into four stages, among which, children in primary school are just in the transition process from the stage of intuitive thinking to the stage of concrete operation and then to the stage of formal operation. At this time, children's thinking is mainly carried out through the concrete image or representation of affairs, and through these concrete things to carry out logical deduction, thus developing abstract and general thinking [4]. This feature requires that English teaching should present an intuitive and specific language environment to students, and promote students' ability to learn, master, and use the language by designing a real context.

In addition, teachers should adhere to the task-oriented teaching model of effective interaction and full participation. In 1995, Ernest L. Byer, an American educator, proposed the concept of a "learning community" for the first time, emphasizing the construction of a cultural ecosystem based on autonomy, cooperation, inquiry, and sharing, and transforming it into the construction of school educational activities and practices. English teaching in primary schools should give full play to students' subjective initiative, insist on students learning in communication, and increase effective interaction in the teaching process. At the same time, given the characteristics of primary school students, such as easy loss of attention and weak understanding ability, designing English reading and writing, audio-visual, play, and other tasks suitable for students' development level, encourage them to "learn from doing", and increase the sense of learning experience and gain [5].

The last is to establish a scientific and efficient habit training mechanism. Primary school is the early stage of children's development, language, behavior, and other plasticity, under the correct and scientific guidance can form good learning habits in time. English teaching mainly focuses on the four modules of listening, speaking, reading, and writing. Teachers need to cultivate students' good learning habits of listening, speaking, and reading frequently through regular listening training, word spelling, and other basic module training, and guide students to master practical and effective learning methods from routine subject teaching to improve their learning efficiency.

2.2. Analysis of Current Situation and Gap of English Teaching Level in Urban and Rural Primary Schools in China

China has a large population and vast geographical areas, and the development of economic, social, and cultural factors between different regions is very different. As one of the core issues of regional coordinated development, the coordinated development of urban and rural areas has always been an urgent problem of The Times.

Affected by the unbalanced development of urban and rural areas, there is also a large regional difference in the development level of urban and rural education, and there are still difficult to reconcile the reality contradiction and development gap between urban and rural areas. At present, the development of primary education in underdeveloped areas has achieved remarkable results, but the urbanization process of compulsory education is still relatively slow. According to the data released by the National Bureau of Statistics, in 2021, the urbanization rate of primary education in underdeveloped areas will reach 79.15%, and the overall urbanization rate of compulsory education will reach 81.91%, which is slower than the growth rate of the urbanization rate of permanent residents [6]. As far as English teaching is concerned, English teaching in primary schools in China has achieved full coverage at present, but there is still a big gap between the level of English teaching in underdeveloped areas and that in developed areas.

From the perspective of students' cognition of English, students in underdeveloped areas lack English learning awareness in their growing environment. The students had no exposure to English before the introduction of the English course in the third grade, and the real and specific language situations were missing in the period of language imitation and learning ability. The number of English classes in most primary schools is no more than three classes a week, and in people's subconscious, English has been in the "second class" position [7].

Secondly, due to the lack of teachers, some primary schools in underdeveloped areas still have non-English major teachers teaching English, and the low professional level of teachers can not transform their professional knowledge into a practical tool for students to improve their English ability and accomplishment. At the same time, due to the large mobility of teachers in underdeveloped areas and the fact that some teachers are volunteer teachers from urban areas, their leaving their posts makes students have to adapt to the transition period for a long time, and they are faced with constantly changing teaching modes and teachers' faces, which makes it difficult for students to develop stable learning habits.

The imperfection of teaching facilities has always been an urgent problem to be solved in the process of promoting education reform in underdeveloped areas. The lack of modern teaching

equipment and multimedia resources in underdeveloped areas has affected the establishment of students' English language learning environment and directly affected the effect and quality of teaching.

2.3. Importance of Primary School English Learning in Underdeveloped Areas of China

Primary school English is an important part of basic English education, which is not only a key stage to improving personal English ability but also a key step to promoting cross-cultural communication and cultivating students' international vision. Compared with developed areas, English teaching in primary schools is of special importance to underdeveloped areas such as rural areas.

First of all, English learning in primary school is helpful to improve the language learning ability of students in underdeveloped areas, develop their learning ability, and promote the all-round development of students. In the process of learning English, students can deeply understand different languages and cultural systems through their grammar, syntax, and language system, and explore the internal laws of language acquisition, to improve their language logic and build their discourse system and communication skills.

Secondly, English learning in primary schools provides students in underdeveloped areas with more equal employment opportunities and opportunities to participate in international exchanges. Today's world is a world of globalization, more and more industries have walked on the new road of international development, the society needs more and more bilingual talents with cross-cultural communication abilities. Due to the backward economic development and few job opportunities in underdeveloped areas, English courses should be set up in primary schools to cultivate students' second language acquisition ability from an early age. Only in this way can students acquire mature English communication skills and cross-cultural communication qualities in the career selection stage, and have equal employment and foreign exchange opportunities with students in other areas.

Thirdly, English learning in primary schools helps to train rural talents to meet the needs of the country, implement the strategy of rural revitalization, and promote the coordinated development of regions. The high-quality development of education in underdeveloped areas has always been an important embodiment and strategic fulcrum of China's rural strategic soft power. Nearly half of the talents needed for socialist modernization in China are from underdeveloped areas such as rural areas. Therefore, bridging the gap in educational development between regions and promoting educational reform in underdeveloped areas are the key measures to increase talent reserves for the motherland. The opening of English courses in primary schools is a positive practice of the educational strategy of "facing modernization, facing the world, and facing the future", and it is also the requirement of training talents in the new era.

Finally, English learning in primary schools is a feasible way to realize the integration of culture and language in underdeveloped areas. Many underdeveloped areas of China have unique national cultures, but these cultures are often difficult to realize cross-domain dissemination or even go abroad because of the cultural level of the communicators. Strengthening English education for students in underdeveloped areas can improve their English cultural accomplishment, enable them to deepen their cognition of their own national culture while absorbing foreign cultures, promote students' identification of national cultural values, enhance their cultural transmission power, and construct a more open national cultural form.

3. Current Situation and Problems of AI English Teaching

At present, AI technology is considered to have great development potential and significance in the field of education. Through the analysis of precise algorithms, AI technology can recommend educational resources and knowledge graphs for students according to their individual needs, which greatly improves the learning efficiency of learners. Another advantage of AI technology in the field of teaching is the ability to generate customized learning feedback. Based on the summary of previous

research, it can be found that the application of AI technology in English teaching has been relatively comprehensive. From English learners to English teachers, AI technology can be applied to many aspects of English learning, such as classroom teaching, and after-class feedback practice [8].

In terms of the coverage and geographical distribution of the application of AI technology in practical English teaching, Asia is currently the main force of application and research in this field, but the coverage population is mainly concentrated in the stage of higher education, and the practical application of English teaching in primary and secondary schools is relatively small. From the perspective of ability cultivation, the existing technology mainly focuses on improving students' speaking and writing ability, while the cultivation of listening and reading skills is still lacking. At the same time, the regional differences of this application are more obvious. Primary schools in underdeveloped areas are limited by the level of local economic development, and the actual application cases are few and far between.

At present, nearly half of school-age children in China are distributed in underdeveloped areas, but the imbalance between the distribution of population and the distribution of educational resources has led to a serious imbalance between the quality of education and the level of development. Education in underdeveloped areas is seriously separated from education in developed areas such as cities, and "left-behind children" and "boarding schools" have become iconic products of backward education in the region. The introduction of AI technology into English teaching in schools in underdeveloped areas not only takes into account the poor educational resources and information caused by time and space constraints in the region but also pays attention to the current situation of quality education, the lack of innovation and professionalism in English teaching in underdeveloped areas, which is difficult to meet the cognitive and quality development needs of students in this section.

The backward resources and information caused by time and space constraints are the primary considerations for the introduction of AI technology in underdeveloped areas. In recent years, although the state has encouraged offline on-site support education and other educational assistance measures, traditional support education is limited by time and other factors and mainly adopts the teaching mode of short-term volunteer visits, which cannot fundamentally solve the backward status quo of educational resources in underdeveloped areas. The introduction of AI technology into primary school English classrooms is timely, trans-temporal, and sustainable, the teaching model is stable and can form a relatively complete education cycle.

The single problem of English teaching methods and interactive scenarios in primary schools in underdeveloped areas needs to be solved, and the introduction of AI technology can provide students with a real, vivid, and specific language learning environment [7]. AI technology can introduce games, questions, answers, and other interactive links into the original boring English class, use interactive mechanisms to encourage students to communicate in English and cooperate in groups, provide students with a sense of English learning, and cultivate students' interest and habits in learning English.

Introducing AI technology into underdeveloped areas is an inevitable requirement for promoting educational equity and modernization. The intellectualization and informatization of education is the only way to promote the sharing of high-quality resources, and it is also an effective means to make up for the shortage of educational resources in underdeveloped areas.

4. Suggestions

4.1. Strengthen Infrastructure Construction and Technology Introduction in Underdeveloped Areas

The first step to realizing the wisdom, informatization, and digitalization of primary English teaching in underdeveloped areas is to comprehensively promote the development and construction of infrastructure. Perfect laws, regulations, and policy system support is the premise that this emerging technology can be effectively and timely applied. Therefore, the local government should change the traditional management concept and education concept, look at the problem from the perspective of development, and solve the problem from the perspective of students' growth cognitive

law and their own development needs. At the same time, the government should increase the investment in primary school English education, strengthen the construction of school hardware facilities, introduce various professional databases and digital teaching equipment, and effectively improve the teaching environment and teaching conditions.

Underdeveloped areas need to strengthen contact with the outside world to learn relevant teaching experience, for example, schools can regularly assign teachers to go out to study, promote talent exchange and exchange, and introduce intelligent technology and advanced experience promptly. Second, strengthen the supervision of the use of smart technology to avoid the ethical risks of technology. Relevant departments should timely formulate institutional regulations on the limits of the use of AI technology in the classroom, restrict the educational practices of AI technology from the legal and moral levels, and ensure the effectiveness and scientific nature of AI technology to enable primary school English education in underdeveloped areas.

4.2. Strengthen the Digital Literacy and Media Awareness of Existing Teacher Teams in Underdeveloped Areas

The application of AI technology in primary school English teaching in underdeveloped areas cannot be separated from the cooperative operation of intelligent professionals and high-quality teachers. English teachers in underdeveloped areas generally have problems such as low professional knowledge and information literacy, weak awareness of innovation, transformation, and media, and poor cognition and acceptance of information platforms. Therefore, changing the inherent bias of teachers towards information-based teaching and improving their digital literacy is an important way to promote education reform in underdeveloped areas.

Underdeveloped areas should strengthen the training of primary school English teachers, encourage primary schools to diversify the content and forms of teacher training, and train high-quality teachers who can adapt to the requirements of education modernization. In terms of training content, schools should not only continuously improve the professional level and teaching ability of English teachers under the guidance of primary school English curriculum standards, but also cultivate teachers to form an open, inclusive, and innovative educational concept. Schools in underdeveloped areas should regularly train all English teachers on the knowledge and application of intelligent technology, from theory to practice, from concept to habit, and gradually improve teachers' digital media literacy. In the form of training, due to the time and space constraints in underdeveloped areas, multi-frequency large-scale offline training is not realistic. Therefore, in teacher training, schools can make use of the inherent advantages of information-based teaching to carry out online training or recorded training courses. Underdeveloped areas can establish friendly and cooperative relations with schools in developed areas, and regularly invite high-quality teachers from the other schools to record lesson videos or online special Q&A sharing meetings to enrich the training content and mobilize the enthusiasm of teachers in the school to actively explore and learn.

4.3. Construct the "Double Teacher" English Classroom Teaching Mode of "AI+ Teachers"

Education is always a human-centered education activity, no matter whether students as the main body of teaching or teachers play a leading role, the role of "human" cannot be ignored in the teaching process. Even though AI technology has advantages such as high efficiency and high precision compared with traditional teacher teaching, artificial intelligence, as a scientific and technological product without human sensibility and values, cannot replace teachers as the leaders to guide students to shape themselves. At the same time, children in the primary school stage are in an important period of exploring self-worth and forming social concepts and are vulnerable to the intervention of the external environment, which is indispensable to the emotional experience and value guidance from the people around them. Therefore, in the process of introducing AI technology into primary school English classrooms, efficiency should not be ignored, and the rationality of human value should be combined with the rationality of technical tools to realize the modernization of educational governance with emotional value.

In practical teaching, primary schools in underdeveloped areas can try the innovative teaching model of "double teachers" [9]. For example, in the teaching session, after teaching theoretical knowledge to students, English teachers can use interactive scenarios built by AI technology to communicate with students. According to the personalized language assessment reports generated by different students, AI technology timely follows up on the learning status of students and makes plans for their next English learning. After class, the AI system can also assist teachers in teaching management, such as homework sending and correcting, class attendance recording, lesson preparation and class reminder, etc., to improve teachers' teaching and office efficiency, so that they have more time to improve their self-knowledge level and teaching methods. The implementation of this model can not only give full play to the advantages of teachers and artificial intelligence, but also clarify the boundaries of technological governance, and lay a good foundation for the realization of a beautiful picture of human-computer symbiosis and common development.

4.4. Build a Course Feedback Platform Based on AI Technology

In traditional teaching, a common problem is that teachers' "tracking degree" of students' learning is not enough, that is, facing a class of dozens of students, it is difficult for teachers to pay attention to each student's course progress, knowledge shortcomings, and learning plans. Therefore, "all-in" teaching has become a common disease of English teaching in most underdeveloped areas. At the same time, because the parents of students in most underdeveloped areas are migrant workers all year round, the elderly in the family can hardly pay attention to their children's English learning due to the limitations of knowledge, culture, level, and physical condition, and the lack of communication between English teachers and student's parents, the original home-school cooperation is difficult to maintain because only the teacher. However, due to the reasons of their native families, some students have little communication with teachers, and teachers are unable to conduct targeted teaching according to student's needs, which undoubtedly becomes a realistic factor hindering the improvement of students' English level in underdeveloped areas.

Building a curriculum feedback platform based on AI technology can not only assist teachers in obtaining real-time interactive results and evaluation reports of each student promptly, but also share students' learning situations and performance analysis with parents on the platform, and formulate the next English learning plan for different students according to their individual needs. At the same time, parents and students can also put forward their suggestions through the digital platform, and evaluate and monitor the teaching work of teachers [10]. This intelligent classroom feedback platform is also linked with the teaching ability supervision and evaluation system of teachers, and the school educational administration can supervise the teachers' lesson preparation and teaching progress from the platform, and carry out periodic assessments, truly realizing the full coverage of AI technology in the training, teaching, assessment and feedback process.

5. Conclusion

This study finds that primary school English is an important part of basic English education, which is not only a key stage to improving personal English ability but also a key step to promoting cross-cultural communication and cultivating students' international vision. For underdeveloped areas, strengthening primary school English education can achieve cross-regional ethnic cultural communication through the integration of cultural languages. It is of great significance to regional economic and social development.

From the perspective of students' cognitive development, children in this age group are at the stage of strongest language learning ability. Therefore, in English teaching, an interest-oriented language learning environment and specific and intuitive language interaction scenarios should be created to cultivate students' good English learning habits. However, due to the unbalanced development between regions and the uneven distribution of educational resources, the English teaching level in underdeveloped areas cannot meet the requirements of primary school English teaching. Therefore,

this paper proposes to accelerate the digital transformation of primary school English classrooms in underdeveloped areas, introduce a digital English teaching platform supported by AI technology, realize the "dual teacher" teaching mode combining "AI+ offline teachers", and improve the digital literacy and media awareness of teachers. At the same time, the government and relevant departments should comprehensively promote the development and construction of infrastructure, and introduce relevant regulations and documents to strengthen the supervision and standardization of the use of AI technology.

This paper's research and analysis on the construction of digital English classrooms in primary schools in underdeveloped areas can improve the knowledge framework of the operation mode and feedback mechanism of digital English classrooms in underdeveloped areas in the existing literature to a certain extent. At the same time, by clearly understanding the mechanism, goal, and improvement direction of AI technology, it can provide a certain theoretical basis for solving the problems of uneven distribution of high-quality English education resources in underdeveloped areas and difficult-to-carry out in-depth English teaching.

References

- [1] Xue E Y, Liu M, Li J. The history, characteristics, and trends of policy changes in China's educational equity development. *Educational Research*, 2019, 40 (05): 142 - 150.
- [2] Li D, Li L. English classroom teaching practice based on the psychological characteristics of primary school students. *Journal of Foreign Languages College of Shandong Normal University (Basic English Education)*, 2012, 14 (03): 59 - 62.
- [3] Liu D Y. Characteristics of primary English teaching and challenges facing primary English classes. *Educational Practice and Research*, 2001, (07): 36 - 38.
- [4] Li R Q. Characteristics and important principles of English teaching in primary schools. *Educational Practice and Research*, 2002, (11): 44 - 45.
- [5] Wang Q, Hu Y L. Research on English subject competence and its performance. *Journal of Education*, 2017, 13 (02): 61 - 70.
- [6] Guangming.com. Report on the development of rural education in China 2020-2022 Released: Many indicators of rural education make significant progress, 2022. Retrieved from <https://m.gmw.cn/baijia/2022-12/26/36256096.html>.
- [7] Xue Y Y. Survey and analysis of the current situation of rural English teachers' professional development under the background of "Internet+". *Journal of Higher Education*, 2018, (03): 63 - 65.
- [8] Zou B, Wang M J. Artificial Intelligence technology and English language teaching: Current status and prospects. *Foreign Languages*, 2021, 37 (03): 124 - 130.
- [9] Yunhan L. Research on English education and strategy analysis of rural elementary schools in China. *International Journal of New Developments in Education*, 2023, 5 (1).
- [10] Zhang L, Cui X Z. Intelligent tutoring system and English teaching: Current situation and prospect-- Taking 'answer' Artificial Intelligence teaching aid system as an example. *Overseas English*, 2022, (02): 96 - 97.