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The Pathways, Effects, and Reflections of Artificial Intelligence Empowering the Implementation of Core Competencies in Primary School Chinese

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Abstract: This paper explores the pathways, effects, and reflections of artificial intelligence (AI) technology empowering the teaching of core competencies in primary school Chinese. Based on an overview of AI technology and an analysis of the current status of Chinese teaching, this study investigates specific empowering pathways such as resource integration and sharing, and personalized learning programs. Through evaluating the improvement of students' competencies and feedback on teaching effects, it is found that AI has a significant impact on enhancing students' core competencies in the Chinese subject. This paper summarizes the main conclusions of AI empowering primary school Chinese teaching, and puts forward reflections and suggestions for future applications, so as to provide a reference for educational practice.

Keywords: Artificial intelligence; Primary school Chinese; Core competencies; Teaching effects; Personalized learning

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1. Introduction

Against the backdrop of current educational reforms, the integration of artificial intelligence (AI) with the core competencies of primary school Chinese has become an important topic in the field of education. Core competencies emphasize the all-round development of students in terms of knowledge, abilities, emotional attitudes, and other aspects, and the application of AI provides a new pathway to achieve this goal. AI technology offers diversified optimization approaches in Chinese teaching, but its effective implementation still requires sound policy guidance, teacher training, and facility allocation. Only by attaching importance to these key elements can the role of AI technology in improving Chinese core competencies be maximized, and the fairness and all-round development of education can be truly realized.

2. Current status of primary school Chinese teaching

Primary school Chinese teaching is currently facing multiple challenges, mainly reflected in the application of teaching methods and teaching resources. With the advancement of curriculum reforms, traditional teaching models have struggled to meet the learning needs of students in the new era. The singleness of textbook content and the monotony of teaching methods have led to students lacking interest and initiative in the learning process. Survey data shows that approximately 58% of teachers still tend to adopt lecture-based teaching methods, which correlates with insufficient student participation and low learning efficiency [1].

2.1. The unbalanced distribution of teaching resources is also a key aspect of the current situation

Some cities and schools have gained access to high-quality teaching aids and resources through internet technology. However, in remote areas, there remains a serious shortage of teachers and teaching equipment. In some schools, the number of Chinese teachers is even inadequate, with a teacher-student ratio reaching 1:40, which greatly affects learning outcomes. In addition, the lack of systematic training and professional development opportunities has hindered primary and secondary school teachers in understanding and applying emerging educational technologies. In the survey, 90% of teachers expressed a desire to receive professional training on the application of information technology in classrooms.

2.2. The cultivation of core Chinese competencies urgently needs further strengthening

According to information released by the Ministry of Education in 2021, the core competencies of Chinese teaching include language ability, thinking quality, cultural awareness, and learning ability. At present, many teachers still focus on knowledge transmission in curriculum design, neglecting the achievement of competency-oriented goals, which restricts the substantive improvement of students' Chinese learning. Analysis shows that in schools implementing competency-oriented teaching methods, students' learning interest and language expression abilities are generally higher than those in educational environments that have not undergone such transformations.

2.3. The implementation effects of modern information technology applications are uneven

Some educators have actively adopted online classrooms, online assessments, and independent learning platforms, which have enhanced students' autonomous learning abilities—particularly achieving significant improvements in fostering reading comprehension and writing skills. Survey data indicate that among classes using artificial intelligence-assisted teaching, 80% of students achieved a score increase of more than 10% in comprehensive Chinese assessments. However, a considerable number of teachers still lack understanding of and support for AI application technologies, resulting in poor classroom teaching effects [2,3].

2.4. The evaluation system of primary school Chinese teaching is incomplete

In terms of the evaluation system, traditional exam scores still occupy a dominant position, making it difficult to fully reflect students' Chinese competencies. Only 35% of schools have begun to implement competency-oriented comprehensive evaluation mechanisms, adopting diversified assessment methods such as student self-assessment and peer assessment to ensure that students' attitudes, abilities, and performances are fully considered. There are still many result-oriented evaluation methods, which fail to effectively guide students in developing good Chinese competencies in practical application.

3. Pathways for artificial intelligence to empower the implementation of core competencies in primary school Chinese

3.1. Resource integration and sharing

Resource integration and sharing lay a critical foundation for AI empowerment in primary school Chinese teaching. By constructing diversified resource libraries and integrating educational resources both inside and outside the school, teachers can access richer teaching content and tools. Specific measures include establishing regional or national sharing platforms that aggregate high-quality courseware, reading materials, audio and video resources, and form a knowledge system framework. The platform should support teachers to upload and download teaching designs and practical cases to facilitate experience exchange and reflection. Introducing intelligent classroom management systems into teaching allows for tracking students' learning progress and collecting learning data through intelligent means. Teachers can understand students' learning status based on specific data and teach students in accordance with their aptitude. During the teaching process, virtual learning groups can be set up to enable students to access diverse cultures and perspectives across schools and regions, enhancing the interactivity and depth of their learning. This cross-regional resource integration not only provides diverse cultural perspectives but also helps improve students' comprehensive competencies. In the implementation process, schools need to guide teachers and students to rationally use AI tools, enhance their awareness of resource integration and sharing, and form a virtuous cycle of resource sharing. In selecting pathways, both technical feasibility and the characteristics and needs of actual application scenarios should be considered to achieve true resource integration and sharing and promote the improvement of students' core competencies [4,5].

3.2. Designing personalized learning programs

Personalized learning programs leverage AI technology to provide customized learning experiences that meet the diverse needs of individual students. Based on students' learning history, interests, abilities, and learning styles, personalized learning paths are constructed. Through data analysis, the system can identify students' strengths and weaknesses in Chinese learning, thereby adjusting teaching content and progress. The implementation steps of personalized learning include: data collection, learning analysis, goal setting, and content recommendation. In the data collection phase, students' homework completion, exam scores, learning duration, and participation are collected through learning management systems. This phase requires ensuring the accuracy and comprehensiveness of data to effectively support subsequent analysis [6].

In the learning analysis phase, machine learning algorithms—specifically cluster analysis and regression analysis—are used to analyze data and identify students' learning patterns and preferences. For example, K-means clustering can be used to divide students into different groups, and targeted learning strategies can be formulated for each group. For instance, students with strong self-directed learning abilities can be provided with optional reading materials, while those requiring more guidance can be given detailed learning steps and resources.

Goal setting is a key link in personalized learning programs. Based on the results of previous analysis, SMART (Specific, Measurable, Achievable, Relevant, Time-bound) goals are set. For example, for students with weak reading comprehension abilities, a clear goal of completing at least five reading comprehension exercises suitable for their level within one month can be established.

In addition, personalized learning programs can incorporate real-time feedback mechanisms. Data visualization technology is used to provide students with real-time feedback on their learning progress and goal achievement, helping them adjust their learning strategies. For example, displaying students' learning progress

through charts can stimulate their self-regulation abilities and promote active learning.

When evaluating the effectiveness of personalized learning, a diversified evaluation method combining quantitative and qualitative approaches should be adopted. The learning effect can be verified through data analysis of exam score improvements using the pre-test and post-test comparison method. Furthermore, student satisfaction surveys can be conducted to obtain feedback on learning experiences and improve the program [7].

Personalized learning programs also require attention to the transformation of teachers' roles. Teachers should shift from knowledge disseminators to learning guides and mentors, actively using AI technology to obtain feedback on students' learning and adjust teaching strategies. Through a blended teaching model that combines online resources and offline guidance, the flexibility and pertinence of teaching can be improved.

To ensure the effective implementation of personalized learning programs, it is necessary to strengthen technical support and training. Teachers need to be proficient in the operation of various AI tools, and students should adapt to changes brought by technology to better participate in personalized learning. Regular technical updates and maintenance are required to ensure the stability of learning platforms and avoid negative impacts on learning outcomes due to technical issues.

Ultimately, personalized learning programs aim to promote the improvement of each student's comprehensive language competencies. Through refined teaching design, educational equity and the maximum development of individual potential can be achieved [8].

4. Effect evaluation of artificial intelligence empowering core competencies in primary school Chinese

4.1. Improvement of students' competencies

Against the backdrop of AI technology application, the strategies for enhancing core competencies in primary school Chinese teaching have achieved initial results. The model combining intelligent learning platforms with traditional teaching can significantly improve students' language expression abilities and reading comprehension levels. In the specific implementation process, adaptive learning systems are used to push personalized learning resources according to students' learning foundations and progress, thereby improving learning efficiency. By analyzing students' homework feedback and test results, the system adjusts learning content in real time to ensure that students learn within a difficulty range suitable for them, enhancing their participation and self-confidence.

In classroom practice, intelligent speech recognition technology is utilized for oral training, helping students correct pronunciation and intonation through real-time feedback. In a one-semester experiment, the average score of participating students' oral expression ability evaluation increased by 15%. This real-time interactive learning method not only promotes students' active learning but also improves their language application abilities [9].

In addition, text analysis-based tools enable teachers to better grasp students' reading comprehension status. Through keyword extraction and thematic analysis, teachers can identify the difficulties and misunderstandings students encounter in the reading process and provide targeted guidance. Data shows that after using this technology, students' reading comprehension abilities increased by an average of 20%. This data-driven teaching reflection and adjustment have optimized classroom teaching strategies and improved overall teaching effects.

In the comprehensive evaluation of students' competencies, clear evaluation criteria have been established, covering multiple dimensions such as language expression, reading comprehension, and critical thinking ability.

By setting quantitative indicators, teachers can more clearly assess the improvement of students' competencies. In specific cases, the intervention of AI has effectively promoted the development of students' comprehensive competencies [10].

However, challenges have also been identified in practical applications. For example, some parents hold a cautious attitude towards the effectiveness of AI teaching tools, worrying that technology may replace teacher-student interaction in the traditional educational process. Therefore, while implementing intelligent teaching, teachers need to attach importance to communication with parents, enhance educational transparency, and gain parents' understanding and cooperation [11].

Teachers' professional development is equally indispensable. In the early stage of technology application, some teachers felt unfamiliar with the use of AI tools. To this end, regular teacher training is carried out to ensure that teachers can proficiently master relevant technologies and flexibly apply them in teaching. For instance, seminars and online training courses are organized to enable teachers to actively absorb new teaching concepts while using tools, so as to achieve their own knowledge update and skill improvement.

4.2. Feedback on teaching effects

In the process of integrating AI technology into primary school Chinese teaching, feedback on teaching effects presents multi-dimensional characteristics. From the perspective of student development, the personalized learning paths of intelligent platforms have effectively stimulated learning initiative, and students have shown stronger awareness of classroom participation and confidence in language expression. By accurately pushing content suitable for students' cognitive levels, adaptive learning systems enable students at different levels to gain growth experiences, with particularly significant effects in enhancing the depth of reading comprehension and the flexibility of language application [12]. Teachers' roles have also undergone a positive transformation, gradually shifting from traditional knowledge disseminators to learning guides and data analysts. The learning situation diagnosis reports provided by intelligent tools help teachers accurately identify each student's knowledge blind spots, thereby achieving precise intervention and hierarchical guidance. As a result, classroom teaching strategies have become more targeted and effective. However, several issues requiring attention have emerged in practice: some students over-rely on system prompts, weakening their independent thinking abilities; individual teachers still remain at the superficial application of technology and lack innovative teaching design for in-depth integration. Parents' recognition of the effectiveness of intelligent teaching varies—they affirm its role in promoting children's learning interest while worrying that it may affect the cultivation of traditional Chinese competencies. These feedbacks indicate that although AI empowerment in Chinese teaching has achieved remarkable results in improving teaching efficiency and optimizing learning experiences, achieving sustainable development still requires balancing technological application with humanistic care, promoting the upgrading of teachers' professional abilities, strengthening the construction of home-school consensus, and building a new human-machine collaborative educational ecology [13–15].

5. Conclusion

In the exploration of the in-depth integration of artificial intelligence and core competencies in primary school Chinese, we have witnessed the innovative power of technology brought to traditional education. Through resource integration and the design of personalized learning paths, AI has effectively improved students' language abilities, thinking qualities, and cultural literacy, while promoting teachers' professional growth and

role transformation. However, practice has also revealed practical challenges such as technology dependence, home-school consensus gaps, and teachers' digital literacy. Looking forward, we should adhere to the principle of "technology empowerment, education-oriented." While advancing the iteration of intelligent technology, we should pay more attention to the humanistic core and individual care in education. By improving training mechanisms, optimizing evaluation systems, and strengthening home-school collaboration, we will build a new ecology where technology and education coexist harmoniously, and ultimately realize the comprehensive and personalized development of every student.

Disclosure statement

The author declares no conflict of interest.

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