Research on Classroom Teaching Innovation Promoted by Artificial Intelligence from the Perspective of High-Quality Development

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Abstract: This paper delves into how artificial intelligence technology facilitates innovative classroom teaching in diverse educational contexts, emphasizing the perspective of high-quality development. Through in-depth research and comparative analysis of teaching practices across different countries, disciplines, and grade levels, the study aims to discover suitable artificial intelligence education models for various educational backgrounds. It provides theoretical and practical support for constructing a more intelligent and personalized education system. The paper aims to offer valuable insights and experiences for education reforms and innovations nationwide, propelling education towards a more intelligent, efficient, and equitable direction.

1. Introduction

Rapid social development and continuous technological advancement present unprecedented challenges and opportunities in the field of education. Providing high-quality education is not only the responsibility of governments worldwide but also a pivotal driving force for societal development. In this context, the education sector urgently needs to explore innovative methods to meet the evolving learning needs and societal demands. Traditional classroom teaching methods are becoming increasingly outdated in the face of diverse student requirements and a constantly changing knowledge landscape [1]. With the rapid development of artificial intelligence technology, the education sector has begun to explore how to enhance teaching quality and meet personalized learning needs through the use of artificial intelligence. Artificial intelligence not only helps teachers better understand students' learning patterns but also provides personalized teaching solutions, offering students a more precise and efficient learning experience. However, despite the enormous potential of artificial intelligence in the education sector, the rational and efficient application of artificial intelligence technology in teaching, as well as ensuring the safety and reliability of these technologies, remain pressing issues [2]. Moreover, the differences in educational systems, cultural backgrounds, and student needs in different countries and regions underscore the importance of research and practical application of artificial intelligence education

models tailored to diverse backgrounds.

High-quality development is a comprehensive and multidimensional concept, extending beyond mere economic growth to encompass various fields such as social, cultural, environmental, and education. In the realm of education, high-quality development signifies providing education services of a higher level and quality, tailored to meet the diverse needs of students, fostering individuals with enhanced innovative and competitive abilities. Exploring how artificial intelligence promotes innovative classroom teaching not only enables the personalized, equitable, and high-quality development of education but also enhances the overall educational experience for students. It contributes to cultivating a greater number of highly skilled individuals for society, propelling the entire community towards higher developmental goals [3].

2. Application of Artificial Intelligence Technology in Education

The application of artificial intelligence technology in education is diverse and extensive, not only transforming traditional teaching methods but also providing more personalized and intelligent learning experiences. For instance, artificial intelligence can analyze students' learning data and behaviors to customize individualized learning plans, enabling personalized education. This tailored teaching approach better meets students' learning needs, helping them learn at their own pace. Artificial intelligence can also provide intelligent teaching aids, such as intelligent tutorials and online Q&A systems. These tools offer real-time problem-solving and learning advice based on students' learning situations and needs, aiding students in better understanding concepts. Adaptive learning systems can be designed to dynamically adjust teaching content and difficulty based on students' performance. When students master a particular topic, the system automatically recommends more advanced learning materials, maintaining the learning challenge and enhancing effectiveness. Artificial intelligence technology can create virtual teachers and mentors who engage in interactive dialogues with students, answer questions, explain concepts, and even provide emotional support. This method enhances the interactivity and fun of learning [4]. With the assistance of artificial intelligence, personalized teaching content, including textbooks, exercises, and quizzes, can be generated. These materials can be customized based on students' learning levels and needs, making teaching more targeted.

Through artificial intelligence, extensive learning data can be analyzed to identify patterns and trends in students' learning, understand their needs, improve teaching methods, and enhance teaching quality. Additionally, artificial intelligence enables gamified learning, speech recognition, natural language processing, and more. Through these various applications, artificial intelligence technology has brought significant innovation to education, making teaching more intelligent and personalized, thereby improving students' learning outcomes and teachers' teaching quality [5].

3. Empirical Research Design and Methods

In order to delve deeper into the effectiveness of the classroom teaching innovation model based on artificial intelligence within the framework of high-quality development, we conducted an empirical study. This study aimed to collect and analyze educational data to validate the impact of artificial intelligence technology on improving teaching quality and personalized education [6].

3.1 Research Design-Variable Definition and Research Model

This survey employed a longitudinal research design, tracking students' academic performance and learning experiences after the introduction of artificial intelligence teaching tools. The study used the application of artificial intelligence technology as the independent variable, and academic

performance, learning interest, and participation level as the dependent variables [7]. (Using a five-point rating scale assessment, all variables had a positive effect; that is, the higher the score, the more significant the effect) [8-9]

First, Personalized education is a key feature of artificial intelligence technology. By analyzing students' learning characteristics and needs, AI can provide personalized learning paths, resources, and support, enhancing the relevance of learning experiences. This personalized approach helps meet students' academic needs, ultimately improving their academic performance. Therefore, Here we Hypothesis:

H1: Artificial intelligence applications (AIA) enhance students' academic performance (XXCJ).

Second, AI technology offers diverse educational resources and interactive learning experiences. Through personalized learning content and interactive tools, students are more likely to engage in classroom discussions, increasing their interest and motivation to learn. Additionally, personalized education encourages students to participate more actively in self-directed learning, promoting their autonomy in learning behaviors and fostering independent learning skills. So, we propose a second hypothesis:

H2-3: Artificial intelligence applications increase student engagement (XSCYD) and autonomy in learning behaviors (XXXWZDX).

Third, AI technology offers flexible study schedules and timetables. Students can choose suitable study periods and content based on their own time and learning needs. Personalized learning experiences and enriched learning resources encourage students to invest more time in learning. Consequently, the flexibility provided by AI promotes longer study durations, facilitating better knowledge acquisition and skill development.

H4: Artificial intelligence applications increase study duration (XXSC).

Personalized learning experiences facilitated by artificial intelligence technology cater to individual students' learning styles and preferences. By tailoring educational content and methods, AI promotes a sense of accomplishment among students. When students feel that their learning experiences are customized to their needs and abilities, it enhances their confidence and motivation, leading to an increased sense of achievement.

H5: Artificial intelligence applications enhance students' sense of achievement (XXCJG).

AI technology provides teaching assistants that help teachers understand students' learning progress, difficulties, and needs more accurately. Through intelligent analysis and feedback, teachers can assess students' academic performance more precisely, offering personalized guidance and support. This personalized assessment contributes to a more accurate understanding of students' actual proficiency levels, enabling tailored teaching approaches.

H6: Artificial intelligence applications enhance the accuracy of teacher Evaluation (JSPG).
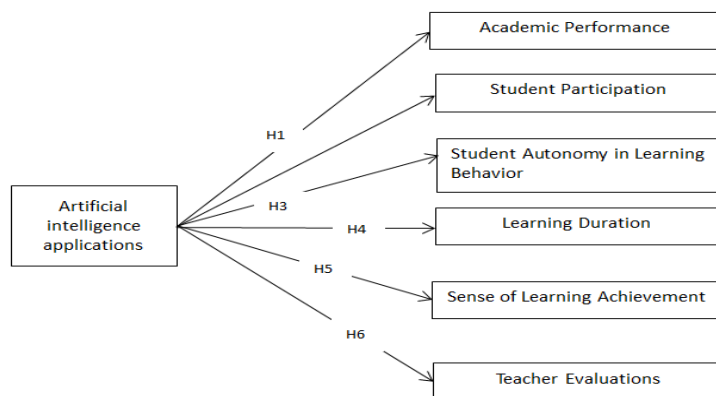

Figure 1: Reasearch model

The selection of these variables allows for a comprehensive evaluation of the application effectiveness of artificial intelligence technology from various perspectives, including students, teachers, and curriculum. This, in turn, provides a scientific basis for educational innovation. Therefore, we establish the following research model is shown in Figure 1.

3.2 Data Analysis

(1) Descriptive Statistical Analysis: Used to understand students' academic levels and learning behavior characteristics [10]

Table 1. Descriptive Statistics

Variables	N	Min	Max	Avg.	Standard Error	Standard Deviation	Skewness
Academic Performance	606	2	5	3.67	.041	1.011	-.123
Student Participation	606	1	5	3.66	.042	1.030	-.180
Autonomy in Learning Behavior	606	2	5	3.64	.041	1.018	-.106
Study Duration	606	2	5	3.68	.038	.936	-.056
Sense of Learning Achievement	606	2	5	3.64	.037	.901	-.053
Teacher Evaluation	606	2	5	3.69	.038	.939	-.131
Artificial Intelligence Application	606	1	5	3.71	.039	.957	-.194
Effective Case Count	606						

Looking at the data in Table 1, variables such as academic performance, student participation, autonomy in learning behavior, teacher evaluation, and the application of artificial intelligence show relatively large standard deviations. This indicates significant variations among students in these aspects, suggesting potential challenges and opportunities. The standard deviation of study duration is relatively small, suggesting that students have similar study durations, possibly due to certain regulations controlling study hours. The skewness of all variables is close to 0, indicating relatively symmetric data distributions, aligning with the characteristics of a normal distribution. This symmetry facilitates subsequent statistical analysis and modeling.

In summary, within the framework of high-quality development, considering the adoption of artificial intelligence technology to promote students' academic performance, enhance student participation, autonomy in learning behavior, and the sense of learning achievement through personalized teaching approaches and intelligent assessment systems is advisable. Attention should also be given to teacher evaluations. Rational application of artificial intelligence technology can better cater to students' needs, drive classroom teaching innovation, and achieve high-quality education.

(2) Significance Testing and Analysis of Variance:

Significance testing will be employed to analyze the impact of artificial intelligence applications on students' sense of learning achievement, study duration, proactive learning behavior, academic performance, student participation, and teacher evaluations. This analysis aims to determine the extent to which artificial intelligence teaching tools significantly influence academic performance and other factors [11-12].

From Table 2, we observe that the T-statistics for all associations between artificial intelligence applications and various factors are extremely high (greater than 10), with corresponding p-values of 0.000. This implies that these correlations are highly significant statistically. In other words, the

relationships between artificial intelligence applications and the sense of learning achievement, study duration, proactive learning behavior, academic performance, student participation, and teacher evaluations are highly significant. Under artificial intelligence applications, the differences between sample means and original samples are relatively small (less than 0.05). This indicates that the sample means effectively reflect the characteristics of the original samples. This enhances our confidence in the research findings. It further proves that artificial intelligence applications play a crucial role in influencing the sense of learning achievement, study duration, proactive learning behavior, academic performance, student participation, and teacher evaluations. Therefore, in educational practices, delving deeper and maximizing the utilization of artificial intelligence technology will facilitate driving innovation in classroom teaching and enhancing educational quality.

Table 2: Significance Analysis

Artificial Intelligence Application	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
->Academic Performance	0.348	0.033	10.395	0.000
->Student Participation	0.378	0.033	11.506	0.000
->Autonomy in Learning Behavior	0.366	0.033	10.973	0.000
->Study Duration	0.371	0.033	11.022	0.000
->Sense of Learning Achievement	0.346	0.034	10.175	0.000
->Teacher Evaluation	0.348	0.033	10.395	0.000

Table 3: Correlation Analysis

		XXCJ	XSCYD	XXXWZDX	XXSC	XXCJG	JSPG	AIA
XXCJ	Pearson Correlation	1	0.325	0.364	0.796	0.428	0.36	0.331
	Bayes Factor		0	0	0	0	0	0
XSCYD	Pearson Correlation	0.325	1	0.337	0.499	0.356	0.364	0.324
	Bayes Factor	0		0	0	0	0	0
XXXWZDX	Pearson Correlation	0.364	0.337	1	0.428	0.724	0.323	0.323
	Bayes Factor	0	0		0	0	0	0
XXSC	Pearson Correlation	0.796	0.499	0.428	1	0.469	0.417	0.383
	Bayes Factor	0	0	0		0	0	0
XXCJG	Pearson Correlation	0.428	0.356	0.724	0.469	1	0.548	0.337
	Bayes Factor	0	0	0	0		0	0
JSPG	Pearson Correlation	0.36	0.364	0.323	0.417	0.548	1	0.352
	Bayes Factor	0	0	0	0	0		0
AIA	Pearson Correlation	0.331	0.324	0.323	0.383	0.337	0.352	1
	Bayes Factor	0	0	0	0	0	0	
	N	606	606	606	606	606	606	606

(3)Correlation Analysis

Correlation analysis is a statistical method used to evaluate the strength and direction of the relationship between two or more variables.

Bayes Factor is utilized to gauge the relative support for the null hypothesis against the alternative hypothesis. Smaller values indicate stronger support for the alternative hypothesis. From the provided data, all Bayes Factors are 0, suggesting a high level of support for the alternative hypothesis (indicating a correlation between variables). This indicates that the observed correlations are not due to randomness.

Looking at the data in Table 3, academic performance is strongly positively correlated with the overall school level. This implies that the overall teaching quality and environment of the school have a positive impact on academic performance. The correlation between artificial intelligence applications and other factors is relatively low. It is possible that, within this dataset, the role of artificial intelligence applications in classroom innovation is comparatively small, indicating that current AI technology might not be fully utilized in education. Regardless, these results provide valuable guidance for high-quality development. For instance, schools could further strengthen the correlation between academic performance and the overall school level. Simultaneously, exploring ways to integrate artificial intelligence technology more effectively could enhance classroom innovation and improve educational quality.

(4) Reliability and Validity Analysis:

Cronbach's alpha, composite reliability and average variance extracted (AVE) for different variables are employed to assess the reliability and validity of measurement tools (such as questionnaires), ensuring the reliability and effectiveness of the collected data (Table 4). In the context of "Promoting Classroom Teaching Innovation through Artificial Intelligence under the Perspective of High-Quality Development," these data assist us in understanding the reliability and validity of the measurement tools used, providing valuable guidance for the improvement and innovation of classroom teaching.

Table 4: Analysis of Reliability and Validity

Variables	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
XXCJG	0.839	0.840	0.892	0.674
XXSC	0.867	0.872	0.903	0.651
XXXWZDX	0.625	0.618	0.800	0.573
XXCJ	0.867	0.869	0.910	0.715
XSCYD	0.864	0.866	0.908	0.711
JSPG	0.822	0.823	0.894	0.737
XXCJG	0.867	0.872	0.903	0.651

(5)Heterotrait-Monotrait Ratio

From the data in Table 5, all HTMT ratios between variables are less than 1, indicating good discriminant validity. This means that the measurement tools can accurately distinguish between concepts, aligning with the expected real-world distinctions. Moreover, the HTMT values between different variables range from 0.399 to 1.154, with most values being relatively low. This suggests that these variables are relatively independent and do not exhibit strong collinearity. This independence is crucial for analyzing their individual impacts on teaching innovation.

Table 5: Heterotrait-Monotrait Ratio, TMT

Variables	AIA	XXCJG	XXSC	XXXWZDX	XXCJ	XSCYD
AIA						
XXCJG	0.399					
XXSC	0.511	0.803				
XXXWZDX	0.426	0.400	1.068			
XXCJ	0.431	0.453	0.619	0.477		
XSCYD	0.414	0.452	0.576	0.442	0.456	
JSPG	0.399	1.154	0.803	0.400	0.453	0.452

4. Conclusions

In modern education, the integration of artificial intelligence technology presents new opportunities for teaching innovation. Personalized learning experiences, real-time feedback mechanisms, and intelligent teaching aids have transformed education from a singular, static process of knowledge dissemination into a more flexible, interactive, and tailored approach that caters to individual student differences. The analysis above indicates a significant correlation between the application of artificial intelligence and learning outcomes. This implies that educational institutions can utilize AI technology to provide personalized learning experiences, better meeting students' academic needs, thereby enhancing students' sense of academic achievement and performance. The results confirm that AI fosters student engagement and proactive learning behaviors. By introducing interactive and personalized teaching tools, students are more likely to participate in classroom discussions, increasing their interest and enthusiasm for learning and consequently enhancing their proactive learning behaviors. Moreover, during the teaching process, teachers can utilize AI technology to provide personalized teaching plans, enhancing the specificity of instruction and subsequently improving teachers' evaluations of teaching effectiveness.

Overall, the empirical analysis results validate the positive impact of AI-based classroom teaching innovation within the framework of high-quality development. This not only has practical implications for educational practices but also provides a scientific basis for educational decision-making. With technology continually advancing, we anticipate the application of more intelligent educational tools, offering further possibilities for achieving high-quality education. However, while intelligent education holds tremendous potential, it also faces multiple challenges. Addressing these challenges requires collaboration among governments, educational institutions, technology companies, and other stakeholders. Continuous investment and innovation are essential to drive the sustainable development of intelligent education.

Acknowledgement

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