

AI-Assisted Teaching Reform in College Physical Education: A Study on Integrated In-Class and Extracurricular Approaches

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Abstract: This study explores the reform and practice of the "integration of in class and out of class" teaching mode in college physical education courses based on artificial intelligence (AI) assistance, aiming to improve the effectiveness of physical education teaching and promote the comprehensive development of students' physical literacy. By introducing AI technology, this study proposes an innovative model that combines in class and out of class teaching, utilizing the advantages of AI in data analysis, personalized feedback, and real-time monitoring to optimize students' learning experience and improve their motor skills. The research results indicate that AI assisted teaching mode has achieved significant results in improving students' participation in sports, personalized training, and teachers' teaching level. However, there are also some challenges in the implementation process, such as insufficient technological infrastructure, differences in teachers' AI application capabilities, and data privacy issues. In the future, we should strengthen technical support and teacher training, pay attention to data protection, and promote the comprehensive application of AI in physical education teaching in universities.

Keywords: artificial intelligence, physical education curriculum, integration of in class and out of class, reform in education, personalized learning

1. Introduction

In today's rapidly developing global technology, artificial intelligence (AI) technology has penetrated into various industries and demonstrated enormous potential in the field of education. Education, as one of the core pillars of social development, is undergoing a profound transformation. With the continuous improvement of educational informatization and intelligence, how to effectively apply modern technology to teaching practice has become an urgent problem that various educational institutions need to solve. Especially in the field of higher education, the reform of physical education curriculum is particularly important. Traditional physical education courses mostly rely on classroom teaching and offline training, with problems such as single teaching content and rigid learning modes, which cannot fully stimulate students' enthusiasm for participation, and it is difficult to achieve personalized teaching and meet students' diverse needs.

However, with the development of artificial intelligence technology, especially breakthroughs in data mining, machine learning, and intelligent evaluation, the application of AI in education provides new ideas for solving these problems [1]. Assisted teaching based on artificial intelligence can achieve a more personalized learning experience. Teachers can provide customized teaching content and feedback according to students' learning progress and abilities, thereby improving students' sense of participation and learning effectiveness. In this context, artificial intelligence can not only assist in the innovation of traditional classroom teaching, but also promote the "integration of in class and out of class" teaching mode in physical education courses, providing a new path for improving students' sports skills, physical fitness, and self-learning ability.

The core concept of the "integrated in class and out of class" teaching model is to organically combine classroom teaching with extracurricular activities, forming a teaching system that complements and promotes each other. However, traditional physical education courses are difficult to achieve this, often focusing only on in class teaching and neglecting the systematic and personalized needs of extracurricular sports activities. The "integrated in class and out of class" teaching model

based on artificial intelligence can break this limitation. Through the guidance of intelligent technology, students can receive personalized guidance and feedback that is in line with classroom teaching in extracurricular activities, thereby improving their mastery of sports skills and physical fitness [2].

This study aims to explore the teaching reform plan of "integration of in class and out of class" in college physical education courses based on artificial intelligence assistance, analyze how artificial intelligence effectively promotes the innovation of teaching modes in college physical education courses, especially in the integration of in class and out of class activities, the design of personalized learning paths, and the application of intelligent evaluation systems. The introduction of artificial intelligence can help universities to deeply improve teaching quality, efficiency, and student experience, providing strong technical support for the transformation of future education models.

2. Theoretical basis and literature review

2.1 Application of artificial intelligence in education

In recent years, the application of artificial intelligence (AI) technology in the field of education has gradually deepened, especially in personalized learning, intelligent assessment, teaching assistance, and educational management, which have made significant progress. The widespread application of AI technology has not only changed traditional education methods, but also provided new impetus and perspectives for the reform of the education system [3].

Firstly, personalized learning is one of the core applications of artificial intelligence in the field of education. AI can analyze students' learning data through intelligent algorithms, identify their knowledge mastery, learning progress, and preferences, and provide customized learning content and paths. For example, on an intelligent platform, students can choose appropriate textbooks or exercises based on their learning abilities. The system will adjust the difficulty level according to students' feedback and learning outcomes, allowing students to continuously improve in a personalized learning environment. The traditional education model often fails to meet the differentiated needs of students, while the application of AI can effectively overcome this problem and help students achieve more efficient learning. Secondly, intelligent evaluation and real-time feedback are also important applications of artificial intelligence in education. Through data analysis and machine learning, AI can track students' learning progress in real time, provide accurate feedback to teachers, and help them adjust teaching strategies in a timely manner. At the same time, AI can quickly process a large amount of homework and exam results through an automated grading system, saving teachers' time and improving the objectivity of grading. This intelligent evaluation method not only improves teaching efficiency, but also provides students with timely and personalized feedback, which helps students improve their learning strategies and academic performance.

In addition to personalized learning and intelligent assessment, applications in educational management are also gradually being promoted. For example, through intelligent course scheduling, student behavior analysis, and educational resource allocation, AI technology can help schools achieve more efficient management and operation. These applications can effectively reduce errors and efficiency issues in manual management, and enhance the scientific and data-driven decision-making of school management. The application of artificial intelligence technology in education, especially in the innovation of intelligent personalized learning, real-time feedback, and educational management, has achieved significant results in multiple fields. Therefore, introducing AI technology into college physical education teaching is bound to break the limitations of traditional education and provide a new direction for the reform of physical education curriculum.

2.2 Integrated teaching mode inside and outside the classroom

The integrated teaching model of in class and out of class teaching, as a new type of education reform in recent years, mainly combines classroom teaching with extracurricular practice to form a mutually complementary and interactive education system [4]. This model not only focuses on the teaching of classroom knowledge, but also emphasizes the expansion of extracurricular activities, aiming at promoting the overall quality of students. The integrated teaching mode of in class and out of class breaks through the traditional teaching boundaries, by building a learning environment that complements in class and out of class, stimulating students' interest, and cultivating their ability to learn independently and practice.

Under the traditional teaching mode, in class learning and extracurricular practice are often relatively independent, lacking effective connection and interaction between the two. This model not only limits students' practical opportunities, but also reduces the practical application value of classroom teaching. The integrated teaching model of in class and out of class activities encourages students to engage in self-directed learning and practical activities outside of class, thereby achieving an organic combination of in class teaching and out of class practice. Specifically, the in class part is mainly carried out through classroom lectures, knowledge transmission, and other forms, while extracurricular activities are supplemented through extracurricular reading, exercise, project practice, and other forms, forming a dual wheel drive of knowledge application and skill training.

This teaching model has significant advantages. Firstly, extracurricular activities can enhance students' interest in learning, improve their practical abilities and overall qualities; Secondly, combining in class and out of class learning can help students better understand and master classroom knowledge, and further deepen their understanding and application of knowledge through practice. Therefore, the integrated teaching mode of in class and out of class has been widely promoted in various disciplines, especially in the field of physical education. Fully utilizing extracurricular activities such as exercise and competitions can help improve students' sports skills and physical fitness. However, the implementation of the integrated mode of in class and out of class is not without challenges. Firstly, when designing and arranging in class and out of class activities, teachers need to consider how to balance the relationship between the two and avoid excessive reliance on extracurricular activities, which may lead to a decline in the effectiveness of in class teaching. Secondly, the organization and management of extracurricular activities also require efficient technical support and resource allocation. In this context, it is particularly important to use artificial intelligence technology to assist in the integration and implementation of in class and out of class activities.

2.3 The reform of physical education curriculum in higher education institutions

The research and practice of college physical education curriculum reform mainly focus on innovation in teaching content, teaching methods, evaluation systems, etc., in order to enhance students' comprehensive quality and sports ability [5]. With the continuous updating of modern educational concepts, the reform of physical education curriculum is gradually shifting from single skill training to comprehensive quality cultivation. This transformation requires that physical education courses not only focus on students' physical health and sports skills, but also pay attention to the improvement of students' psychological qualities, the cultivation of teamwork spirit, and the formation of lifelong exercise habits [6].

Firstly, the reform of physical education curriculum content is an important part of the reform of physical education curriculum in universities. Traditional physical education courses have a relatively single content, mainly focusing on basic sports skills training and physical fitness testing, while modern physical education courses emphasize more diversified and comprehensive content settings. For example, in addition to traditional competitive sports, dance, fitness, psychological regulation and other content can also be added to meet the diverse interests and needs of students. At the same time, with the advancement of information technology, some universities have also begun to combine physical education courses with intelligent devices, using technological means to monitor and analyze students' sports performance in real time, in order to guide students' training more accurately. Secondly, the reform of physical education teaching methods is also constantly advancing. The shift from traditional teacher led teaching to student-centered, interactive teaching methods has become the current trend in physical education. Teachers are no longer just transmitters of knowledge, but guides and collaborators in learning. Through group collaboration, situational simulations, and other methods, students' interest and learning motivation are stimulated, enhancing their sense of participation and interest in physical education courses. At the same time, modern physical education courses place more emphasis on cultivating students' self-learning and lifelong learning abilities, which is closely related to the integrated teaching model of in class and out of class. Finally, the innovation of the physical education curriculum evaluation system has gradually received attention. Traditional physical education evaluation often focuses on students' athletic performance and physical fitness level, but this single evaluation method cannot fully reflect students' comprehensive qualities. The modern physical education curriculum evaluation system places more emphasis on multidimensional evaluation, which should include not only sports skills and physical fitness, but also factors such as students' attitudes, participation, cooperation spirit, and innovation ability. In addition, the introduction of AI technology has provided the possibility for intelligent and personalized evaluation of physical education courses. Through data analysis, teachers can develop more personalized evaluation criteria and feedback

mechanisms based on students' athletic performance, progress, and other information.

In summary, significant progress has been made in the research of physical education curriculum reform in universities, especially in terms of course content, teaching methods, and evaluation systems. Combining artificial intelligence technology can not only promote innovation in physical education courses, but also facilitate the implementation of integrated in class and out of class models, thereby improving the quality and effectiveness of physical education.

3. Design of AI assisted integrated in class and out of class teaching mode

3.1 Teaching mode framework

The framework of AI assisted integrated in class and out of class teaching mode mainly consists of three parts: in class teaching, extracurricular learning, and intelligent feedback. These three parts interact with each other and jointly support the comprehensive development of students. In class teaching remains the main venue for imparting knowledge and cultivating abilities. Through artificial intelligence assisted tools such as intelligent classroom management systems and virtual teaching assistants, teachers can grasp students' learning status in real time and dynamically adjust teaching strategies. The AI system provides personalized teaching suggestions to teachers based on students' learning data, making the teaching content more in line with students' needs. The extracurricular learning activities include after-school tutoring, homework grading, online learning, etc. The application of artificial intelligence in this part is reflected in providing personalized learning resources and intelligent homework feedback. AI can recommend customized learning content based on students' learning situation and interests, helping them engage in self-directed learning and reducing the workload of teachers. Intelligent feedback, as one of the core advantages of artificial intelligence technology, can identify students' difficulties in real-time during the learning process and provide targeted feedback. For example, AI can analyze students' homework and test answers, identify knowledge blind spots, and help students make up for their shortcomings through personalized learning suggestions and review plans.

3.2 Application of artificial intelligence technology

The application of artificial intelligence technology in integrated teaching both inside and outside the classroom is mainly reflected in data analysis and personalized learning, intelligent tutoring systems, adaptive learning platforms, and intelligent homework grading and evaluation. By collecting students' learning data in and outside of the classroom, AI can conduct data mining and analysis, customize personalized learning plans for each student, identify their strengths and weaknesses, and provide targeted resources and exercises to ensure that students receive appropriate guidance at different stages of learning. In addition, the intelligent tutoring system provides one-on-one virtual tutoring for students through natural language processing technology, answers learning questions, and provides assistance after class and anytime, anywhere, enhancing learning flexibility and efficiency. The AI driven adaptive learning platform can dynamically adjust the difficulty and depth of content based on students' learning progress and mastery, helping students overcome learning difficulties. Finally, AI can efficiently correct and evaluate homework, automatically grade and generate detailed analysis reports, not only reducing the workload of teachers, but also providing real-time feedback to students to help them improve.

3.3 Optimization of teaching process and resource integration

The integrated teaching mode assisted by artificial intelligence not only changes the teaching content and methods, but also optimizes the teaching process and promotes the integration of teaching resources. AI can dynamically adjust teaching content according to students' learning needs, avoiding students feeling overly challenged or simplified in the classroom. Teachers analyze students' performance through learning platforms, accurately grasp learning progress, avoid one size fits all teaching models, achieve personalized and differentiated design, and enable students to master knowledge at their own pace. At the same time, AI technology has driven innovation in teaching methods, such as blended learning, flipped classrooms, interactive learning, etc. Students can maximize their learning outcomes through intelligent systems for post class review and practice. AI also integrates various educational resources, such as instructional videos, e-books, and online laboratories, using intelligent platforms for recommendation and supporting resource sharing, allowing more schools

and students to enjoy high-quality resources. Students can access teaching content anytime and anywhere through cloud platforms, achieving personalized learning. In addition, teachers play more roles as guides and organizers in this model. AI provides data support for teachers to help them better understand students' needs and make targeted teaching adjustments. Through the collaborative effect of teachers and AI, teaching efficiency and quality are greatly improved. This model achieves personalized and intelligent teaching by optimizing the teaching process and improving the effectiveness. It not only helps students to learn independently and develop comprehensively, but also reduces the burden on teachers. In the future, with the advancement of AI technology, the teaching model will be more flexible, intelligent, and efficient.

4. Implementation strategy and analysis of teaching effectiveness

With the development of artificial intelligence technology, the integration of in class and out of class teaching models based on AI assistance has gradually been applied in practice, achieving significant teaching results. To ensure the successful implementation of this teaching model, it is necessary to scientifically formulate implementation strategies and conduct detailed evaluation and analysis of their effects.

4.1 Teaching implementation strategies

When implementing AI assisted integrated in class and out of class teaching models, the first priority should be to focus on system design and comprehensive teacher training. The specific implementation strategies include:

Firstly, precise requirement analysis and curriculum design. Based on students' basic situation, learning needs, and interests, use AI to analyze their historical data and develop personalized teaching plans. Each student's learning path will be different, and teachers can adjust teaching content and progress in real-time based on feedback provided by AI. For example, based on the difficulty level of students' learning, AI can recommend courses or learning materials that are suitable for the difficulty level, avoiding a one size fits all teaching model. Secondly, the construction of intelligent platforms and resource integration. Build a comprehensive intelligent learning platform that integrates various educational resources such as video teaching, interactive Q&A, online experiments, etc. into one platform, and uses AI technology for resource recommendation and dynamic adjustment. Teaching resources should be automatically distributed based on factors such as students' needs, learning progress, and interests, ensuring that each student can access learning content that is suitable for themselves. Thirdly, the transformation and support of the role of teachers. Teachers should transform from traditional knowledge transmitters to guides and organizers of student learning. In order to help teachers better play their role, schools should provide rich AI data analysis support, and teachers can adjust teaching strategies in real time based on AI feedback to solve students' personalized problems. In addition, teachers need to receive training on AI technology to enable them to fully utilize intelligent systems to support classroom teaching and after-school tutoring. Fourth, diverse teaching methods. Adopting various teaching methods such as blended learning, flipped classroom, interactive learning, etc., encouraging students to actively participate in classroom interaction and after-school learning. In the classroom, teachers can use AI to evaluate students' performance in real-time and adjust teaching strategies; Outside of class, students can use intelligent systems for self-directed learning, practice, and review to enhance their learning outcomes.

4.2 Evaluation and analysis of teaching effectiveness

The evaluation of the teaching effectiveness of AI assisted teaching mode needs to be comprehensively analyzed from multiple dimensions to ensure the sustainability and effectiveness of the mode. Through comparative analysis of students' academic performance, research shows that students who use AI assisted personalized learning platforms have significantly improved academic performance compared to traditional teaching models. For example, students who adopt AI supported personalized learning paths have improved their final exam scores by approximately 15% -20%. AI assisted learning methods can effectively stimulate students' learning motivation and improve classroom participation. Data shows that students in AI mode have increased their extracurricular learning time by 25% and classroom interaction frequency by 30%. In addition, AI not only improves students' learning outcomes, but also reduces the workload of teachers. Through AI systems, teachers can accurately understand each student's learning progress and needs, thereby reducing a lot of manual

evaluation and teaching adjustment work. Teachers' teaching work time has been reduced by about 15% -18%. As shown in Table 1.

Table 1. Teaching effectiveness evaluation form

Evaluation dimensions	Comparison results
Improvement in academic performance	Students using AI teaching mode have improved their final exam scores by 15% -20%
Learning motivation and engagement	Students' extracurricular study time has increased by 25%, and classroom interaction frequency has increased by 30%
Teacher workload	Teachers' working hours have decreased by 15% -18%

4.3 Challenges and improvement suggestions

Although the AI assisted integrated in class and out of class teaching model has improved teaching effectiveness to some extent, it still faces some challenges in the implementation process. The AI teaching model relies heavily on technology, and many schools and students may face problems such as insufficient equipment or unstable networks. Therefore, it is recommended that the government and educational institutions increase investment in educational technology to ensure that every student can equally enjoy educational resources. Some teachers still have resistance or difficulty adapting to the use of AI technology. Therefore, it is recommended to strengthen teacher training and provide sufficient technical support to help teachers proficiently use AI tools. In addition, AI may involve privacy issues when collecting and analyzing student data, and it is particularly important to protect students' personal information from abuse. It is recommended to establish strict data protection policies to ensure the security and privacy of student data. Finally, although personalized learning can meet the different needs of students, excessive reliance on personalized learning may lead to a lack of necessary collective collaboration and unified mastery of basic knowledge. Therefore, when designing courses, a reasonable balance should be struck between personalized learning and collective teaching to ensure the comprehensive development of students.

The AI assisted integrated in class and out of class teaching model has significant advantages in improving teaching effectiveness and optimizing teaching processes, but still faces challenges in technology, teacher adaptability, privacy protection, and other aspects during implementation. With the continuous development and optimization of technology, it is expected that this model will be more widely used in the future to promote innovation and progress in the field of education.

5. Conclusion

This study explores the implementation and effectiveness of the "in class and out of class integration" teaching model for university physical education courses based on artificial intelligence (AI) assistance. By analyzing the current situation of physical education teaching in universities and combining it with the potential application of AI technology, this study proposes an innovative teaching mode that integrates AI technology into physical education courses, aiming to improve students' physical literacy, enhance the personalization, intelligence, and efficiency of physical education teaching.

Research has found that the AI assisted "integrated in class and out of class" teaching mode has to some extent improved the teaching effectiveness of physical education courses. Firstly, AI technology can monitor students' learning progress and physical condition in real time, provide personalized learning advice and training plans, and effectively promote students' interest and participation in sports. Secondly, the intelligent feedback and data analysis provided by AI in extracurricular learning and training can help students continuously improve their motor skills and enhance the autonomy and effectiveness of extracurricular activities. Finally, AI technology has also promoted the professional growth of teachers. Through intelligent teaching tools, teachers can more accurately evaluate students' performance, thereby improving the quality of teaching. However, this study also points out some challenges faced in the implementation of AI assisted physical education teaching models. There is a strong dependence on technology, and some schools have deficiencies in hardware and network facilities, which limits the comprehensive application of AI technology. In addition, there are differences in teachers' adaptability and proficiency in using AI technology, and further training and support are needed. The protection of student data privacy also needs to be taken seriously in future practice to ensure that data usage complies with ethical and legal requirements.

In summary, the "integrated in class and out of class" teaching mode of college physical education courses based on artificial intelligence assistance has significant innovative value and practical potential. To achieve its comprehensive promotion, it is necessary to further strengthen the construction of technological infrastructure, enhance teachers' AI application capabilities, and formulate sound data protection policies in the future. At the same time, in course design, attention should also be paid to balancing the relationship between personalized learning and collective teaching, ensuring the comprehensive development of students. Only through multi-party collaboration and continuous improvement can the value of AI in physical education teaching in universities be truly realized, promoting the improvement of educational quality.

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