

AI-Enabled Self-Directed Learning Model: Challenges to Traditional Classrooms

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Abstract: This study aims to explore the challenges posed by AI-enabled self-directed learning models to traditional classrooms in the digital education era. Adopting the methods of literature review, case analysis and comparative research, the study first combs the core connotation and operational characteristics of AI-enabled self-directed learning, then compares the differences between this model and the traditional classroom teaching model, and finally analyzes the specific challenges of the former to the latter from the perspectives of teaching concepts, teaching methods, teacher-student roles and teaching evaluation. The results show that AI-enabled self-directed learning has brought profound impacts on traditional classrooms, requiring the transformation of teaching concepts, the innovation of teaching methods and the reconstruction of teacher-student roles to adapt to the new educational pattern. This study provides theoretical reference and practical enlightenment for the reform and development of traditional classroom teaching under the background of AI education.

Keywords: AI-Enabled Self-Directed Learning; Traditional Classrooms; Teaching Challenges; Educational Technology

1. Introduction

1.1 Research Background and Significance

The rapid iteration of artificial intelligence technology has promoted the in-depth transformation of the education field, breaking the relatively closed and fixed pattern of traditional classroom teaching. The integration of AI technology and self-directed learning has given birth to an AI-enabled self-directed learning model, which relies on intelligent algorithms, big data analysis and natural language processing technology to provide personalized learning support for learners,

enabling them to independently formulate learning goals, select learning content and adjust learning progress according to their own needs and characteristics. This model has gradually become a key direction of educational digital transformation, supported by relevant national policies. The Opinions on Accelerating the Advancement of Educational Digitalization jointly issued by nine departments including the Ministry of Education clearly proposes to take teachers and students as the focus to improve the digital literacy and skills of the whole people, and promote the in-depth integration of intelligent technology and teaching practice. In the context of the global wave of educational digitalization, the traditional classroom teaching model, which has long been dominated by teachers' knowledge transmission, is facing unprecedented impacts and challenges. The core of traditional classroom teaching lies in the one-way transmission of knowledge, with fixed teaching progress and unified teaching content, which is difficult to meet the personalized learning needs of learners in the digital age. The popularity of AI-enabled self-directed learning has made learners no longer rely on classrooms as the only source of knowledge, and the foundation of the traditional teacher-centered teaching model has been weakened. Against this background, exploring the specific challenges posed by AI-enabled self-directed learning models to traditional classrooms and putting forward corresponding response strategies is not only an inevitable requirement for adapting to the trend of educational digitalization, but also an important way to promote the reform and optimization of traditional classroom teaching and improve the quality of education. From a theoretical perspective, this study helps to enrich the research system of the integration of AI technology and education, clarify the internal relationship between AI-enabled self-directed learning and traditional classrooms, and provide a new theoretical perspective for the research on educational teaching reform. From a practical

perspective, the research results can provide practical guidance for front-line teachers to adapt to the changes in the educational environment, help schools optimize teaching models and improve teaching efficiency, and ultimately promote the all-round development of learners and the high-quality development of education.

1.2 Research Status at Home and Abroad

Foreign research on AI-enabled self-directed learning and its impact on traditional classrooms started earlier, and has formed a relatively systematic research system. Foreign scholars focus on the application of AI technology in personalized learning, the design of self-directed learning systems and the transformation of classroom teaching models. Some scholars have built an adaptive learning system based on AI algorithms, which can dynamically adjust learning content and paths according to learners' learning behaviors and feedback data, and verified the effectiveness of the system through empirical research. Other scholars have studied the impact of AI-enabled self-directed learning on the role of teachers and students, pointing out that AI will change the traditional teacher-centered classroom structure and promote the transformation of teachers' roles from knowledge transmitters to learning guides and helpers. However, foreign research focuses more on the technical application and effect verification of AI in self-directed learning, and there is insufficient in-depth analysis of the specific challenges faced by traditional classrooms and the differences in response strategies in different educational contexts. Domestic research on AI-enabled self-directed learning has developed rapidly in recent years, closely focusing on the national strategy of educational digitalization and the actual needs of domestic education. Domestic scholars have carried out in-depth research on the connotation, characteristics and operation mechanism of AI-enabled self-directed learning, and explored the integration path between AI-enabled self-directed learning and traditional classroom teaching. Some studies have pointed out that AI-enabled self-directed learning has obvious advantages in meeting personalized learning needs and improving learning efficiency, but it also brings challenges to traditional teaching concepts and teaching methods. Other studies have focused on the cultivation of teachers' digital literacy, believing

that improving teachers' ability to apply AI technology is the key to responding to the challenges brought by AI-enabled self-directed learning. However, there are still some deficiencies in domestic research: most studies focus on a single aspect of challenges, lack a systematic analysis of the overall challenges faced by traditional classrooms; the research on response strategies is relatively general, lacking targeted and operable implementation plans; there is insufficient combination of specific educational practice cases, and the research results are difficult to effectively guide front-line teaching practice. Based on the above research status, this study focuses on the specific challenges posed by AI-enabled self-directed learning models to traditional classrooms, combines current industry hotspots and social reality, and puts forward targeted response strategies, which is of great significance for promoting the in-depth integration of AI technology and traditional classroom teaching and promoting the reform and development of education.

2. Relevant Theoretical Basis

2.1 Core Connotation and Characteristics of AI-Enabled Self-Directed Learning Model

The AI-enabled self-directed learning model refers to a learning model that takes learners as the core, relies on AI technology to provide comprehensive support for the entire learning process, and enables learners to independently complete learning activities such as goal setting, content selection, process control and effect evaluation. Its core connotation lies in the organic combination of AI technology and self-directed learning, which makes up for the limitations of traditional self-directed learning in terms of resource acquisition, progress control and effect feedback, and realizes the intelligence and personalization of self-directed learning. The core characteristics of this model are reflected in four aspects. First, personalization. AI technology can collect and analyze learners' learning data, including learning habits, knowledge mastery, learning interests and learning needs, and build personalized learner portraits. Based on this, it can push targeted learning resources, design personalized learning paths, and meet the individual differences of different learners. For example, learners can use generative AI to independently set learning goals

and content, formulate learning plans, and build their own online learning classrooms, realizing the transformation from passive knowledge acceptors to active learning designers. Second, data-driven. The operation of the AI-enabled self-directed learning model is based on a large amount of learning data. AI algorithms can real-time analyze learners' learning behaviors, such as learning duration, learning progress, error distribution and question frequency, to accurately grasp learners' learning status and knowledge blind spots, and provide timely feedback and guidance for learners. Third, autonomy. Learners are in a dominant position in the learning process, and can independently decide the learning time, learning content and learning pace according to their own actual situation, without being restricted by the fixed teaching schedule and teaching content of traditional classrooms. This kind of autonomous learning model can fully mobilize learners' learning initiative and enthusiasm, and cultivate their independent learning ability and critical thinking ability. Fourth, interactivity. AI-enabled self-directed learning models provide a variety of interactive ways, such as intelligent Q&A, peer interaction and human-computer interaction. Learners can ask AI for help when they encounter difficulties in the learning process, and can also communicate and discuss with other learners to form a good learning atmosphere. This interactive learning method is conducive to deepening learners' understanding and mastery of knowledge and improving learning effect.

2.2 Core Logic and Limitations of Traditional Classroom Teaching Model

The traditional classroom teaching model is a teaching model formed under the background of industrialization, with the core logic of taking teachers as the center, textbooks as the basis and knowledge transmission as the main purpose. In this model, teachers are the main body of teaching activities, responsible for explaining knowledge, arranging learning tasks and evaluating learning effects. Learners are in a passive position, accepting knowledge imparted by teachers passively and completing learning tasks according to the requirements of teachers and textbooks. The core goal of traditional classroom teaching is to enable learners to master the knowledge and skills specified in textbooks, and the teaching process is usually

carried out in a fixed time and space, with a unified teaching progress and teaching content. Although this model has the advantages of clear structure and high teaching efficiency in the era of relatively stable knowledge, it has obvious limitations in the current digital age. First, the lack of personalization. Traditional classroom teaching adopts a "one-size-fits-all" teaching method, with unified teaching content and teaching progress, which cannot take into account the individual differences of learners. Learners with different learning foundations and learning needs can only accept the same teaching content, which is easy to lead to the situation that advanced learners cannot meet their learning needs and backward learners cannot keep up with the teaching progress. Second, the passivity of learning. In traditional classrooms, learners mainly accept knowledge passively, and their learning initiative and enthusiasm are not fully mobilized. The teaching process is mostly one-way knowledge transmission, lacking effective interaction and communication between teachers and students and between students and students, which is difficult to cultivate learners' independent learning ability and innovative thinking ability. Third, the singleness of teaching methods. Traditional classroom teaching mainly adopts the teaching method of teacher's lecture, which is relatively single and boring, and it is difficult to attract learners' attention and interest. With the rapid development of information technology, this single teaching method has been difficult to adapt to the learning characteristics of contemporary learners. Fourth, the limitation of evaluation methods. Traditional classroom teaching evaluation mainly focuses on the results of learning, such as exam scores, and ignores the process of learning. This evaluation method is difficult to comprehensively reflect learners' learning status, learning ability and comprehensive quality, and is not conducive to the all-round development of learners. In addition, the traditional classroom teaching model is limited by time and space, and learners' learning activities can only be carried out in a fixed classroom and within a fixed time, which cannot meet the needs of lifelong learning and personalized learning of learners in the digital age.

3. Specific Challenges of AI-Enabled Self-Directed Learning Model to Traditional Classrooms

3.1 Challenges to Teaching Concepts

The popularization of AI-enabled self-directed learning models has brought a profound impact on the traditional teaching concepts, which is the core challenge faced by traditional classrooms. Traditional teaching concepts take teachers as the center, emphasizing the authority of teachers and the passivity of learners, and the core goal of teaching is to transmit knowledge. This concept has been formed for a long time and has a deep impact on front-line teachers. However, AI-enabled self-directed learning models take learners as the center, emphasizing the autonomy and initiative of learners, and the core goal of teaching is to cultivate learners' independent learning ability and comprehensive quality. This change in teaching concepts requires teachers to abandon the traditional "teacher-centered" teaching concept and establish a "student-centered" teaching concept. However, in actual teaching practice, many teachers still adhere to the traditional teaching concepts, lack the awareness of adapting to the changes in the educational environment, and are unwilling to change their teaching methods and teaching concepts. They still regard knowledge transmission as the main task of teaching, ignoring the cultivation of learners' independent learning ability and innovative thinking ability. In addition, the traditional teaching concept also emphasizes the unity of teaching content and teaching progress, ignoring the individual differences of learners. AI-enabled self-directed learning models focus on personalized learning, which requires teachers to pay attention to the individual needs of each learner and provide targeted teaching support. This requires teachers to change their traditional teaching concepts and establish a personalized teaching concept. The transformation of teaching concepts is a long and arduous process, which requires teachers to have a deep understanding of the connotation and characteristics of AI-enabled self-directed learning, and actively adapt to the changes in the educational environment. If teachers cannot timely update their teaching concepts, it will be difficult to adapt to the challenges brought by AI-enabled self-directed learning, and it will also restrict the reform and development of traditional classroom teaching.

3.2 Challenges to Teaching Methods

AI-enabled self-directed learning models have

also brought great challenges to the traditional teaching methods. Traditional classroom teaching mainly adopts the teaching method of teacher's lecture, which is a one-way knowledge transmission method. Teachers explain knowledge in class, and learners listen and take notes passively. This teaching method is relatively single and boring, and it is difficult to mobilize learners' learning initiative and enthusiasm. AI-enabled self-directed learning models adopt a variety of teaching methods, such as personalized learning, inquiry learning and cooperative learning, which focus on the autonomy and initiative of learners. Learners can independently explore knowledge, solve problems and complete learning tasks with the help of AI technology. This change in teaching methods requires teachers to abandon the traditional single teaching method and innovate teaching methods to adapt to the needs of AI-enabled self-directed learning. However, many front-line teachers are accustomed to the traditional teaching methods and lack the ability to use AI technology to innovate teaching methods. They do not know how to integrate AI technology into classroom teaching, nor do they know how to design personalized teaching activities and inquiry learning activities. In addition, AI-enabled self-directed learning requires teachers to provide timely guidance and feedback for learners in the learning process, which requires teachers to change their role from a knowledge transmitter to a learning guide and helper. This also puts forward higher requirements for teachers' teaching methods. Teachers need to pay more attention to the interaction and communication with learners, understand learners' learning needs and learning status, and provide targeted guidance and feedback. If teachers cannot innovate teaching methods in a timely manner, it will be difficult to meet the learning needs of learners in the digital age, and it will also affect the effect of traditional classroom teaching.

3.3 Challenges to Teacher-Student Roles

AI-enabled self-directed learning models have brought a fundamental change to the traditional teacher-student roles, which is another important challenge faced by traditional classrooms. In traditional classrooms, teachers are the main body of teaching activities, with absolute authority in knowledge transmission and teaching evaluation. Learners are in a passive

position, accepting knowledge imparted by teachers passively and obeying the arrangement of teachers. This teacher-student relationship is a kind of unequal relationship, which is not conducive to the cultivation of learners' independent learning ability and innovative thinking ability. AI-enabled self-directed learning models have broken this traditional teacher-student relationship, and the roles of teachers and students have undergone fundamental changes. Learners have become the main body of learning activities, with the right to independently decide learning goals, learning content and learning pace. They can obtain knowledge and solve problems through AI technology without relying on teachers. Teachers are no longer the only source of knowledge, but have become learning guides, helpers and evaluators. Their main responsibility is to guide learners to establish correct learning concepts, help learners solve difficulties encountered in the learning process, and evaluate learners' learning effects. This change in teacher-student roles requires teachers to adjust their own positioning and change their working methods. However, many teachers are not adaptable to this role change. They are still accustomed to the traditional role of knowledge transmitter, and are unwilling to reduce their own authority. They also lack the ability to play the role of learning guide and helper. In addition, learners also need to adjust their own learning attitude and learning methods, and establish the awareness of independent learning. However, some learners are used to passive learning and lack the ability to independently formulate learning goals and learning plans, which also affects the effect of AI-enabled self-directed learning. The reconstruction of teacher-student roles is a key link in adapting to the challenges brought by AI-enabled self-directed learning, which requires the joint efforts of teachers and learners.

3.4 Challenges to Teaching Evaluation System

The traditional classroom teaching evaluation system is mainly based on the results of learning, such as exam scores, which is a single and static evaluation method. This evaluation method focuses on the mastery of knowledge by learners, ignoring the process of learning, the improvement of learning ability and the development of comprehensive quality. AI-enabled self-directed learning models focus on

the process of learning and the personalized development of learners, which requires the traditional teaching evaluation system to be reformed and improved. AI-enabled self-directed learning can collect a large amount of learning data of learners, including learning behaviors, learning progress, learning effects and feedback information, which provides a good basis for the reform of teaching evaluation system. The new teaching evaluation system should be a diversified and dynamic evaluation system, which not only pays attention to the results of learning, but also pays attention to the process of learning; not only pays attention to the mastery of knowledge, but also pays attention to the improvement of learning ability and the development of comprehensive quality. However, the traditional teaching evaluation system has been formed for a long time, and it is difficult to change in a short time. Many schools and teachers still take exam scores as the main index to evaluate learners' learning effects and teachers' teaching quality. This single evaluation method is not conducive to the development of AI-enabled self-directed learning, nor is it conducive to the all-round development of learners. In addition, the reform of the teaching evaluation system also requires the support of relevant policies and technical conditions. Many schools lack the technical ability to collect and analyze learning data, and cannot effectively carry out process evaluation and personalized evaluation. This also restricts the reform of the teaching evaluation system. The reform of the teaching evaluation system is an important part of adapting to the challenges brought by AI-enabled self-directed learning, which requires the joint efforts of the government, schools and teachers.

4. Strategies for Traditional Classrooms to Respond to the Challenges of AI-Enabled Self-Directed Learning Model

4.1 Update Teaching Concepts and Establish Digital Teaching Thinking

Updating teaching concepts is the premise for traditional classrooms to respond to the challenges of AI-enabled self-directed learning models. Schools and teachers should actively change the traditional "teacher-centered" teaching concept and establish a "student-centered" teaching concept, focusing on the personalized development of learners and the

cultivation of independent learning ability. Teachers should fully recognize the impact of AI technology on education and teaching, and establish digital teaching thinking, taking the integration of AI technology and classroom teaching as an important direction of teaching reform. Schools should strengthen the training of teachers' teaching concepts, organize academic salons, cross-disciplinary teaching and research and other activities, guide teachers to deeply understand the connotation and characteristics of AI-enabled self-directed learning, and promote the transformation of teachers' teaching concepts from "technology instrumentalism" to "education ontology". Teachers should pay attention to the individual differences of learners, respect the autonomy and initiative of learners, and design teaching activities according to the learning needs and characteristics of learners. In addition, teachers should also establish a lifelong learning concept, actively learn new knowledge and new technologies, and continuously improve their own quality and ability to adapt to the changes in the educational environment. Only by updating teaching concepts and establishing digital teaching thinking can traditional classrooms effectively respond to the challenges brought by AI-enabled self-directed learning and promote the reform and development of teaching.

4.2 Innovate Teaching Methods and Realize Online-Offline Integrated Teaching

Innovating teaching methods is the key for traditional classrooms to respond to the challenges of AI-enabled self-directed learning models. Teachers should abandon the traditional single teaching method and integrate AI technology into classroom teaching to innovate teaching methods. Online-offline integrated teaching is an effective way to combine AI-enabled self-directed learning with traditional classroom teaching. Teachers can use AI technology to build online learning platforms, push personalized learning resources to learners, and guide learners to carry out independent learning online. In offline classrooms, teachers can focus on explaining key and difficult knowledge, organizing interactive activities and cooperative learning, and helping learners solve difficulties encountered in online learning. This online-offline integrated teaching method can give full play to the advantages of AI-enabled self-directed learning in personalized learning and the advantages of traditional classroom

teaching in interactive communication, and improve the effect of teaching. Teachers can also use AI technology to design inquiry learning activities and cooperative learning activities, guide learners to independently explore knowledge and solve problems in the process of interaction and cooperation, and cultivate learners' independent learning ability and innovative thinking ability. In addition, teachers should also pay attention to the diversification of teaching methods, combine situational teaching, case teaching and other methods, make teaching more vivid and interesting, and mobilize learners' learning initiative and enthusiasm.

4.3 Reconstruct Teacher-Student Roles and Improve Teachers' Digital Literacy

Reconstructing teacher-student roles and improving teachers' digital literacy is an important guarantee for traditional classrooms to respond to the challenges of AI-enabled self-directed learning models. Teachers should actively adjust their own positioning, change from knowledge transmitters to learning guides, helpers and evaluators, and focus on guiding learners to establish correct learning concepts and improving their independent learning ability. Teachers should strengthen the interaction and communication with learners, understand their learning needs and learning status, and provide targeted guidance and feedback. In addition, improving teachers' digital literacy is crucial to the integration of AI technology and classroom teaching. Schools should strengthen the training of teachers' digital literacy, formulate personalized training plans according to the actual needs of teachers, and help teachers master the basic skills of using AI technology, such as the operation of intelligent teaching tools, the analysis of learning data and the design of personalized learning resources. Teachers should also actively participate in digital teaching practice, accumulate experience in the application of AI technology, and continuously improve their ability to integrate AI technology into classroom teaching. In the process of role reconstruction, learners should also be guided to establish the awareness of independent learning, learn to independently formulate learning goals and learning plans, and improve their independent learning ability. Only by reconstructing teacher-student roles and improving teachers' digital literacy can traditional classrooms better adapt to the

challenges brought by AI-enabled self-directed learning.

4.4 Improve the Teaching Evaluation System and Build a Diversified Evaluation Mechanism

Improving the teaching evaluation system and building a diversified evaluation mechanism is an important part of traditional classrooms responding to the challenges of AI-enabled self-directed learning models. Schools and teachers should abandon the traditional single result-oriented evaluation method and build a diversified and dynamic teaching evaluation system that combines process evaluation and result evaluation, quantitative evaluation and qualitative evaluation. The evaluation content should not only include the mastery of knowledge by learners, but also include the improvement of learning ability, the development of comprehensive quality and the performance of independent learning. The evaluation method should make full use of AI technology to collect and analyze learners' learning data, carry out process evaluation and personalized evaluation, and comprehensively reflect learners' learning status and development potential. For example, based on big data and AI technology, a dynamic evaluation model can be established to track and evaluate learners' learning process in real time, and provide targeted feedback and guidance for learners. In addition, the evaluation subject should be diversified, including teachers, learners themselves and peers, to ensure the fairness and objectivity of evaluation. Schools should formulate relevant evaluation standards and systems, strengthen the management and supervision of teaching evaluation, and ensure that the evaluation work is carried out in an orderly manner. The improvement of the teaching evaluation system can effectively guide the reform of traditional classroom teaching, promote the healthy development of AI-enabled self-directed learning, and realize the all-round development of learners.

5. Conclusion

This study focuses on the challenges posed by AI-enabled self-directed learning models to traditional classrooms, and carries out in-depth research on the relevant theoretical basis, specific challenges and response strategies. The research finds that AI-enabled self-directed

learning models, with their characteristics of personalization, data-driven, autonomy and interactivity, have brought profound impacts on traditional classrooms, and posed challenges to traditional teaching concepts, teaching methods, teacher-student roles and teaching evaluation systems. Traditional classroom teaching models, which have long been dominated by teachers' knowledge transmission, have obvious limitations in the digital age and are difficult to meet the personalized learning needs of learners. To respond to these challenges, traditional classrooms need to update teaching concepts and establish digital teaching thinking; innovate teaching methods and realize online-offline integrated teaching; reconstruct teacher-student roles and improve teachers' digital literacy; improve the teaching evaluation system and build a diversified evaluation mechanism. This study enriches the research system of the integration of AI technology and education, and provides theoretical reference and practical enlightenment for the reform and development of traditional classroom teaching under the background of AI education. However, this study also has some limitations. The research scope is mainly focused on the theoretical analysis and case discussion of AI-enabled self-directed learning and traditional classrooms, and the empirical research on the effect of response strategies is insufficient. In the future, we can further expand the research scope, carry out in-depth empirical research, verify the effectiveness of response strategies, and explore the long-term mechanism of the integration of AI-enabled self-directed learning and traditional classroom teaching. With the continuous development of AI technology, the integration of AI-enabled self-directed learning and traditional classroom teaching will become more in-depth, and traditional classrooms will usher in a new round of reform and development. It is necessary for the government, schools, teachers and learners to work together to promote the healthy development of educational digitalization and improve the quality of education.

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