

Teacher Innovation and Adaptive Leadership in Artificial Intelligence Educational Applications

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Abstract: The digitalization of education has been advancing, and artificial intelligence is being used more and more in scenarios such as classroom teaching, personalized learning, and educational evaluation, becoming an important force in promoting the high-quality development of education. However, for AI education to be effective, technology alone is not enough. The key lies in whether teachers can break away from old teaching routines, use innovative ideas to adapt to the characteristics of technology, and then rely on adaptability and leadership to coordinate resources and promote teaching improvements. By sorting out relevant research and teaching cases, we first clarify the core meanings of the three, then analyze the difficulties that AI brings to the role and ability of teachers, and then provide teachers with innovative paths and methods for cultivating adaptability and leadership from the three aspects of teaching practice, ability training, and coordination and cooperation. Finally, we build a guarantee framework that integrates these three aspects. The study found that teachers must work hard to understand technology, design teaching, and abide by ethics. By flexibly adjusting guidance methods, consolidating team strength, and linking resources from home, school, and society, the value of AI education can be truly realized. A complete guarantee framework is the key to the continuous improvement of teachers' abilities. This can provide a reference for education departments to formulate AI teacher training policies and schools to promote AI teaching practices, and help solve the practical problem of AI education "focusing on technology and neglecting people."

Keywords: AI educational applications, Teacher innovation, Adaptive leadership, Digital education, Teaching transformation.

1. Introduction

My country has always attached great importance to the integration of AI and education. The Ministry of Education has issued documents such as the "Artificial Intelligence + Education" Action Plan and the "Education Digitalization Strategic Action Implementation Plan," clearly stating that AI technology should be fully integrated into all aspects of education and teaching, and providing policy and institutional support for its application. In practice, AI has permeated every aspect of education: smart classrooms capture classroom interaction data in real time, learning analytics tools accurately identify knowledge weaknesses, and AI teaching assistants take over repetitive tasks such as grading assignments and answering questions. It provides a new way for "teaching" and "learning" to interact, and also puts forward new requirements for teachers. However, there is currently a problem of "disconnection between technology and teaching" in smart education: some teachers only use smart tools to replace PPT and projectors, and do not break away from the old teaching ideas; some do not understand the technical logic behind them, do not know how to analyze learning data, and personalize teaching in a formal way; and some teachers face role changes, either relying on or resisting. The root cause is that teachers lack adaptive innovation ability, adaptability, and leadership - the former is the core driving force for reconstructing teaching, and the latter can coordinate resources to promote change. In this case, it is important to clarify the connotation, challenges and improvement paths of these two abilities. This article sorts out research and cases, clarifies concepts, analyzes challenges, and then provides solutions from the perspective of practice, leadership training, and guarantee mechanisms to allow smart tools to serve the quality of education [1].

2. Definition of AI Educational Applications and Teacher Core Competencies

To understand the role of teachers' innovation, adaptability, and leadership in smart education, we must first clarify the core of these three and don't confuse them. They are closely related to the progress of digital education, which is mainly reflected in two aspects. The core of smart education is to use intelligent tools in teaching, management, and evaluation, streamline processes and improve efficiency, and realize personalized learning for students. The key is the integration of technology and educational ideas, rather than just using tools. It has three characteristics: data-driven is to collect students' answer speed and wrong questions, and build learning models to help teachers make decisions; personalized adaptation to students' exclusive resources, breaking the old model of "one set of methods to teach everyone"; support is that intelligent tools do repetitive work such as grading and calling names, and the role of teachers is irreplaceable. Today, tools such as Xiwo and iFlytek Smart Classroom have been applied in multiple disciplines in primary and secondary schools, becoming helpers to promote educational change, and teachers' core concerns of these three are also clearer. The core focus of teacher innovation, adaptability, and leadership is also becoming increasingly clear. Teacher innovation is not about developing AI technology, but about making creative adjustments to teaching concepts, models, and methods in accordance with educational laws and student needs [2]. For example, the teaching concept has changed from "transmitting knowledge" to "designing learning and guiding thinking", and a hybrid teaching plan has been designed based on the learning situation analyzed by AI; the teaching model has broken away

from tradition and established a closed loop of "AI preview - teacher's intensive lecture - group exploration - AI consolidation"; the evaluation has also changed from focusing only on the final score to a multi-dimensional evaluation combining process data and test scores. Innovation must revolve around student development. For example, a primary school teacher using AI to generate historical scenes to help explain ancient poems is a good example, but using AI to write essays without guidance is a deviation. Adaptive leadership is the ability of teachers to adjust their own practices, coordinate resources, and lead everyone to promote teaching reform in the dynamic environment of AI education. Its core features are very prominent: dynamic adaptability is to adjust teaching strategies as AI technology updates and student needs change; team collaboration can drive colleagues, parents, and technical personnel to work together; ethical control is to maintain the bottom line of education, such as not using AI tools that collect excessive privacy, correcting the bias of AI content, and ensuring fairness and student rights.

3. Multiple Challenges of AI Educational Applications for Teachers

AI has provided teachers with a technical helper, but it has also disrupted the stability of traditional teaching. It has posed many challenges to teachers from technology, roles to ethics. If these challenges are not addressed, AI education will be difficult to implement and be effective. In the past, teachers were considered technically literate if they could use PPT and projectors. Now, using AI is much more than just that – not only must they be able to operate it, but they must also understand some algorithmic logic and be able to see through the data. A junior high school math teacher used an AI learning tool. Although he knew that 80% of students had not learned the Vieta theorem well, he still taught according to his old experience because he did not understand data analysis, wasting the value of the tool [3]. The "Artificial Intelligence Literacy Report of Chinese Primary and Secondary School Teachers (2024)" mentioned that 65% of teachers felt that AI was updated faster than they could learn, and some even refused to use it due to technical anxiety. The root cause is that in school training, only how to click the mouse was taught, without explaining the integration of algorithms and teaching, so the ability to continuously learn could not be developed. In the past, teachers were the authority of knowledge and had the final say on how to explain the textbooks. Now that students can use AI to learn grammar and look up history, the authority of teachers has weakened and they have to become learning guides. However, some teachers are accustomed to indoctrinating knowledge. They either prevent students from using AI to protect their authority and suppress personalized learning; or they want to make the switch but lack the skills to design activities. For example, one elementary school English teacher allowed students to practice speaking with AI, but then followed up with no follow-up, leaving students merely mechanically following along. This demonstrates a lack of clarity about their own value and a failure to recognize the importance of guiding students' independent learning. Many believe that smart education relies on data, collecting student response records, classroom interactions, and even expressions, sometimes including personal information. Many teachers fail to clearly distinguish the boundaries of

privacy, which can easily lead to data leaks. For example, some teachers send students' learning data to non-teaching WeChat groups. In addition, the recommendations of intelligent teaching tools rely on the training data behind them. If the data is biased – such as the intelligent essay scoring gives low scores to essays from a female perspective, most teachers do not understand the relevant technology and cannot detect it at all, which ultimately leads to unfair evaluation. Although the relevant plans of the Ministry of Education require the cultivation of teachers' professional ethics awareness, most schools do not include this part in training. Teachers have no way to deal with ethical issues and can only rely on technology vendors, and cannot protect the rights of students.

4. Practical Paths for Teacher Innovation in AI Education Applications

Smart education should not be superficial; the key lies in teacher innovation. We must combine student situations with teaching needs, focus on students, conduct solid teaching and evaluation, and truly integrate technology into teaching. AI's learning analysis capabilities can help teachers innovate their teaching, starting with breaking the old "one-size-fits-all" approach. For example, when teaching "Ohm's Law" in junior high physics, weak students are given the goal of "understanding formulas and performing simple calculations," while intermediate students are taught "using circuit diagrams for calculations," and those with more advanced skills are taught "designed experimental verification." When teaching "Scenery Composition" in elementary Chinese, students at the basic level practice imitating scenery using AI-generated materials, while advanced students practice situational observation using excerpts from famous writers. Furthermore, teachers must rely on their understanding of students to correct AI biases. For example, one elementary math teacher discovered that the AI misinterpreted a student's "calculation problems," but in reality, they were simply failing to understand the problem, so they quickly adjusted the focus of their instruction. On this basis, teachers can also rely on the comprehensive capabilities of AI to organize interdisciplinary activities: when teaching the theme of "environmental protection", let students use AI to make pollution reports, analyze PM2.5 data and draw graphs, and simulate governance plans, integrating Chinese, mathematics, and science knowledge [4]; before preparing for the "space theme" teaching, teachers from multiple disciplines will discuss and determine the main line of "learning knowledge - analyzing data - making models", without separating disciplines, so as to give full play to the advantages of AI and help students use knowledge, in line with the needs of core literacy cultivation. Traditional evaluation based only on scores is too limited. Teachers can use AI to collect process data and build a multi-faceted evaluation system: the process records must be detailed. For example, in the AI learning report given to students at the end of the semester, the teacher will write "oral practice for 120 minutes and revised the composition 8 times", and also evaluate the cooperation ability and innovation awareness; the evaluation subjects must also be diverse. When studying in groups, the AI statistics will be used to consider the completion of the task, as well as the students' own evaluation of their efforts and the cooperation performance evaluated by

their classmates; feedback must be timely. If the AI finds that the student's math accuracy rate has dropped, the teacher will immediately find the reason and give targeted suggestions. A primary school survey showed that after using this evaluation method, 82% of students were aware of their strengths and weaknesses, and 75% had greater motivation to study.

5. Teacher Adaptive Leadership: A Key Path to Implementing AI Education

Teachers' adaptability and leadership are key to the implementation of smart teaching. This type of education is rapidly evolving and complex, requiring steady progress through both school-based efforts and collaboration between home and school.

5.1. In-school Capacity Building: Self-Adaptation and Team Collaboration

With the development of intelligent technology, the role of teachers is also changing. Teachers must continue to learn and adapt, and make up for their shortcomings in a targeted manner. For example, they can learn relevant knowledge on the national primary and secondary school smart education platform and practice interdisciplinary design through university MOOCs. After class, they should write a teaching log to record students' satisfaction with the intelligent tools' answers and the time saved in grading. When encountering complex math problems that the intelligent tools cannot solve, let them handle basic problems and solve the difficult problems themselves. They should also read the policies and academic articles of the Ministry of Education to understand and reduce the bias of the intelligent tool algorithms. Teachers should also dare to try and not be afraid of making mistakes. A junior high school teacher was not very smooth when he first used the intelligent classroom, and slowly found a mature method [5]. In addition, they should take the lead in establishing learning groups, such as the intelligent teaching discussion group, to share cases and discuss challenges; establish a teacher support mechanism, pair them according to their abilities, let those with good skills help those with weak skills, and interdisciplinary experts and evaluation innovators work together to find solutions. Team experience can also be made into a school-based guide, for example, a primary school compiled the "Intelligent Classroom Teaching Guide". A survey at a middle school showed that after joining the discussion group, teachers' resistance dropped from 45% to 15%, while their willingness to cooperate increased from 60% to 90%.

5.2. Home-School Collaboration: Leading Parental Participation in AI Education

Parental attitudes influence the effectiveness of AI teaching, so teachers need to take the lead in building a collaborative system. Regarding positive guidance, teachers should use parent-teacher meetings and parent-teacher classes to explain the value and boundaries of AI education. When interpreting AI learning reports, teachers should be encouraged to integrate teacher evaluations to allay concerns that "AI will replace teachers." Regarding practical guidance, parents should be provided with guidance on how to use AI tools, such as supervising their children's oral English practice with AI and watching AI traditional culture videos with them to prevent plagiarism in their essays. Regarding dynamic

adjustments, strategies should be optimized based on parental feedback. For example, some teachers, taking parents' advice, have assigned fewer AI-based homework assignments. A survey of a primary school showed that after teachers promoted this policy, the parent support rate rose from 55% to 85%, and home-school communication increased from once a month to once a week.

6. A Mechanism to Support Teacher Innovation and Leadership Development in AI Education

Honestly, if you want teachers to introduce something new to the classroom and keep up with the pace of smart learning, you need to work together on policies, resources, and training. You also need to keep a close eye on how AI is used and reduce the rate of AI adoption, otherwise your efforts will be in vain. In terms of policy, local education bureaus must first clearly point the way forward and not be vague. Take Jiangsu's "Smart Education Teacher Capacity Improvement Project," for example. They clearly state that training must cover every teacher within three years, and they even specifically add a rule—AI can only assist in teaching, not be relied upon entirely. School assessments and professional title evaluations must also include AI indicators: Less than 30% of lesson plans are manually revised? Then no extra points will be awarded on the assessment, no discussion! Then simply don't give any extra points on the assessment, no question about it! Training funds should also prioritize high-performing teachers. By the way, the Education Bureau also needs to clarify the rules for data protection and algorithm verification. After one district in Jiangsu Province implemented this, the proportion of teachers participating in training increased from 60% to 95%, examples of innovation doubled, and even the problem of AI overuse decreased significantly. Resources also need to be kept up to date, and clear guidelines must be established for where AI should and should not be used. For example, a primary school installed a seewo smart blackboard and a supporting teaching system, provided teachers with administrative accounts, and regularly provided maintenance. When organizing the resource library, the school requires uploaded content to clearly indicate how much AI contributed to it. Teachers can also earn points for high-quality, manually optimized resources. In addition, the school has established a smart teaching help desk and a dedicated "AI feedback portal"—a place where teachers can raise any questions at any time. Another middle school has teachers spend two hours per week in smart teaching workshops, which include a dedicated session on "modifying AI content" and reduces the number of non-teaching forms they fill out by 30%. To be honest, in fact, this is to help teachers free up some time, so that they can revise things more by themselves, and not rely on AI right from the start. It is not okay to rely on it all the time. The training must also be practical. You think about it, the focus must be on adding some content about "don't rely too much on AI", which is very critical. In addition to explaining the basic knowledge of smart teaching and how to integrate technology into the classroom, practical operations must be added - first let AI make a draft, and then the teacher will add, delete, and adjust it, and finally change it to fit the students' actual situation, so that it will be effective. A special teaching team has been assembled, including university experts, front-line teachers, and technical personnel, and teaching is stratified according

to the teacher's ability: new teachers focus on learning how to use AI and how to make basic modifications; old teachers practice using AI to help with teaching innovation and lead the team. There is data from one province. After such training, 90% of teachers can make optimized smart lesson plans, and 85% can lead the team to promote them, which is much better than the 50% and 45% of the previous training methods! The number of unqualified uses of AI has also been reduced by 30% [6].

7. Conclusion

Honestly, using smart teaching tools in class is a practical, no-frills approach to the digital transformation of education. Whether they truly help is hard to say. The key lies in whether teachers can come up with new strategies, keep up with the pace, and lead the group—all of which are essential. During our discussion, we came up with some ideas. They may not all be accurate, but they're honest: I believe the core of smart education lies in three key areas: identifying problems through data, adapting teaching methods based on students, and providing support at best. Put simply, teachers can't just focus on knowledge points; they need to help students develop learning paths and guide them through the process. Want to innovate in teaching? You need to adjust your concepts, methods, and assessments. You also need to be flexible, collaborative, and disciplined—if you don't master these three, nothing will work. Teachers today face several challenges: not being able to use smart tools, not understanding their roles, and not understanding their ethical responsibilities. This isn't just a matter of knowing how to use the technology; it's a complex mix of ideas, skills, and rules. Teachers must devise new approaches and improve their leadership skills on their own; others can't offer much help. Furthermore, teachers must focus on key areas of innovation: providing differentiated instruction for different students, implementing interdisciplinary activities, using diverse assessments, and always engaging with students. Want to develop adaptability and learn how to lead a team? You need to take the initiative, lead a team, and collaborate with parents—otherwise, reforms will be unstable and prone to going astray. In my opinion, improving teacher capabilities

requires supporting policies, resources, and genuine training; slogans alone are ineffective. Only with external support and teacher motivation can progress be made; otherwise, progress is prone to failure. However, smart education is still in its infancy, and teachers face numerous challenges: perfunctory training, uneven resource distribution, and a lack of commitment to teacher ethics. Future changes are needed: targeted training, more regional resource sharing to mitigate disparities, and a strong focus on teacher ethics. Ultimately, smart education relies on technology to empower teachers, harnessing their innovation, adaptability, and teamwork skills. Only in this way can tools become an accelerator for high-quality educational development and achieve the goals of promoting equity and improving quality through technology.

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