

The path of deep integration of information technology and courses under TPACK model

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Abstract: This article aims to explore the role and value of the TPACK (Technological Pedagogical Content Knowledge) model in promoting the deep integration of information technology and curriculum in the context of educational informatization. By analyzing the *Action Plan for Information Technology in Education 2.0*, the gap between the popularization of hardware equipment and teachers' insufficient understanding of the integration of information technology and curriculum is revealed. Research has found that the TPACK model provides a new perspective on education and teaching, which is one of the keys to promoting educational modernization, and can also optimize the functions of smart teaching products. The research on deep integration paths based on the TPACK model involves the current status of deep integration of information technology and disciplines, TPACK evaluation model, teacher training and technology platform function development, etc., aiming to provide effective guidance for teacher training and technology development.

Key words: TPACK model; educational informatization; deep curriculum integration; teacher training; the development of technical platform function

1 Introduction

The *Action Plan for Information Technology in Education 2.0* promulgated by the Ministry of Education in 2018 proposed the task of deeply integrating information technology and education, emphasizing the necessity of educational informatization from integrated application to innovative development. However, despite the popularization of hardware equipment, teachers have not fully thought about how to integrate information technology with curriculum, resulting in a lack of soft power in education informatization. The significance of the topic selection of this paper is mainly to reveal the importance and challenges of educational informatization in the current context. It has prompted research on the TPACK model to help teachers understand how to deeply integrate information technology and curriculum to promote educational innovation.

2 The significance and value of topic selection

The research value is reflected in the following aspects: First, it supplements theoretical research on the in-depth integration of information technology and curriculum. The TPACK model has fundamental changes in teaching concepts, methods and structures, and can provide a new perspective for educational teaching theory. Secondly, it promotes the modernization of education development. Educational informatization is an important strategic choice for building an educational powerhouse, and is of key significance to improving the quality of education and promoting lifelong learning. Thirdly, by optimizing the functionality of smart teaching products, the TPACK model can promote cooperation between

teachers and technicians, and enhance the development efficiency of smart teaching platforms and service levels.

3 Research basis

3.1 Maturity and application of TPACK model

The *Action Plan for Information Technology in Education 2.0* will continue to promote the in-depth integration of information technology and education, so TPACK knowledge is the key bridge to promote the integration of the two. Regarding the TPACK model, Matthew J. Koehler and Punya Mishra of Michigan State University defined TPACK as: It is a "framework of teacher knowledge that integrates technology", which is based on Shulman's pedagogical subject knowledge (PCK) [1]. It is a complex interaction between the three knowledge elements of "subject content, teaching methods and technology" and is a new form of knowledge formed after integrating these three types of knowledge. Therefore, the implementation of TPACK in China has very important practical significance. And the implementation of TPACK in China holds significant practical significance. Since 2008, TPACK models have been implemented internationally, with continuous research ongoing. Pre-service and in-service teachers have been consistently involved in TPACK experiments, all yielding results indicating a significant improvement in teachers' information literacy due to their mastery of TPACK knowledge. Building upon existing research and considering the unique educational landscapes in different regions of China, there's a push to explore a TPACK model tailored to China's specific characteristics.

3.2 Have mature experience in Internet online education

I have five years of experience in the Internet + education industry, working at both NetEase and ByteDance. I joined during the early rise of internet-based education and witnessed the complete development process of educational products from inception to execution. The educational and instructional products developed by leading internet companies in the industry have almost reached the pinnacle in terms of technological product experience. The interaction and collaboration among students in learning content have greatly enhanced learning outcomes. This integration of information technology and curriculum holds significant implications. For instance, within the closed-loop of pre-, in-, and post-class learning, technological means can intervene at every stage, simulate students' usage pathways, combine teaching knowledge with peak student experiences, and introduce interactive technical elements at crucial junctures. Enabling students to engage in hands-on, interactive learning fosters a strong sense of participation and interest. Thus, using the technological capabilities achievable within the industry as a research foundation, it's essential to explore the functions and conditions that can be optimized and realized through the profound integration of information technology and curriculum in the current era.

4 Research content

4.1 The current situation and problems of the deep integration of information technology and disciplines

At this stage, information technology is more used as an auxiliary means of classroom teaching. Teachers have no concept of the in-depth integration of information technology and curriculum, especially lack cognitive foundation for the integration of information technology and curriculum under the TPACK model. In addition, teachers currently place most of their digital resources in the pre-class introduction or after-class expansion links, which is similar to the first stage of the Web Quest phase of the integration of information technology and curriculum. But the difference is that the Web Quest stage before and after class mainly allows students to use technology platforms to find corresponding digital resources to complete teaching tasks before and after class. Due to the limitations of various disciplines, teachers today have few opportunities to involve in the use of digital resources. This is far from the requirements of the *Education Informatization 2.0 Era*, and is even worse than the first two development stages of the early integration of information technology and curriculum. Therefore, it is urgent to improve teachers' awareness of TPACK. Only when teachers master the knowledge of

TPACK can they know when they need students to join in and when students need teachers to guide them in their teaching sessions.

TPACK has a single evaluation model, and is currently conducted and implemented less frequently by means of classroom observation scales. Among the technology platforms that rely on the integration of information technology and curriculum, the TPACK model can currently be seen as a classroom teaching observation scale under a smart teaching and research platform developed by Beijing Normal University's Advanced Innovation Center for Future Education under teachers' listening and evaluation. The person who evaluates the teacher's class can be any teacher who wants to evaluate the class. However, because the teacher lacks TPACK knowledge, he cannot conduct professional evaluation, which will lead to the teacher being in a vacuum state. It is difficult to evaluate and verify teaching effects and student learning effects, making it difficult for teachers to make improvements [2].

4.2 The deep integration path of information technology and disciplines under the TPACK model

In China, both pre-service and in-service teachers are generally called teachers, but the training programs are different for the two roles. Pre-service teachers generally refer to teachers who have not yet begun to engage in education and teaching activities and have not systematically received education and teaching knowledge. At this time, the TPACK model should be included in the training plan [3]. When teachers begin to master the design methods of instructional design, TPACK knowledge should be added, which cultivates the TPACK knowledge model from the source. After professional teaching and a lot of practice, TPACK will be included in classroom teaching to create greater value.

In addition, training for in-service teachers is also urgent. In-service teachers have gone deep into front-line classrooms, but most still use the traditional teaching methods without timely guidance and ideological changes. As time goes by, training costs will continue to increase, and mastering the technology will become more and more difficult. Therefore, how TPACK training can be mastered and applied by in-service teachers as soon as possible is also an important way to change traditional teaching and reconstruct the teaching model.

Redefining the role of digital resources in classroom teaching requires teachers to master traditional teaching methods, especially the knowledge of IT. Digital resources are the first step for teachers to contact IT. In addition, students must also be taught how to use digital resources and how to design resources in teaching. In the task, technically, it is necessary to meet the requirements and interactive functions of teachers and students for the use of digital resources. Only in this way can the value of TPACK be further unleashed and the deep integration of information technology and courses reflected.

4.3 The technology platform can develop functions under TPACK mode

Most of the current digital resources are visual video micro-course resources. Generally speaking, micro-course resources, as an important performance result of flipped classroom, will be more effective when used before class. But for classroom teaching, micro-course resources with shorter, more concise and condensed knowledge points of classroom teaching should also be the focus of subsequent development of digital resources. Classroom teaching focuses on the process of transmission and reception. And real-time classroom assessment feedback is a key link for teachers to judge the rhythm of classroom teaching. Therefore, when the teacher's delivery and guidance are in place, the technical team should add interactive answering functions to short videos containing teaching knowledge points. When students see a certain part of the video, a question will automatically pop up, allowing students to answer interactively by clicking or dragging on the tablet. This technology can already be implemented in the industry. It depends on how the technology is combined with teaching resources.

The functions of current smart teaching platforms are mostly from the perspective of teaching management and building digital campuses. Teachers and students are the main bodies of the teaching system. To realize the deep

integration of information technology and education and teaching, we need to develop functions that can be used by teachers and students. Online collaboration functions are currently widely used in offices and are a powerful tool for improving efficiency and innovation at work [4]. When placed in classroom teaching, teachers can achieve innovation and efficiency improvement in school-based teaching and research, and students can work in groups to complete teaching tasks based on the teacher's task-based teaching in the classroom. The realization of online collaboration function is an important feature of the implementation of TPACK mode.

5 Conclusion

This article provides an insight into the deep integration of information technology with the curriculum in the TPACK model and focuses on the challenges and importance of IT in education and the value of the TPACK model in contributing to the modernization of education. By analyzing the *Action Plan for Information Technology in Education 2.0*, the article points out the gap between the availability of hardware and teachers' understanding of the integration of IT with the curriculum. The TPACK model is seen as an important perspective that emphasizes the integration of technological, pedagogical, and curricular knowledge and offers new ideas for modernizing education.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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