The Research and Practice of Improving College Students' Computer Innovation Ability under TPACK Framework

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Abstract: The computer innovation ability to promote technological innovation has played an important role in the field of the information age, the promotion of students' computer practice innovation ability has become the important mission of basic computer education in university, this paper puts forward the "design drive innovation" computer practice teaching mode, and from multiple aspects elaborated the TPACK support for the teaching mode reform, for colleges and universities to explore the characteristic and practical computing new paths for cultivating the innovation to provide certain theoretical and practical references.

1. Introduction

With the current development of education informatization, online teaching has been booming, online teaching is the age of the Internet for education reform attempt and innovation choice, below the centerline of the colleges and universities teaching and classroom teaching increasingly fusion, hybrid teaching pattern suddenly become a hot topic in teaching reform in colleges and universities. However, in the process of the practical application of blended teaching in teaching, there are some cases that are mere formality, the quality of online teaching is not high, and the combination of online and offline teaching is mechanical [1-2]. Educational informationization poses a new challenge to teachers' professional competence. How to realize the deep integration of educational information technology and educational teaching has become the focus of researchers. Integration technology, Knowledge of the subject teaching TPACK (Technological Pedagogical Content Knowledge) (hereinafter referred to as the TPACK) framework can stimulate the teachers' understand teaching Content (CK), so as to master scientific and flexible teaching methods (PK), and using advanced technology aided teaching (TK), make it follow the TPACK framework, to improve its ability of informatization teaching effectively, fully promote hybrid teaching effect.

2. The Research Status

Through the literature search of the database, it was found that the researchers of TPACK related research literatures abroad were mainly from the United States, Singapore and Europe. At the founding stage of TPACK, the relevant literature is mainly the theoretical review published by the founder. TPACK stage of rapid development, the relevant research literature emerged in great quantities, and the trend of the present is a wider research field, research method more diversified, more rich the research content, the research content are mainly concentrated in TPACK ontology, TPACK development strategy study, based on the TPACK framework of teacher training, TPACK method study, based on the research on information technology and curriculum integration of TPACK framework. With the gradual improvement of TPACK theoretical framework, TPACK related researches are mainly based on practical research [3]. Domestic research on TPACK mainly focuses on the following aspects: research on the integration of information technology and curriculum in the TPACK knowledge framework; future research will pay more attention to

improving teachers' TPACK practical application ability; TPACK training strategy research, this topic is popular, in the future research, around the teacher TPACK training strategy research is still a hot spot; Pay attention to the cultivation of teachers' TPACK knowledge framework, which will be the focus of future research of TPACK. As for the connotation research of TPACK, more attention will be paid to the research combining the connotation of TPACK with the actual situation of domestic teachers in the future.

In terms of the research on blended teaching, the focus in foreign countries is to promote students' active learning and mixed learning. In China, the focus is to build a blended teaching model and optimize the teaching design by using educational resources such as micro-class and mooc. In terms of research types, in recent years, both domestic and foreign countries have shifted from carrying out theoretical research to the application and practice research of blended teaching. In dimension, foreign data correlation method, usually through hybrid teaching application before and after contrast to consider the effect of domestic through test, questionnaire survey and interviews to understand the teacher and students recognition about the course, the students' interest in learning, participation, appeal to examine such as hybrid teaching effect [4-6]. At present, the research on the application and practice of blended teaching in China has been growing especially, and the innovation and research depth have been greatly improved. The design of blended teaching system has been developing in a trend of specialization.

By combing the research context of TPACK and mixed teaching, the author thinks that the future research direction of TPACK and mixed teaching should pay more attention to the applied research. Pay more attention to the relationship between teachers' TPACK knowledge and specific educational and teaching practice, and discuss how to better integrate online and offline teaching under the framework of TPACK so as to improve the teaching effect. This paper does not do too much abstract theoretical research, so that the theoretical framework of TPACK can better serve the hybrid teaching of computer science, and the research focus will fall on the application level.

3. Feasibility of Combining TPACK Framework with Blended Teaching

The research focuses on the scientific integration of "TPACK framework" and "blended teaching" in basic computer science. TPACK knowledge is generated by the interaction of the three core elements of technical knowledge, teaching method knowledge and subject content knowledge. It requires teachers to design appropriate teaching programs based on the integration of TPACK knowledge with basic computer science according to the needs of specific teaching situations on the basis of comprehensive consideration of the three elements.

Hybrid teaching mode mixing in the form of online and face-to-face teaching, and has a larger proportion of the content is the online teaching, greatly reduce the amount of face-to-face teaching, thus requires teachers to have in-depth understanding of course content, master the scientific method of teaching, but also to education technology ability to better construction and integration of online resources, gives students a good learning experience.

When teachers improve and optimize their TPACK knowledge framework, their ability to complete blended teaching reform will surely be improved, and blended teaching will also achieve better teaching results. At the same time, taking the mixed teaching of specific subjects as the carrier, it also promoted the implementation of TPACK, which provided strong support for us to further study the theoretical framework of TPACK and dig its connotation in the future, and laid a solid practical foundation. Therefore, the research of "TPACK framework" and "blended teaching" is complementary to each other, which can form a benign research system.

4. To Construct an Efficient Hybrid Computer Teaching Model Based on TPACK

4.1 Analyses of the Current Teaching Mode of Basic Computer Courses

This paper analyzes and evaluates the existing teaching mode of computer basic courses, finds out the gap between the current mode and teachers' teaching needs and students' learning needs, and

finds out the missing points of its theoretical framework, so as to explore the direction of improvement and development of its proper integration with network teaching.

4.2 Based on the TPACK Framework, Deeply Mix from Multiple Aspects

TPACK application of the research should be more inclined to China, to translate TPACK into specific subject research, help teachers in the actual teaching situation of technology combined with a specific subject consciousness, TPACK model for the cultivation of teachers build the framework of knowledge system, although TPACK not specific subjects of technology integration of operational guidelines, but it to teacher in the class will be content, technology, teaching method has a very important guiding significance. This paper is based on the basic computer course in colleges and universities as the course carrier for research. The basic computer course is a general education course, which is the first basic computer course for non-computer major students. It is a preliminary course for continuing to learn other computer courses, and it is designed to cultivate the computer culture awareness of college students. The hybrid computer teaching mode based on TPACK framework must be deeply mixed from multiple aspects to integrate the online and offline in a scientific and reasonable way.

4.2.1 Under the Framework of TPACK, Teachers are Encouraged to Have a Deep Understanding of the Teaching Content

Basic computer courses mainly include basic computer knowledge, basic use of operating system, application of Office software, basic knowledge of computer network and network security, basic application of Internet, basic knowledge and application of multimedia technology. Based on the basic operation of computer, the course focuses on the application of Office software in practical work. In the traditional classroom, these contents are all taught in the classroom, theoretical knowledge is taught orally, and practical contents are taught in the laboratory by means of explanation, guidance and operation at the same time. In fact, the teaching efficiency is low, because a lot of students can study online independently before and after class, and the valuable class time can be used for practice, creative discussion, and targeted answers. Based on the above teaching content of the course, teachers should divide it rationally and flexibly. Most theoretical chapters, such as basic knowledge of computer, network and multimedia, can be set as online learning, while those with strong practical operation should be placed in offline laboratories in a large proportion. CK requires teachers to have a deep understanding and in-depth study of the teaching content, and to make detailed design for each chapter, so as to lead learners' learning from shallow to deep to deep learning.

4.2.2 Master Scientific and Flexible Teaching Methods Under the Framework of TPACK

The key to the mixing of teaching methods lies in the formation of an integrated teaching model. Teachers from pre-class preparation to after-class evaluation, students from pre-school preview to after-class evaluation, should become a closely linked whole, so that teachers' "teaching" and students' "learning" can reach an agreement. "Teaching" is a process of two-way interaction between "teaching" and "learning". Both online and offline teaching methods should pay attention to this two-way interaction. So teachers should teaching methods flexibly to mobilize the enthusiasm of students' autonomous learning, in addition to the traditional teaching method, demonstration method, direct method, practice method is applied to the appropriate teaching scientifically, should notice more heuristics to interact, task driving method, discussion method, talking about the creative method, experimental method can play a role. Especially in blended teaching, "online" is not an auxiliary or icing on the cake of the whole teaching activity, but an essential activity of teaching. Online teaching teachers cannot meet with students to supervise the school, so students' independent learning becomes the basis and prerequisite of online teaching, and the application of teachers' teaching methods also becomes an important condition to attract students to study independently online. There are many online teaching methods of course group materials, such as task-driven method, heuristic activity method, discussion method.

4.2.3 Advanced Technology is Used to Assist Teaching under the Framework of TPACK

To carry out blended teaching, teachers' information teaching ability is the basic guarantee, and teachers' information technology level directly determines the effect of online teaching. Teachers should master the computer, Internet, mobile devices, and other new technology, and actively explore and apply information technology to change the student's study way, in order to make the learners' autonomous learning to get the best effect, the teacher must carry on the informatization instructional design meticulously, by means of all kinds of information, an intuitive, multiple digital learning material, flexible use of various teaching platform to assist learners' autonomous learning, cooperative learning, individualized learning. Teachers need to use information technology to connect and combine the real communication environment of traditional classroom teaching with the virtual communication environment of online teaching, so as to lay a good foundation for teaching activities.

4.3 Hybrid Teaching Assessment Based on TPACK Framework

For the assessment of computer hybrid teaching, teachers should pay attention to the content, methods and technical means of assessment according to the TPACK framework, and build a new and scientific assessment system. Use online hybrid task assessment, scientific compartmentalizing online score proportion, increase participation is strong, strong innovative, interaction and mutual task, to build an independent, to explore the personalized assessment environment, in the hybrid teaching evaluation should not only stiffly inspection feedback data platform, the need for personalized attention, such as high quality discussion thread, won the praise of more innovative work, etc., so as to arouse the enthusiasm of students.

5. Conclusion

TPACK provides a knowledge framework for the integration of subject content, teaching method and information technology, and is the basis for the measurement of teachers' abilities in the context of educational informatization. Blended teaching reform is a hot topic in the higher education reform. There is no fixed model for blended teaching reform, but there is an unified goal, which is to give full play to the advantages of "online" and "offline" teaching to optimize our teaching, and the effect of blended teaching is directly related to teachers' TPACK ability. This paper discusses the extension and development of TPACK framework, combined with basic computer subjects teaching so as to, in the reform of teaching research teacher TPACK ability to ascend, allowing effective online teaching union, to break the limitations of time and space and form a complete system of the computer teaching mode, to improve the traditional classroom teaching process due to the excessive teaching to students' learning initiative is not high, thinking is limited, participation is not high, these problems ,such as lack of innovation, education and teaching reform in colleges and universities teachers' information ability training, have positive meanings.

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