

Research on the Characteristic Index System of College teachers' Teaching Ability Facing Smart Education

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Abstract: Smart Education is an Intelligent “New Education” Based on Information Technology Such as Mobile Internet, Internet of Things, Cloud Computing, and Big Data Analysis. Achieving the Rich Connotation of Smart Education Will Inevitably Require Comprehensive Improvement of Teachers' Teaching Ability. Based on the Discussion of the Development Trend of Smart Education, This Paper Defines the New Connotation and Extension of Teaching Ability, and Proposes the Content, Characteristic Indicators and Training Methods of Teaching Ability. in Addition, It Also Proposes a Set of Operable Training Measures, Which Provide Practical Guidance for the Upgrading and Transformation of College Teachers' Teaching Ability in the Context of Smart Education.

1. Introduction

Smart education, which is getting more and more attention, is a concept describing learning in the information age. Smart education integrated with modern information science and technology has become a new trend in the global education field [1]. College education, teaching, and management are gradually becoming intelligent relying on the support of the next-generation information technology such as the Internet of Things, cloud computing, big data, and mobile Internet. The teaching ability of college teachers is the basis for completing teaching activities. It is the most direct, obvious and effective factor that directly affects teaching efficiency and it is a key element to improve the quality and development of school teaching [2]. The talent training goals, training objects, and training methods of higher education are quite different from those of elementary and middle school education because of the particularity of their work fields, scope of work, and working methods. Therefore, there is a big difference in the evaluation system of teaching ability between teachers in colleges and elementary and middle schools. The training and evaluation of teaching ability through the construction of college teacher's teaching ability evaluation system is the basis of college teacher management and scientific research talent training [3].

This paper uses the structure model of college teachers' teaching ability to build an index system of the first-level indicators for teaching integration ability, information acquisition ability, teaching evaluation ability, teaching interactive ability and teaching collaboration ability. Next, the secondary indicators and their specific meanings are analyzed in detail.

2. Connotation of College Teachers' Teaching Ability Facing Smart Education

2.1 Smart Education

At present, the concept of smart education has not yet formed a uniform standard. This paper believes that the essence of smart education refers to the informatization of education. It emphasizes that in the field of education, the characteristics of openness, sharing, and interaction of modern information technology are used to comprehensively promote the reform of education in order to

create a smart learning environment, master smart teaching methods, and encourage learners to conduct smart learning. Eventually, the goal of in-depth integration of information technology and teaching will be achieved to cultivate intelligent talents. This puts forward higher requirements for college teachers, and each on-the-job teacher needs to continuously update the educational concept, improve the teacher's ability to apply information technology, and expand the teaching ability in a smart education environment.

2.2 Connotation of College Teachers' Teaching Ability

Teaching ability is an indispensable ability for teachers to complete teaching tasks. It is a concentrated expression of teachers' professional competence. From the perspective of teaching tasks and content, teaching ability is the ability for teachers to implement teaching activities and complete teaching tasks with the help of specific teaching materials.

The purpose of the development of teachers' informatization teaching ability is the key content of teachers' informatization research, and the focus is on the differences from the traditional teaching ability. According to the existing research results, combined with the development status of smart education, the connotation of the college teachers' teaching ability can be defined as follows: under the guidance of modern teaching theory, the teaching ability of college teachers is based on the idea of college education, supported by information technology and teaching process, and it has the developmental ability to teach by using educational technology.

2.3 New Changes of College Teachers' Teaching Ability in the Environment of Smart Education

With the rapid development of society, the demand for talents is higher, especially for innovative talents. Therefore, young teachers in colleges are facing more severe challenges. Education informatization has entered the stage of smart education. The main points of the Department of Higher Education of the Ministry of Education in 2016 pointed out that colleges should accelerate the deep integration of information technology and teaching [4].

The construction of the teaching ability evaluation index system of college teachers provides a scientific basis for measuring the teaching ability, and it is also the starting point for improving teachers' informatization teaching ability. Stanford University professor Schulman proposed the PCK (Pedagogical Content Knowledge) framework. The PCK framework is a teacher's subject teaching knowledge framework combining CK (professional knowledge) and PK (pedagogical knowledge) [5]. Based on Schulman's PCK framework, Dr. Koehler [6] and Dr. Mishra [7] of Michigan State University in the United States conducted in-depth research to incorporate T (technical elements) into the PCK framework, and a new framework for teachers' subject knowledge-TPCK was proposed.

The indicator system for teaching ability evaluation of college teachers proposed in this paper is the result of the concrete description of the first and second level indicators based on the TPCK model.

3. Characteristic Index System of College Teachers' Teaching Ability

Informatization teaching ability is a comprehensive ability for the purpose of promoting the development of teachers and students. College teachers should have the ability to analyze teaching, such as analyzing teaching resources, predicting the deficiencies of students' knowledge structure and cultivating students' creativity. This constitutes the structure of informatization teaching ability of young teachers in colleges, as shown in Figure 1.

The design of college teachers' teaching ability evaluation index system should follow the principles of objective, scientific, reasonable and fair. According to the preliminary research, the evaluation index system of college teachers' informatization teaching ability can be determined as 5 first-level indicators and 20 second-level indicators, as shown in Table 1 below.

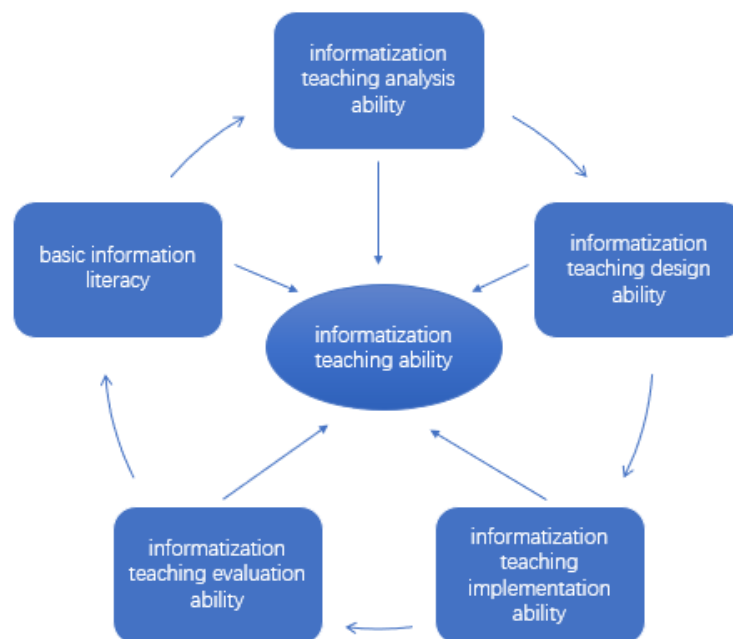


Fig.1 The Structure of Informatization Teaching Ability of Teachers in Colleges.

Table 1 the Evaluation Index System for Teaching Ability.

First-level indicators	Secondary indicators
Teaching integration ability	Integrate teaching form and teaching process
	Integrate teaching content with teaching purpose
	Integrate teaching methods with teaching content
	Integrate teaching mode and teaching objects,
	Use teaching resources
	Integrate teaching ideas with traditional teaching
Information acquisition ability	Obtain industry development information
	Information awareness
	Select and apply informatization teaching resources
	Information processing
Teaching evaluation ability	Process evaluation
	Conclusive evaluation
	Development evaluation
	Multiple evaluation
Teaching interactive ability	Interact with students through informatization means
	Interact with other teachers through informatization means
	Interact with industry experts through informatization means
Teaching collaboration ability	Collaborate with other teachers through informatization methods
	Collaborate with teaching objects through informatization methods
	Collaborate with industry experts through informatization methods

3.1 First-Level Indicators

The first-level indicators include five abilities such as teaching integration ability, information acquisition ability, teaching evaluation ability, teaching interactive ability, and teaching collaboration ability.

3.2 Secondary Indicators

Secondary indicators include:

a. Teaching integration ability: the ability to integrate teaching form and teaching process, the ability to integrate teaching content with teaching purpose, the ability to integrate teaching methods with teaching content, the ability to Integrate teaching mode and teaching objects, the ability to use teaching resources, the ability to integrate teaching ideas with traditional teaching;

b. Information acquisition ability: the ability to obtain industry development information,

information awareness, the ability to select and apply informatization teaching resources, the ability of information processing;

c. Teaching evaluation ability: process evaluation, conclusive evaluation, development evaluation, multiple evaluation;

d. Teaching interactive ability: the ability of teachers and students to interact through informatization platforms, the ability of teachers to interact with other teachers through informatization platforms, the ability to interact with industry experts through informatization means;

e. Teaching collaboration ability: the ability to collaborate with other teachers through informatization methods, the ability to collaborate with teaching objects through informatization methods, and the ability to collaborate with industry experts through informatization methods.

4. Strategies to Improve the College Teachers' Teaching Ability in the Smart Education Environment

Strategies for improving the teaching ability of college teachers in a smart education environment include the following three aspects.

4.1 Improving College Teachers' Information Literacy

College teachers should fully realize that informatization teaching is a necessary professional skill for teachers. Only by improving teachers' informatization teaching ability can we fully integrate information technology and disciplines. Changing the traditional teaching mode can make learning more in-depth, which can improve the efficiency of informatization teaching. Colleges can rationally combine teachers of different ages, education backgrounds, and genders to ensure that teachers can help each other. Experienced teachers with high teaching quality drive teachers with ordinary teaching ability to make progress together.

4.2 Creating an Informatization Teaching Atmosphere in Colleges

Improve the informatization teaching environment of colleges, formulate relevant policies, and create an informatization teaching atmosphere. Colleges should take corresponding positive measures in the three aspects: First, colleges should improve the equipment of hardware and other equipment, and introduce high-end technical talents to help teachers carry out information-based teaching work; Secondly, colleges should introduce corresponding policies to encourage college teachers to use information technology for teaching and carry out more informatization teaching design competitions to create an atmosphere of using information technology in the entire college; Third, colleges should formulate relevant information-based teaching incentive mechanisms. It is necessary to strongly encourage teachers to use information technology for teaching, which can stimulate teachers' enthusiasm for using information technology for teaching. In addition, the ability to apply information-based teaching can be included in the year-end evaluation and professional title selection, which encourages young college teachers to take the initiative to use information to teach.

4.3 Strengthen the Training of College Teachers' Teaching Ability

Improve the training content of college teachers and innovate evaluation and assessment methods. Each dimension of teachers' informatization teaching ability is positively related, and the performance of different ability dimensions of different teachers is not balanced. Therefore, we should consider training the design ability, analysis ability, implementation ability, and evaluation ability together to improve teachers' own teaching application awareness. This is conducive to teachers' mastery of basic knowledge and skills, and can strengthen communication and sharing among peers. Moreover, the training process needs to be strengthened. A monitoring team needs to be established to manage the training process. Training assessment and innovation assessment methods, such as information-based teaching demonstrations, need to be done well. The follow-up guidance and answers to questions during the training effectively promote the improvement of

teachers' information-based teaching ability.

In summary, only through the unification of the three aspects of teacher, college and training level can the effective teaching ability of young teachers in colleges be effectively improved.

5. Conclusion

Based on the analysis and summary of related literature research results, this paper explores the connotation of college teachers' teaching ability for smart education and proposes an index system of teaching ability characteristics of college teachers. This paper also carries out strategies to improve the college teachers' teaching ability in the environment of smart education through preliminary discussion. However, there are still many limitations in the research of this paper, which need to be continuously improved in further research. Necessary supplements need to be made in the investigation and improvement of the indicator system, the analysis of indicator weights, and the investigation of the rationality and feasibility of the promotion strategy.

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References

- [1] Zhu, Z. T., He, B. (2012). Smart Education: a new realm of educational informatization [J]. *Journal of Electrification Education Research*, Vol. 33, No. 12, pp. 5-13.
- [2] Huang, D. C., Zhao, J. (2016). Analysis of evaluation indexes of university teachers' teaching ability. *Technology Square*, No. 12, pp. 161-163.
- [3] Chen, B. Q., Li, B. Y. (2011). Construction of evaluation model of university teachers' teaching ability and its philosophical reflection. *Journal of Jilin University (Natural Science Edition)*, No. 6, pp. 121-125.
- [4] the Ministry of Education, (2016). Highlights of the work of the Higher Education Department of the Ministry of Education in 2016. *Education High Education Letter*, No. 7.
- [5] Shulman, L.S. (1986). Those who understand: knowledge growth in teaching. *Educational Researcher*, Vol. 15, No. 2, pp. 4-14.
- [6] Koehler, M.J., Mishra, P. (2008). Introducing TPCK. AACTE Committee on Innovation and Technology (Ed.), *The handbook of technological pedagogical content knowledge (TPCK) for educators*. Mahwah, NJ: Lawrence Erlbaum Associates.
- [7] Mishra, P., Koehler, M.J. (2006). Technological pedagogical content knowledge: A framework for integrating technology in teacher knowledge. *Teachers College Record*, Vol. 108, No. 6, pp. 1017-1054.