

The Connotation and Framework Construction of Digital Literacy of University Teachers in The Intelligent Era

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Abstract. With the further development of educational information technology, digital technology plays a more and more important role in modern classroom. In addition, with the outbreak of COVID-19, the implementation of online teaching in multiple locations across the country has put forward higher requirements for teachers' digital literacy. After deeply interpreting the specific concept of digital literacy, further exploring the connotation of digital literacy and understanding a large number of related literature research, this paper constructs the framework of digital literacy of university teachers in the digital intelligence era, which is divided into three dimensions. Thirteen basic elements. According to the previous article, this paper puts forward the implementation path of three aspects of university teachers' digital literacy framework, namely, to build a perfect university teachers' professional training system to improve teachers' basic digital literacy; cultivate university teachers' concept of technological integration and enhance peer cooperation and communication to improve their own digital teaching ability; develop diversified digital literacy promotion and evaluation tools to help teachers' digital learning.

Keywords. The age of intelligence; Teachers; Digital literacy

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1. Introduction

With the outbreak of COVID-19, the global education system has been greatly challenged and impacted. Forced by the epidemic situation, most universities around the world have adopted online teaching or mixed teaching more or less, but the effect of this kind of teaching is different in different colleges and universities and different regions. As the leader of teaching, teachers participate in the whole process of teaching, and the teaching effect is closely related to the teachers' own accomplishment. At present, both online teaching and hybrid teaching have put forward requirements for the digital literacy of university teachers. In September 2020, the European Union issued the "Digital Education Action Plan 2021 ~ 2027". It is proposed that digital ability should become the core technology of educators.

After experiencing the information age and the digital age, education has ushered in a new era of intelligence. Under the background of the intelligent era, data technologies such as big data and

artificial intelligence have sprung up everywhere in the field of education, which makes the field of education begin to put forward new challenges and requirements for the digital literacy of learners and teachers, especially for teachers. Teachers' digital literacy and digital literacy have gradually received the focus of educational research practice. For the role of teachers, the impact of the vigorous development of intelligent technology on teachers is reflected in two aspects: on the one hand, the research and development of artificial intelligence teachers, digital technology with the support of big data and sophisticated learning analysis technology, can make accurate judgment and appropriate feedback on learners' various reactions and learning conditions, and promote learners' accurate and personalized learning. On the other hand, with the deep integration of digital technology and teachers, under the premise of the continuous development of technology, teachers continue to improve their digital literacy and comprehensively use different digital technologies to teach learners. This poses a great challenge to teachers' digital literacy.

On the basis of combing the relevant digital literacy literature, this study constructs the digital literacy framework of college teachers in the intelligent era, and proposes the corresponding practical path of teachers' digital literacy framework, in order to help the digital intelligent teaching in universities.

2. Literature Review

2.1 *The Connotation Of Digital Literacy*

The connotation of digital literacy was first defined by the Israeli scholar ESHET-ALKALAI Y, who divided the framework of digital literacy into five types: picture and text literacy, innovative literacy, branch literacy, information literacy and social emotional literacy. Ng, W believes that as an attribute, digital literacy is not only a simple search and recognition of digital information; it combines the ability to absorb and understand information from a variety of digital resources. Youmei Wang and others believe that digital literacy is formed through the development of media literacy, computer literacy, information literacy and network literacy. It is a comprehensive, dynamic and open concept. Ala-Mutka, K believes that digital literacy in the intelligent age emphasizes the instrumental knowledge and skills required by digital media, including the ability to communicate and collaborate, information management, high-level skills for problem solving and learning, and application attitude skills characterized by cross-cultural, critical, creative, responsible and autonomous. Degang Li believes that digital literacy is the ability to recognize, criticize and interact with digital content, multimedia language and digital media by means of digital technology in the digital environment. In this study, digital literacy is defined as the comprehensive and creative ability that teachers need to carry out digital teaching.

2.2 *Related Research On Digital Literacy*

2.2.1. *Basic Situation*

Junqi Wu deepened the connotation of digital ability on the premise of discriminating digital literacy and digital ability, and then, on the basis of comparing the dimensions of teachers' digital ability in various countries, from three levels and thirteen basic points, this paper puts forward some suggestions, such as optimizing the curriculum system of vocational education and training, reasonably arranging the training content of digital skills, paying attention to the practical ability of teachers' knowledge form, and the concrete measures of combining knowledge with practice.

In addition, Guangfen Yan compared seven representative frameworks of teachers' digital literacy in the European Union and its member states, and analyzed the core elements of five frameworks of teachers' digital literacy, such as digital teaching, digital content creation, digital communication and cooperation, digital security, and digital evaluation.

2.2.2. *Research On The Strategy Of Improving Digital Literacy*

The research on the cultivation of digital literacy is mainly divided into two angles: learners and teachers. In terms of the improvement of learners' digital literacy, E-M Zhang interpreted the Global Framework for Digital Literacy issued by UNESCO, which mainly requires learners to have seven dimensions: equipment and software operation, information and data literacy, communication and collaboration, digital content creation, digital security, problem-solving and career-related abilities. Du Y-Y's empirical analysis through a survey of primary and secondary school teachers in two provinces shows that the digital literacy of Chinese primary and secondary school teachers is in the middle level. especially in the aspects of "professional participation", "teaching and learning", "evaluation" and "improving learners' digital literacy" is still in the primary stage. For this reason, the author proposes to improve teachers' digital literacy from the aspects of improving teachers' awareness of the value of digital literacy, meeting their personalized demands, building intelligent space, and creating a digital teaching atmosphere.

2.2.3. Summary And Enlightenment

From the above literature review and analysis, we can understand that the research in the field of digital literacy is still in the stage of continuous enrichment and development. The literature focuses on the comparative analysis of the framework of teachers' digital literacy in different countries and the strategic research on how to improve teachers' or students' digital literacy. Digital literacy has its unique influence on teaching and learning, but how does digital literacy affect teaching or learning? What is the impact of the subordinate concept of digital literacy on students' learning and teachers' teaching? The research in these areas still needs a large number of scholars to fill the gap.

3. Construction of Digital Literacy Framework for University Teachers

With the arrival of the information age, the digital literacy of teachers has become one of the core attributes of university teachers around the world, and the research on the framework of digital literacy of university teachers has also become one of the research trends. The international research on the framework of teachers' digital literacy is also relatively mature, such as UNESCO's "ICT competency Framework for Teachers", the European Union's "European educators' Digital Literacy Framework", Norway's "teacher Professional Digital Literacy Framework", Spain's "Teachers' General Digital Competency Framework" and so on. Based on the experience of teachers' digital literacy framework, Yuting Li and others divided the dimensions of educators' digital literacy framework into professional ability, teaching ability and learner ability, and refined the indicators step by step according to the above three dimensions.

This study defines the connotation of university teachers' digital literacy by consulting a large number of related literature on the basis of detailed analysis of the factors of teachers' information literacy, this study draws lessons from the framework of digital literacy studied by Ning Ma, Yuting Li, Junqi Wu and others. After a lot of consultation and deliberation, the framework of digital literacy of university teachers in the intelligent era is finally constructed. Then, by the way of interview, we communicate face-to-face with the teachers and experts who have carried out relevant index research and research for a long time, and absorb their valuable experience. the evaluation index system of digital literacy of university teachers has been repeatedly modified and improved, and the final framework of digital literacy of teachers in the intelligent era has been obtained, as shown in figure 1.

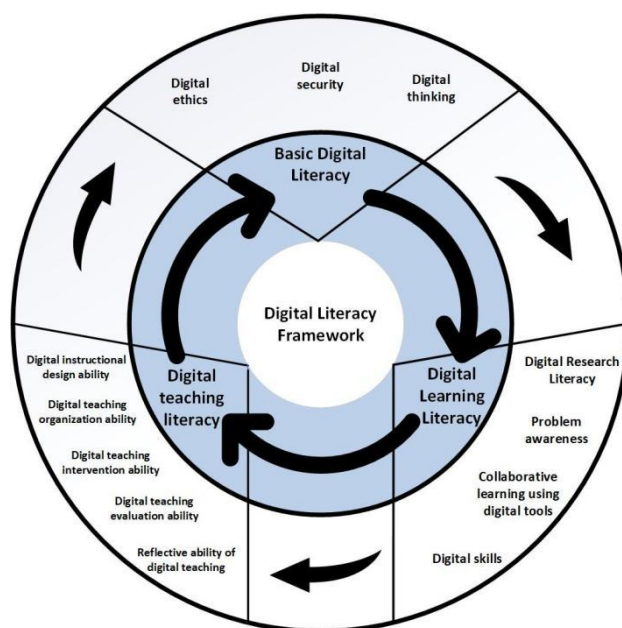


Figure 1. Digital literacy framework for teachers.

The framework is divided into three dimensions and thirteen secondary indicators. The first dimension is the basic digital literacy, which refers to the necessary literacy of teachers in the digital intelligence era. Its subordinate indicators are digital ethics, digital security and digital thinking. Digital ethics and digital security are the necessary core qualities for teachers to carry out digital teaching, which includes moral consciousness, legal consciousness, copyright consciousness, privacy security consciousness and so on. For example, in the actual process of digital teaching, we should not only protect students' sensitive information such as privacy, but also prevent students from receiving bad behaviors such as network fraud and bullying in time, so as to establish a safe digital network awareness for students. Digital thinking refers to the idea that teachers are willing to actively use digital means to improve teaching quality and enrich their own knowledge in the process of teaching.

The second dimension is digital teaching literacy, which has five subordinate indicators, namely, digital teaching design ability, digital teaching organization ability, digital teaching intervention ability, digital teaching evaluation ability and digital teaching reflection ability. Digital instructional design ability means that teachers can choose training materials, determine teaching objectives, adopt appropriate digital teaching models, digital resources and tools according to the requirements of students' personality development, and adopt appropriate digital teaching models, digital resources and tools. the ability to set digital evaluation programs. The organizational ability of digital teaching means that when developing digital teachers, teachers can fully coordinate the various elements of teaching and stimulate students' interest in learning, so as to cultivate students' awareness of autonomous learning and improve their ability of collaborative learning. compared with other digital teaching abilities, it points to the control of the whole practical activities. If teachers improperly use digital technology, it will not only affect the teaching effect. It may even endanger the physical and mental health of teachers and students. The intervention ability of digital teaching refers to the ability of teachers to supervise, intervene and adjust effectively when students have cognitive bias or low level of cognitive participation in the process of digital teaching. The ability of digital teaching evaluation means that teachers can use the tools and programs of digital evaluation to accurately evaluate the process and results of students' learning data according to the goals of digital teaching and the different situations of students. and then guide students to self-evaluation and mutual evaluation. The reflective ability of digital teaching refers to the ability of teachers to make self-reflection by using digital tools according to the problems in teaching, and to improve the teaching plan and optimize the teaching

results. Evaluation and reflection are the core links of constantly optimizing digital teaching. Digital technology provides teachers with corresponding convenient conditions and objective data, which enriches the diversity and ultimate effectiveness of teaching evaluation. Therefore, teachers should use a variety of digital evaluation means and programs to promote the spiral development of "teaching-evaluation-reflection-re-teaching-re-evaluation-re-reflection". To sum up, with the continuous development and progress of digital technology, each different ability of teachers in the process of digital teaching plays an irreplaceable role, so teachers should not only pay attention to the improvement of unilateral digital ability. we should also pay attention to the mutual supplement and comprehensive application of different digital teaching abilities.

The third dimension is digital learning literacy, which refers to the ability of teachers to use digital technology and resources for independent learning and to extract and innovate general rules. It includes digital research literacy, problem awareness, collaborative learning using digital tools and digital skills. Digital Research Literacy refers to the ability to identify problems and conduct academic research at work, summarize teaching rules and have unique insights into different things, and the ability to use digital tools to develop and design original works. Problem consciousness means that digital tools and means can be used to solve problems in digital teaching, the accuracy and flexibility of digital technology provide a sufficient foundation for teachers to understand data through multi-channels and analyze data from multi-angles. therefore, teachers should give full play to critical thinking and put forward digital and flexible problem solutions. Collaborative learning using digital technology is not only an important means of teachers' own professional development, but also the main way for teachers to process and create new digital teaching programs. Digital technology breaks the limitation of time and space on teachers' cooperation. In the process of cooperation, teachers can not only optimize their current digital teaching, but also communicate with each other, learn from each other and develop in coordination. Digital skills refer to the ability to diagnose, evaluate, intervene, process and create one's own development by using digital tools.

4. The Implementation Path of Digital Literacy Framework for College Teachers

4.1. Build A Sound Professional Training System For University Teachers To Enhance Teachers' Basic Digital Literacy

Teacher training in colleges and universities is an important way to promote teachers' professional growth. Constantly improving the digital literacy of university teachers is the direction of professional development of university teachers in the digital era. Technology empowers wisdom education. Use the new generation of digital technology to empower people and build a society driven by digital technology. In addition, to build a pre-service and in-service training system for teachers to help university teachers improve their digital literacy, in reality, in-service teachers have little opportunity to further improve their digital ability, and it is difficult for them to allocate a lot of energy to build themselves. the effect of short-term investment is not ideal, so we can only make up for the deficiency through unified and standardized on-the-job training to meet the actual needs of teachers and enhance the pertinence of on-the-job training. Ensure that teachers can learn something and gain something. In the face of different groups of teachers, the emphasis should be changed, and theory teachers should focus on the training of teachers' digital teaching methods, ideas and teaching models. For the teachers of practical courses, we should pay attention to the training of digital environment resources and digital simulation training room [17]. The improvement of teachers' digital literacy is not temporary, nor short-term, but to establish the concept of lifelong learning, to break through themselves in practice, to achieve the unity of knowledge and practice.

4.2. Cultivate The Concept Of Technology Integration Among University Teachers And Enhance The Cooperation And Exchange Between Peers To Enhance Their Digital Teaching Ability

The research on the integration of digital literacy and subject curriculum mainly refers to excellent digital teaching practices or teaching models. If there are scholars who conduct research on foreign

language teaching practices in Europe from the perspective of digital literacy, There are also scholars from the perspective of digital literacy education and art education curriculum integration analysis of digital literacy and subject curriculum integration issues. The relevant studies focus on digital literacy and subject integration, but less from the specific subject characteristics and methods to start, so the promotion of digital literacy of college teachers urgently need to explore how to determine the appropriate digital technology according to the nature of the subject curriculum to carry out subject knowledge integration. In addition, through the digital media to build a digital network interactive platform for resource aggregation and group intelligence, to build a digital learning community for teachers, to strengthen teachers' exchanges and communication, learn from each other, and learn from experience. The government has come forward to establish an online teacher network called "Teaching and Research Space," bringing together college teachers from across the country. Allows and safeguards teachers to engage in online collaboration in a free and safe manner, share digital educational resources between teams or groups, and provide the convenience of sharing documents online, as well as attending online meetings.

4.3. To Develop Diversified Digital Literacy Improvement And Evaluation Tools To Help Teachers' Digital Learning

Teachers' digital evaluation ability can accurately judge the learning effectiveness of students, the teaching status of teachers themselves and the overall teaching effect. We should strengthen the digital evaluation of teachers, develop multiple evaluation tools of teachers' digital literacy and formulate multi-dimensional evaluation indicators. First of all, develop self-assessment tools for teachers' digital literacy. Self-assessment tools can help teachers understand their own professional development, check and fill gaps, and clarify the main points of their own development. Secondly, the evaluation criteria of students' digital literacy. The evaluation standard of students' digital literacy can effectively guide teachers to carry out the evaluation of students' digital literacy, help teachers find the weak areas of students' development, and urge teachers to improve teaching strategies in time and teach students in accordance with their aptitude. Finally, finding the problems existing in students or themselves can not only make teachers correct in time, but also help to improve teachers' reflective ability and critical consciousness, so as to continuously optimize digital teaching programs and reflect on the ideal effect of spiraling teaching results.

5. Conclusion

The impact of technology in the intelligent era has brought a huge challenge to the role of teachers. Teachers want to shoulder the important task of the times and better cultivate talents, and it is urgent to give play to the unique advantages of teachers, improve their digital literacy, and firmly control the convenience brought by technology. Instead of being manipulated by technology, they become appendages of technology. Therefore, this paper constructs the digital literacy framework of teachers in the intelligent age, in order to provide reference for the development of teachers in the technological age.

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