

# Exploring the Path of Digital Literacy Cultivation for Teacher Trainees based on the Digital Literacy for Teachers Standards

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## Abstract

The strategy of digitalisation of education has put forward new requirements for the cultivation of digital literacy of teacher trainees. Digital literacy training of teacher students is an inevitable requirement to promote the digital China strategy, build a high-quality teaching force, and adapt to the learning situation of students in the new era. There are dilemmas in the existing digital literacy training for teacher trainees such as the lack of school-level top-level design, the lack of curriculum construction, and the absence of evaluation standards. In the digital literacy training of teacher students, it is necessary to build a digital literacy training network based on the standard of Digital Literacy for Teachers to cultivate digital awareness; establish a synergistic system of popular courses + demonstration courses to improve knowledge and skills of digital technology; set up a platform for competitions and practical training to promote the in-depth fusion of education and digital applications; use the main channel of ideological and political education to incorporate the digital social responsibility into the scope of moral cultivation; and equip on-campus+off-campus mentors so that digitalisation can become a part of the professional development. mentors to make digitalisation an intrinsic need for professional development.

## Keywords

Digital Age; Teacher Educators; Digital Literacy; Digital Literacy for Teachers.

## 1. Introduction

In the global digital world, digital technology has become an important force for social change, and all aspects of life have been accelerated and integrated with digital technology. Digital+ has become an inevitable choice for every country, industry and individual to keep up with the pace of the times without being eliminated by the wave of digitisation, and at the same time, it is also a "catalyst" that empowers traditional industries, incubates new quality productivity, and facilitates the birth of new forces. The report of the 20th National Congress of the Communist Party of China (CPC) put forward for the first time the strategy of education digitisation, pointing out that it is necessary to "promote the digitisation of education, and build a lifelong learning society for all people, and a large country with a learning culture. <sup>[1]</sup> In 2023, the National Education Conference also proposed to "deeply promote the strategic action of education digitisation". In the same year, the World Conference on Digital Education was held in Beijing to discuss the impact and challenges of digitalisation on education under the theme of "digital change and the future of education". Undoubtedly, in the field of education, digital+ is rapidly and deeply changing the traditional mode of education. Digital literacy is not only one of the basic literacies that students need to possess, but also the professional literacy that teachers must possess. In the process of digital transformation of education, teachers are the key factor, the main driving force, and the bridge intermediary in promoting the integration of education and digital technology. Teacher trainees are the reserve team of teachers, and their ability and level of digital literacy directly determine the digital education ability of the teaching force, indirectly affecting the quality and efficiency of China's digital transformation of

education, as well as an integral part of enhancing the digital literacy of the whole population. Therefore, sorting out the current status of digital education for teacher trainees, establishing a digital literacy cultivation system for teacher trainees that integrates with the existing education and teaching system, incubating digital literacy cultivation courses for teacher trainees in line with the requirements of the times, and comprehensively enhancing teacher trainees' awareness of digital education, knowledge and skills, application skills, ethical norms, and professional innovation abilities, have become an important pathway for empowering teacher trainees' education with digital education.

## **2. The Value Purpose of Digital Literacy Education for Teacher Trainees**

### **2.1. Cultivating Digital Literacy among Teacher Trainees is an Inevitable Requirement for Building a Digital+ Teaching Force.**

With the development of digital technology, the paradigm of all kinds of education is changing. In the classroom, the networked electronic large screen can be accessed at any time to high-quality classroom resources; on the playground, intelligent sports equipment to make the ten minutes between classes more interesting; open the mobile phone, a variety of campus data and information is readily available ..... Smart Campus, technology is full of sense. The construction of smart campus and the development of artificial intelligence have brought great changes to teachers' education and teaching. Teachers are the beneficiaries and implementers of digital education, as well as creators and disseminators, digital technology to the teaching method and parenting approach to bring new problems, new challenges, as teachers are bound to use digital capabilities and literacy to solve, digital + become the basic professional literacy of teachers in the new era. [2]

### **2.2. Cultivating digital literacy among teacher trainees is an inevitable requirement for advancing Digital+China.**

In 2023, the CPC Central Committee and the State Council issued the Overall Layout Plan for the Construction of Digital China, pointing out that the construction of digital China is an important driving force for the promotion of Chinese-style modernisation, and a strong pillar for enhancing the country's new competitive advantages. The construction of Digital China covers all sectors of society and is a lasting, three-dimensional project. The Plan points out that it is necessary to promote the participation of institutions of higher education in the construction of digital China. For teacher training colleges and universities, promoting digital literacy education for teacher trainees is an important channel to participate in the construction of digital China and an important path to help the construction of digital China.

### **2.3. Cultivating Digital Literacy among Teacher Educators is the Only Way to Adapt to the Needs of Digital-plus Students.**

Primary and secondary school students in basic education are the "aborigines" of the digital age. Digital media, platforms and technologies have accompanied their growth process, and their way of thinking has been deeply influenced by digital+, and their learning styles and pathways are different from those of their counterparts in the past. Digital literacy is an essential core quality for the professional development of modern teachers. Only with digital literacy that keeps pace with the times can they fully understand the way of thinking and learning of the education targets in the education process, choose reasonable teaching methods, tailor teaching to the students' needs, and improve the quality of education.

### **3. The Realistic Dilemma of Digital Literacy Education for Teacher Trainees**

In the practice of teacher training, the establishment of a feasible digital literacy cultivation system for teacher trainees still faces the dual dilemmas of theory and practice, such as the lack of embedded design, the slow construction of curricula, and the lack of evaluation standards.

#### **3.1. Lack of School-level Top-level Design, the Digital Literacy Cultivation System for Teacher Trainees Needs to Be Further Co-ordinated and Planned.**

At present, the digital literacy training of teacher training students still stays more at the national planning level, and the teacher training colleges and universities still lack a specific school-level top-level design. [3] The cultivation of digital literacy for teacher educators requires the establishment of an implementation programme covering a series of elements such as cultivation objectives, methods, contents and effects to ensure that the cultivation of digital literacy can be put into practice. After a long period of development, the teacher training majors have formed a more mature and systematic personnel training programme, how to integrate the concept of digital literacy training and curriculum into the existing training system and add digital literacy training modules without destroying the scientific and systematic nature of the original programme is the core issue to be concerned with in the first place.

#### **3.2. Lack of Professional Curriculum Construction, the Digital Literacy Training Programme for Teacher Educators Urgently Needs to Accelerate the Pace of Construction.**

Traditional teacher education in the cultivation of digital literacy of teacher trainees stays more at the level of computer operation courses such as basic computer and educational technology, which can only cultivate the informatisation skills of teacher trainees, whereas digital literacy also covers various elements such as digital education awareness, application ability, and ethical norms. Simply accumulating courses that include each element will not only increase the total amount of class time, resulting in an even heavier curriculum system that is already numerous now, but also go against the concept of digital+ integration. Therefore, in how to upgrade and transform the existing information technology skills courses on the basis of the new requirements of digital education, it is a practical need to cultivate the digital literacy of teacher students by building as soon as possible a comprehensive digital literacy course that meets the characteristics of teacher education, highlights the concept of digital +, and is suitable for the characteristics of post-00 learning. [4]

#### **3.3. Lack of Evaluation and Measurement Standards, the Evaluation Standards of Digital Literacy for Teacher Educators Need to Be Constructed as Soon as Possible.**

Scientific and reasonable digital literacy evaluation standard is the basic condition to ensure the cultivation and learning of digital literacy of teacher trainees, and it is also the impetus to promote each teacher training college to accelerate the construction of digital literacy system for teacher trainees, and urge teacher trainees to actively and proactively improve their digital literacy. 2022 The Ministry of Education of the People's Republic of China issued the "Teachers' Digital Literacy Standard" on 30 November 2022 [5], which is only an elaboration on the digital literacy that teachers should have, and it hasn't not addressed the level of evaluation. At the same time, in recent years, the teacher training colleges and universities have a greater impact on the teacher training professional certification, in the "secondary education professional certification standards" for the core qualities of teacher trainees did not focus on digital literacy. According to the requirements, the teacher training programme certification is divided into

three levels, Level 1 is the basic requirements, Level 2 is the qualified requirements, and Level 3 is the excellence requirements. Only in the third level of certification is there a requirement for "technology integration" in the dimension of "learning to teach", stating that teacher trainees should "initially master the methodological skills of applying information technology to optimise subject classroom teaching, and have the ability to use information technology to support the design of learning and the transformation of student learning". information technology to support learning design and initial experience in transforming students' learning styles." [6] It can be seen that in the existing education system for teacher trainees, digital literacy is regarded as a higher-order literacy for teacher trainees, which is somewhat different from the requirement of digital literacy as a basic literacy for teacher trainees in digital education. The lack of promotional evaluation and measurement standards will make teacher training colleges lack the motivation to promote digital literacy education for teacher trainees, and will also prevent digital literacy education from being implemented and put into practice in the end. Therefore, how to build promotional evaluation standards for digital literacy at the macro level, an evaluation framework to urge teacher trainees to strengthen their digital literacy at the meso level, and an evaluation system to implement the learning effects of digital literacy education for teacher trainees at the micro level are the key conditions to ensure that the digital literacy training for teacher trainees is truly implemented, detailed, and on the ground.

#### **4. Cultivation Path of Digital Literacy Education for Teacher Trainees**

In the standard of Digital Literacy for Teachers issued by the Ministry of Education, the digital literacy of teachers is defined as "the awareness, ability and responsibility of teachers to make appropriate use of digital technology to acquire, process, use, manage and evaluate digital information and resources, to discover, analyse and solve educational and teaching problems, and to optimise, innovate and transform educational and teaching activities." and based on this definition, five first-level dimensions, 13 second-level dimensions and 33 third-level dimensions are constructed. "And based on this definition, we constructed five first-level dimensions, 13 second-level dimensions and 33 third-level dimensions of teachers' digital literacy. Among the first level dimensions are 5 dimensions of digital awareness, digital technology knowledge, digital application, digital social responsibility and professional development. Each dimension is broken down and described in detail in the secondary and tertiary dimensions, explaining in detail the five dimensions of digital literacy that teachers should possess, and building an overall framework of digital literacy for teachers. "The digital literacy framework for teacher educators can be directly benchmarked by simply replacing the subjects in it with teacher educators." [7] Therefore, digital literacy education for teacher students should be based on the standards of Digital Literacy for Teachers, and build a specific and feasible practice path from the five dimensions.

##### **4.1. Constructing a Cultivation Network and Embedding Digital Awareness**

Digital awareness includes three aspects: digital awareness, digital willingness and digital will. It takes a long time to change and identify with the consciousness level, and simple preaching and hard education not only can't achieve a good educational effect, but also cause resentment and rejection of the educated. Therefore, the cultivation of digital awareness of teacher trainees should be realised through the digitalisation of campus environment, infrastructure, teaching methods, management methods and learning resources, so that teacher trainees can feel the convenience brought by digitalisation, observe the real cases of digital education, and realise the value and significance of digital education in their study life on campus. And they can take the initiative to generate the willingness to adopt digital teaching methods in the education process, take their own teachers as an example, overcome the difficulties arising from the

process of digital teaching, constantly adjust the way of digital teaching, and ultimately reap the fruits of digital education and teaching and constantly improve the quality of teaching.

#### **4.2. Establishing a Synergistic System of Popularisation + Demonstration Courses to Enhance Digital Knowledge and Skills**

Digital knowledge and skills require teacher trainees to possess both knowledge related to digital technology including common digital technologies and concepts, as well as skills in the application of digital technology resources, including strategies for selecting and using digital technology resources. Therefore, teacher training colleges should establish a digital knowledge and skills cultivation model of general education courses or online courses + professional courses according to the actual situation of each institution. Adhering to the concept of not destroying the original curriculum system, on the one hand, they should popularise the knowledge and technical resources of digital technology through general education courses, network courses and lectures, on the other hand, they should guide the lecturers of the professional courses and practical courses to use digital teaching means and technology in teaching and demonstrate the application strategies of digital technology, so that the teacher trainees can intuitively see the application of digital technology in the teaching and learning process, and transform it into their own knowledge and skill reserves.

#### **4.3. Build a Competition and Training Platform to Promote the Deep Integration of Education and Digital Applications**

The focus of digital literacy for teacher trainees is to cultivate their ability to apply digital technology to the whole process of education and teaching, which mainly includes four dimensions: digital teaching design, digital teaching implementation, digital academic evaluation, and digital collaborative education. We make good use of the "second classroom", uphold the concept of "promoting training and learning through competition", and actively organise activities with the theme of digital literacy, including debate competitions, teaching skills competitions, summer teaching trips and other activities at all levels, including the school, faculty, department, class and clubs. Encourage teacher trainees to participate in all activities, consolidate their digital knowledge, improve their digital skills, and acquire the practical ability to apply digital technology to the process of education and teaching through various practice platforms. At the same time, relying on the "second classroom" platform, we can produce the "Digital Literacy Evaluation Manual for Teacher Trainees", and take the number, type, and performance of teacher trainees' participation in the activities as one of the indicators for measuring their digital literacy ability, so that teacher trainees can have a "platform" to rely on and a "platform" to support the cultivation of their digital literacy and learning. "(d) Use good ideological and political education to promote the development of digital literacy.

#### **4.4. Use the Main Channel of Ideological and Political Education to Incorporate Digital Social Responsibility into the Scope of Moral Education.**

An important element of digital literacy for teacher trainees that cannot be ignored is digital social responsibility, including the rule of law and ethics, as well as digital security protection. With the increasingly close connection between digital technology and life, there is a growing problem of moral misconduct and criminal offences caused by the neglect of ethical norms and legal provisions on the use of digital technology. Teacher educators not only need to have good digital social responsibility themselves, but also shoulder the responsibility and mission of guiding students to regulate the use of digital technology in the process of education and teaching. Digital social responsibility is an important content and component of moral education. Teacher training colleges need to make good use of the main channel of ideological and political education, and carry out cybersecurity education by means of thematic class meetings, reunion activities, and the National Information Security Day, so as to make teacher

trainees aware of the relevant ethical requirements and legal systems of digital security and cybersecurity, to establish a sense of responsibility for maintaining a good digital environment, and to have the ability to make reasonable use of digital products and services, and to ability to protect personal and social privacy and information security.

#### **4.5. Equip On-campus + Off-campus Mentors to Make Digitalisation an Intrinsic Need for Professional Development**

In the digital era, digitalisation is not only a means of education, but also a way of life. Having good digital literacy and being able to transform digital technology resources into the ability to promote one's own and the community's professional development is the ultimate goal of digitalisation in education. For teacher educators, digital professional development includes digital learning and training, as well as digital teaching research and innovation. In the post-epidemic era, digital learning and training is more common and easier for teacher educators. However, as "novices" in the teaching profession, pedagogical research and innovation are relatively distant and difficult. Therefore, teacher training colleges can divide teacher training colleges into small groups and provide teacher training students with internal and external mentors who have experience in digital research and innovation, and introduce, share and teach them cases of digital research through free talks, exchanges and project presentations, so that teacher training students can have a preliminary concept and impression of using digital technology for education and teaching research, and develop an interest in digitalisation as an important assistant in promoting their personal professional development. They will develop an interest in digitalisation as an important aid to their professional development, and develop ideas and competence in using digital technologies for educational research while they are still at school. After entering the field of education, they are able to carry out relevant research in response to educational and pedagogical problems existing in the actual teaching process, promote personal professional development, and form habits and attitudes of lifelong learning.

[8]

### **5. Conclusion**

With the implementation of the education digitalisation strategy and the release of the Digital Literacy for Teachers (DLT) industry standard, the cultivation of digital literacy for teacher trainees has become an important part of the formation of digital literacy for teachers, and a challenge of the times that teacher training colleges and universities have to face and an urgent need to solve. The cultivation of digital literacy of teacher trainees cannot be a simple addition, but must be measured against the Digital Literacy of Teachers from the school's meso-level, and in the process of pushing forward the digital transformation of teacher education, a scientific and operationally strong formation system should be established, so as to realise the digital transformation of teacher training colleges and universities, and at the same time, enable teacher trainees to be immersed in the atmosphere of the campus of the digital transformation, and to form a digital awareness in an intangible way, acquire digital knowledge and skills, and have the ability to apply digital knowledge. knowledge and skills, and digital application ability. In the construction of the talent training system, it is necessary to take the initiative to integrate with the existing talent training programme and synchronize it with the improvement of digital literacy of teachers in teacher training colleges, so as to avoid the contradiction of the curriculum, the increase of the burden of coursework, and the detachment of theory. The cultivation of digital literacy of teacher training students is a long way to go, and the current theoretical research and practical exploration are in the initial stage, which requires researchers to collaborate and communicate with each other to conduct comprehensive and in-depth research.

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