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Enhancing Digital Security of College Teachers Empowered by Digital Technology

Fang Liu[1], Junjie Zhang[2,3,*]

[1]*School of Literature and Media, Wuzhou University, Wuzhou 543002, Guangxi, China*
[2]*Academic Affairs Office, Wuzhou University, Wuzhou 543002, Guangxi, China*
[3]*Academy of Sciences Wuzhou University, Wuzhou 543002, Guangxi, China*
**Corresponding Author.*

Abstract:
The rapid development of digital technology has promoted the transformation of college education and teaching, and put forward higher requirements for the digital security of college teachers, who are the key resources of education. College teachers should make full use of digital technology knowledge and application skills, change data attitude, enhance data awareness, enrich data knowledge and strengthen data skills in the daily education and teaching process. Through systematic training, optimization of infrastructure, promotion of resource sharing and construction of data cloud platform, effective application of digital technology, improving teaching quality and scientific research efficiency, can adapt to the development and change of education in the digital age.

Keywords: digital security, digital age, college teachers, digital literacy, education quality, lifting path

INTRODUCTION

The acceleration of global digital transformation is profoundly changing the way people learn, work and live. As the main front of talent training, colleges and universities will inevitably be deeply affected. Digital technology continues to integrate into classroom teaching, which has a great impact on the traditional cramming and abstract teaching mode, and also brings opportunities for college education and teaching. As the key players in knowledge transfer and students' ability development, college teachers' digital literacy is the key and core to implement education digital strategy, reform education and teaching mode, and innovate education and teaching concepts, as well as an important driving force to promote education digital transformation [1]. Digital literacy not only includes the basic cognition and application ability of digital technology, but also involves a broader dimension such as digital awareness and digital social responsibility. Improving the digital literacy of college teachers is the basic work to achieve the goal of education digitization, and it plays a crucial role in training students who meet the needs of future social development. This paper aims to explore ways to improve digital literacy of college teachers, and provide theoretical and practical guidance for teachers' effective adaptation and innovation in the digital teaching environment by strengthening institutional research, promoting infrastructure connectivity, resource sharing and capacity building.

THE CONCEPT OF DIGITAL LITERACY OF COLLEGE TEACHERS

There are many different interpretations of teacher digital literacy in academic circles, and different scholars have defined it from their own research perspectives. Jennifer Howell, an Australian scholar, believes that teachers' digital literacy involves a deep understanding and application ability of educational technology, and emphasizes that teachers should be able to critically evaluate and effectively integrate various digital tools and teaching strategies [2]. Marta Duran Cuartero argues that teacher digital literacy is not only about the use of technology, but also about information processing, multimedia use, effective communication, collaboration, and the ability to assume social responsibility in the digital environment [3]. This multi-dimensional understanding highlights the complexity and importance of digital literacy in modern education, highlighting the need for teachers to have a wide range of skills and the right attitudes in order to effectively teach and guide students to grow in the digital world. Joan Hughes' research focuses on how teachers integrate technology into their teaching practices. She defines teacher digital literacy as teachers' ability to evaluate, adopt and integrate appropriate technology tools into their teaching practices, with the aim of promoting innovation and improvement in teaching and learning [4]. Chinese scholar Kong Lingshuai et al believe that teachers' digital literacy is a comprehensive ability, which goes beyond mastering the use of information technology, and should

make use of a variety of complex cognitive, social and emotional abilities to enhance understanding and convey ideas in the digital environment [5]. To sum up, teacher digital literacy refers to the comprehensive knowledge, skills and awareness required by teachers to use digital technologies to support teaching and learning activities, which includes not only the in-depth understanding and application ability of educational technologies, but also the ability to critically evaluate and effectively integrate various digital tools and teaching strategies. To process information, use multimedia, communicate and collaborate effectively in a digital environment, and assume corresponding social responsibilities, with the aim of enhancing students' digital literacy and promoting innovation and improvement in teaching and learning.

The digital literacy of college teachers is similar to that of teachers in core concepts, both of which emphasize the use of digital technology to improve teaching quality and efficiency, as well as to promote students' learning. However, because the environment and goal of higher education are different from that of basic education, the connotation of digital literacy of college teachers is different from that of teachers. The digital literacy of university teachers also includes deeper academic research ability, international communication ability, and advanced curriculum design and teaching implementation ability to adapt to more complex teaching and research environment. Therefore, based on the three functions of teaching and education, scientific research and social service, and the definition of teachers' digital literacy, this paper defines college teachers' digital literacy as the ability of college teachers to promote students' critical thinking, innovation and independent learning through the use of digital technology tools, communicate and collaborate in the digital environment, participate in digital social activities, and the comprehensive ability to adapt to the rapid development of educational technology and the global academic environment.

THE IMPORTANCE OF IMPROVING DIGITAL LITERACY OF COLLEGE TEACHERS

First, it is conducive to adapting to the accelerating digital transformation of society around the world. As the digitalization of the economy, government, and entertainment continues, there is an urgent need for education to keep up. The digital literacy of university teachers is crucial for higher education to adapt to the global digital transformation. With the acceleration of digitalization in various fields such as economy, government and entertainment, and the rapid development of technologies such as artificial intelligence, big data and cloud computing, education and teaching are driven by the transformation and upgrading from digitalization and networking to intelligence. The demand for teachers' "technical" literacy develops from educational technology ability, information technology application ability, media literacy, Internet literacy and information literacy to digital literacy [6]. By mastering and applying various digital tools and resources, college teachers can not only integrate modern technology into teaching more effectively, improve teaching interaction and efficiency, but also help students adapt to the future digital working environment. As well as cultivate their cross-cultural communication and global collaboration skills, thereby enhancing their future career competitiveness and global vision.

Secondly, it is conducive to promoting education reform and improving teaching quality. First of all, by mastering and applying the latest digital tools and teaching platforms, college teachers develop personalized learning paths, design courses that include rich multimedia and interactive simulation, meet students' personalized learning needs, and optimize learning experience. Secondly, with the support of modern information technologies such as VR, AR and multi-screen interaction, classroom teaching can be made more vivid, immersive and active to promote students' brain-based learning [7]. Finally, college teachers can use digital technology to update teaching evaluation methods. To change the traditional evaluation model which takes grades as the only evaluation result, we can analyze various learning behaviors of students such as class attendance rate, head up rate and question answering rate in real-time class. In extracurricular learning, students can analyze various learning behaviors such as the statistics of various grades, the learning content they are interested in, and the length of online learning. Through the real-time tracking and data collection of the whole process of students' learning, the whole process of students' growth is recorded and evaluated, and the learning characteristics of each student are visually and digitally evaluated to form a digital portrait of students. Help teachers to carry out more targeted teaching and improve teaching quality.

Thirdly, it is beneficial to expand scientific research methods and improve research efficiency. The application of digital technology not only changes the mode of education and teaching, but also brings great changes to the

scientific research methods of college teachers. Based on digital technology and resources, college teachers can realize online communication and in-depth collaborative discussion across time and space to realize resource infiltration and cognitive innovation. In the research process, teachers can break through the limitations of time and space anytime and anywhere based on social software, online collaboration platform and conference platform, etc., achieve in-depth collaborative discussion, and stimulate research wisdom and vitality [8]. In addition, through the mass collection, analysis and processing of multi-source data, under the action of certain data analysis mechanism, teachers can provide accurate personalized services according to the characteristics of their scientific research capabilities, and at the same time, they can plan their scientific research and development paths [9]. By mastering digital tools and data analysis skills, university faculty can effectively handle large-scale data sets and apply complex statistical models, such as machine learning algorithms, to improve the accuracy, depth, and innovation of research. By reducing human error through accurate data processing and analysis, it can also reveal deep patterns in the data and enhance the explanatory and predictive power of the theory. Through exposure to the latest research methods and tools, college teachers can also improve the efficiency of translating research results into practical applications, and improve the practical value and social influence of research.

RESEARCH AND PRACTICE STATUS OF TEACHERS' DIGITAL LITERACY AT HOME AND ABROAD

In the digital era, digital literacy is the core quality of teachers' professional development, and cultivating teachers' digital literacy is the new goal of teachers' professional development [10]. Since the concept of digital literacy was first proposed in the academic circle in 1997, the research on the enhancement and cultivation of teachers' digital literacy has changed from the early basic skills training, to the construction of theoretical framework, to the integration of technology and teaching, and finally to the stage of personalized and sustainable development. Each stage reflects the deepening of research and the gradual enrichment of practice in educational technology and digital literacy. Paul Gilster proposed the concept of digital literacy, and through practice and case analysis proposed the main methods and paths to improve digital literacy, including cultivating critical thinking, mastering the use and production of multimedia, learning efficient information retrieval skills, and cultivating the ability of content creation and sharing [11]. Through extensive data collection and analysis, Henry Jay Becker reveals the current state of information technology in teaching and learning and the challenges it faces. He believes that in order to fully realize the educational potential of information technology, schools must systematically integrate information technology, develop clear curriculum standards and teacher training plans, and provide continuous professional development opportunities for teachers [12]. Polly et al. proposed to train teachers' digital skills through a combination of online learning and offline training, and demonstrated the effectiveness of blended learning in improving teachers' professional skills and teaching quality through practice. The design and implementation of teacher training programs provide valuable references [13]. Kirkpatrick proposes a four-level training evaluation model, which provides a comprehensive framework for educational technology training and evaluation to improve teachers' digital literacy and ability to apply educational technology by systematically evaluating responses, learning, behaviors, and outcomes, optimizing training design and implementation strategies. At present, this model has been applied to the design, implementation and evaluation of teacher training programs, providing strong theoretical and practical support for the effectiveness of educational technology training [14]. Huang Lingyan found that peer mutual aid is an effective way to improve teachers' educational technology ability. Through mutual aid and collective cooperation, teachers can continuously improve teaching methods and enhance their own technical ability in practice. Although the effect varies from person to person, it has proved that peer mutual assistance plays an important role in the development of teachers' technical competence [15].

From the perspective of the practice of improving teachers' digital literacy, driven by the external impetus of digital technology innovation and the transformation of talent training needs, the education field of all countries in the world has also entered the fast lane of digital transformation, and the digitalization of education has been elevated to a national strategic level. UNESCO, the European Union, the United Kingdom and other countries have successively issued research frameworks on teachers' digital literacy to enhance international competitiveness [16]. The European Union issued the Digital Competence Framework for European Educators, which stipulates the basic digital literacy of teachers in the fields of professional engagement, digital resources,

teaching and learning, assessment, and empowering learners [17]. The United Kingdom issued the Professional Framework of Digital Teaching, which consists of seven parts: planning teaching, teaching methods, supporting learners to develop employability skills, subject teaching, evaluation, accessibility and inclusion, and self-development, and builds a collaborative education mechanism with digital technology, aiming to help educators make better use of digital technology and digital resources [18]. The UNESCO ICT Competency Framework for Teachers (3rd Edition) issued by UNESCO puts forward new requirements for teachers' digital literacy in terms of understanding ICT, curriculum and assessment, pedagogy, application of digital skills, organization and management, and teacher professional learning in education policies, and requires teachers to be flexible in the use of digital tools. Create digital teaching knowledge. Different from the former, the framework focuses on the integration of new technologies and new education methods, focuses on the application and innovation of teachers' digital skills, and provides compliance for teachers' digital literacy standards from the aspects of digital technology application and educational method reform. The ISTE Standards for Educators issued by the International Association for Educational Technology in the United States plan the development direction of educators, requiring teachers to become learners, leaders, citizens, collaborators, designers, facilitators and analysts [19]. It puts forward new expectations for the role of educators from the level of educational needs, and emphasizes the multi-dimensional view of the role of educators. Technology empowers the work of educators, and digital creativity accelerates the development of educators, with a view to reshaping educational role groups and achieving horizontal balance and vertical development of teacher roles.

From the existing practical and theoretical research framework, the basic framework of teachers' digital literacy at home and abroad has basically converged, showing the characteristics of unity. However, based on the differences of education and teaching modes in different countries, as well as the particularity of teacher profession, it also reflects the characteristics of alienation on business trips. However, on the whole, the current domestic and foreign research on the improvement of teachers' digital literacy presents the characteristics of various methods, the combination of theory and practice, and the development of diversified education environment. Most of the research focuses on specific training methods and short-term effects, and lacks detailed research on teachers at different stages, types and levels of their career.

WAYS TO IMPROVE DIGITAL LITERACY OF COLLEGE TEACHERS

Changing the Attitude of Data and Enhancing the Initiative of University Teachers in Using Data

Social cognitive theory, developed by Albert Bandura, emphasizes the interplay between behavior, environment, and individual cognition. Self-efficacy is an important concept of this theory, which refers to an individual's confidence in whether he or she can successfully complete a task [20]. Teachers with high self-efficacy are more likely to believe that they can effectively use digital technology to improve teaching results. At present, many college teachers are still resistant to the deep integration of teaching and digital technology. First of all, most college teachers lack systematic digital technology training, especially older teachers, who are unfamiliar with or difficult to operate and apply new technologies, resulting in them feeling at a loss when facing digital teaching tools and reducing their willingness and confidence in using new technologies. In addition, some schools have insufficient investment in hardware equipment and software resources, and even if teachers are willing to use digital technology, they cannot implement it due to constraints, thus reducing their enthusiasm. In addition, the daily teaching and scientific research tasks of college teachers are heavy, it is difficult to spare time and energy to learn and apply new technologies, and the lack of policy support from the school management makes teachers feel isolated and helpless when applying digital technologies, fearing that they cannot master them and afraid of failure, leading them to prefer to continue to use traditional teaching methods. By enhancing teachers' digital awareness, they can enhance their sense of self-efficacy and motivate them to apply digital technology in teaching. This will not only help teachers overcome their fear and resistance to new technologies, but also stimulate their enthusiasm and motivation to actively explore and apply digital technologies in their teaching.

Self-efficacy can be significantly improved in the following ways: First, universities should formulate and implement policies to support digital teaching, including providing financial and resource support. Encourage cooperation and exchange among teachers, and promote experience sharing and mutual assistance among teachers through the formation of learning groups and other forms. Let the old teachers and new teachers pair,

one-on-one help, to help the old teachers who are afraid of the application of digital technology quickly adapt to and master the new technology. In addition, colleges and universities should adopt a progressive training method when carrying out skills training for teachers, starting with simple and easy to learn technologies, and gradually guiding teachers to master more complex skills to reduce their psychological pressure. Establish successful examples of digital teaching through positive incentives and recognition, and inspire other teachers to experiment and embrace new technologies. Finally, establish an effective incentive mechanism, increase the assessment index of digital teaching application in the teaching competition of teachers in the school, and encourage teachers to actively explore and apply new technologies. At the same time, college teachers should also actively integrate their own digital technology into the teaching implementation and summarize and improve, so as to continuously enhance their confidence in digital application.

Enhancing Awareness of Data and the Acuteness of Data Application of College Teachers

The acuity of data application of college teachers refers to the acuity and ability of college teachers in identifying, understanding, analyzing and applying data. Specifically, this includes their awareness of data resources, skills in data analysis, and the ability and flexibility to use data effectively in teaching and research.

To put it simply, the acumen of university teachers in using data is reflected in the following three aspects:

a. How to obtain digital resources.

b. How to identify the value of data.

c. How to analyze and use digital resources.

First, compared with traditional data, digital resources have higher accessibility, large capacity and diversity, real-time and dynamic, operable and interactive, shareable and collaborative, storable and replicable, and powerful analysis and visualization capabilities. These characteristics make the application of digital resources in teaching and scientific research have significant advantages, and help to improve the teaching effect and scientific research efficiency. At present, there are academic databases such as CNKI, Wanfang Data and Weipu Information in China, as well as learning management systems such as Super Star Learning Tong and Xuetang Online, as well as teaching evaluation and feedback tools such as Blue Ink Cloud class and learning evaluation and teaching. Through these tools and platforms, university teachers can easily access, manage and analyze digital resources, thereby enhancing their data acumen and improving the quality of teaching and research. But many college teachers still find it cumbersome to switch between platforms. Colleges and universities can try to build a smart campus platform, integrating library resources, teaching management systems, data analysis tools, online learning platforms, etc., into a portal to provide unified access for teachers. And the development of academic portal, a variety of academic resources and services together, convenient for teachers to search, access and use. Data synchronization and integration between platforms can also be realized through API or other data integration technologies, so that teachers can access and manage data from different platforms on one platform.

Thirdly, colleges and universities can develop unified data standards and norms to ensure the consistency and comparability of data and help teachers judge the value of data more easily. It is necessary to develop uniform data standards and specifications, clarify the definition and scope of each data item, and ensure that data from different sources have the same meaning. In order to implement these standards, a detailed data standards manual can be published, explaining the collection, storage, management and use of data specifications, and promoted in various departments and systems. At the same time, the responsibilities, processes and standards of data quality management should be clarified to ensure the orderly conduct of data governance.

Universities should also organize regular data analysis exercises so that teachers can apply their skills in real projects. Invite data analysis experts and experienced teachers to guide other teachers in data analysis exercises. It can help teachers understand and apply data analysis methods. In addition, teachers are encouraged to use data analysis methods in their teaching, such as analyzing students' test score data to identify common problems and individual differences. Universities can also provide teachers with school licenses for data analysis tools such as SPSS, Tableau, Python, and R, ensuring that teachers can freely use this software for data analysis.

Enriching Data Knowledge and Promoting the Popularization of Teachers' Use of Data

In the process of the transformation of education digitalization, teachers are the direct users of digital education technology, the innovators of teaching methods, and the developers of digital resources. Therefore, it is the basic requirement for teachers to master digital technology knowledge and skills to adapt to the modern education environment. College teachers can apply digital technology to provide personalized education for students, cultivate students' innovation ability, enhance scientific research ability, and enhance professional competitiveness, which not only contributes to the realization of higher education goals, but also promotes the process of education digitization and modernization.

As the basic theory and prerequisite of data skills, data knowledge is very important to cultivate data thinking ability. However, the current methods of teaching and evaluating data knowledge are not perfect, which has a negative effect on teachers' ability to use data and their behavior. In order to enhance teachers' confidence in using data and put it into practice, we should improve the education and evaluation methods of data knowledge, including optimizing the curriculum, implementing professional training for in-service teachers, establishing data knowledge learning communities to promote their development, and innovating the existing education evaluation system to strengthen teachers' data knowledge learning.

In addition, the hierarchical training of teachers is also crucial. According to the technology acceptance model (TAM) proposed by Davis, training should enhance teachers' perceived usefulness and ease of use of data technology [21]. Teachers will be more inclined to embrace and use data technologies if they recognize that they can improve teaching outcomes, improve student achievement, and streamline the teaching process. Education administration departments and universities can increase teachers' data knowledge reserve through short-term training and online courses. Through specialized training programs, teachers can acquire data processing and analysis skills in specific contexts, thereby increasing their confidence and motivation to apply data technologies in teaching.

Finally, setting assessment criteria and constructing data-based learning and application guidelines are the key to promoting teachers' active learning of data knowledge. Colleges and universities should establish a data literacy evaluation system for teachers, and regularly test the data literacy programs, experimental courses and the effectiveness of data use in the classroom. Based on the technology acceptance model, through the positive incentive and feedback mechanism, teachers' perceived usefulness and ease of use of data technology are improved, and they are encouraged to apply data knowledge more actively in teaching, so as to improve the quality of education and teaching effect.

At present, some teachers in colleges and universities lack the basic understanding of digital technology, the mastery and application of digital skills, and the selection of digital resources. Colleges and universities need to develop extensive and informative training programs and ensure that each teacher receives the training appropriate to his or her level and needs. Increase investment in hardware equipment and software resources, establish technical support team, and provide continuous technical support and coaching. Provide a variety of learning methods and time arrangements, convenient for teachers to find the right learning time and way in the busy work. Establish an evaluation and feedback mechanism, regularly evaluate the learning effect of teachers, collect feedback, and constantly optimize the training program and resource content. Through these systematic and comprehensive measures, it can effectively improve the digital technology knowledge and skills of college teachers, help them better apply digital technology to teaching innovation, and improve the quality and effect of education.

Strengthening Data Skills and Improving the Effectiveness of Teachers' Data Use

Shulmande proposed the theory of data-driven decision making, which emphasizes that effective teaching decision, should be based on detailed analysis and deep understanding of student learning data. Teaching is not only a skill, but also a professional judgment of students' needs, which must be based on systematic, evidence-based analysis [22]. By using digital skills, college teachers can identify students' academic and behavioral strengths and weaknesses. Through the use of digital tools in teaching, college teachers can better understand

the individual needs of students, so as to provide targeted support, which can significantly improve the teaching effect and promote the all-round development of students.

In order to achieve the goal of empowering teachers with digital skills for teaching, colleges and universities, in addition to providing regular training, have the following two paths: first, optimize the data management system, and second, adopt demand-oriented technology application strategies.

First of all, the control and utilization of teaching data are excessively segmented, and there is no connection between various platforms, resulting in data isolation. All kinds of test data of the same student are controlled by multiple institutions, and these institutions have their own characteristics in collection and storage methods, as well as analysis skills, which makes the sharing and contact of teaching data complicated and greatly increases the difficulty of teaching data management. In order to optimize the current teaching data is divided into different platforms and obtain complex problems, universities can try to jointly build a data cloud platform to achieve data integration and centralized management, and optimize the acquisition and use of teaching and scientific research data. First of all, select a reliable cloud service provider (such as Alibaba Cloud), build a unified data warehouse, centralized storage and management of data from different sources, and achieve data interconnection among various systems to ensure real-time update and consistency of data. Integrate big data processing frameworks (such as Hadoop, Spark) and data analysis tools (such as Tableau, Power BI) to provide powerful data processing and analysis functions. It is also necessary to design a unified interface that is simple and easy to operate, improve the user experience, and implement strict rights management and data encryption measures to ensure data security. Through these measures, universities can simplify the data acquisition process, improve the efficiency of data utilization, and comprehensively improve the quality and effectiveness of teaching and research.

In order to ensure that digital technology can truly solve the problems faced by teachers and students in teaching and research, universities should adopt a demand-oriented technology application strategy. First of all, through questionnaire survey, interview and other means, we have a deep understanding of the specific needs of teachers and students, such as their difficulties and expectations in course design, teaching methods, research data analysis and other aspects. Conduct a comprehensive needs survey every semester or school year to collect feedback from teachers and students on the application of existing digital technologies, and adjust and optimize based on the feedback results. For example, improving the user interface of the teaching management system and adding more practical data analysis functions. In this way, universities can ensure the effectiveness and pertinence of digital technology application strategies, and continuously improve user experience and use effects.

CONCLUSION

Through in-depth analysis of the current situation and promotion path of digital literacy of college teachers, we realize the importance of digital literacy in promoting the digitization of education and building a modern education system. As the primary resource of education, teachers are the key driving force to implement the strategy of education digitization and reform and innovate the teaching mode. Improving the digital literacy of college teachers not only includes the basic cognition and application ability of digital technology, but also involves a broader dimension such as digital consciousness and digital social responsibility. By improving digital literacy, university teachers can more effectively integrate modern technologies into teaching, improve teaching interaction and efficiency, and adapt to the needs of global digital transformation. At the same time, teachers master and apply the latest digital tools and teaching platforms, and are able to design a rich and diverse curriculum to meet the personalized learning needs of students, promote education reform, and improve teaching quality. In addition, through the use of digital tools and data analysis skills, teachers can expand research methods, improve research efficiency, and achieve innovation and improvement in education and teaching.

In general, improving the digital literacy of college teachers is an important basis for realizing the modernization and digitalization of education, and a key measure to train students who meet the needs of future social development. Through systematic and comprehensive strategies and measures, universities can help teachers better adapt to the digital teaching environment, promote the continuous innovation and development of

education and teaching, so as to improve the quality of education, promote education equity, and help build a learning society with lifelong learning for all.

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