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Evaluating and Enhancing University Teachers' Smart Teaching Competencies: A Survey-Based Analysis

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The smart teaching competence of university teachers is key to improving teaching quality and efficiency during the digital transformation of education. Based on the industry standards of the Ministry of Education's "Teacher Digital Literacy," the survey questions are designed and formulated from five dimensions: understanding and attitude towards smart teaching, application of smart teaching environment, development of smart teaching resources, design and implementation of smart teaching, and evaluation of smart teaching. A questionnaire was conducted on Wen Juan Wang, 146 valid questionnaires were effectively collected. through an online survey platform, and 146 valid questionnaires were effectively collected. The analysis of the survey data shows that

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university teachers can correctly understand the concept and role of smart teaching, design and implement smart teaching based on the school's talent cultivation goals, course characteristics, and smart teaching environment, and have certain capabilities in developing smart teaching resources and collecting and analyzing data. Some teachers also have relatively low capabilities in smart teaching concepts and teaching design, operation and use of smart environments, development of smart teaching resources, and data collection and analysis. In response to these issues, the following suggestions are proposed: strengthen the construction of smart teaching environments, formulate policies to establish incentives for smart teaching, strengthen training in teachers' smart teaching competencies, and enhance inter-school and school-enterprise cooperation to build and share smart teaching resources.

Keywords: University teachers; smart teaching; questionnaire survey; data analysis; suggestions.

1. INTRODUCTION

The smart teaching competencies of teachers refers to the capability of teachers to optimize the teaching process and improve the teaching effect by using modern information technology such as artificial intelligence and big data (Yang & Xie, 2019). It is a key factor in enhancing teaching quality and efficiency during the digital transformation of education. As the main base for cultivating innovative talents, universities should bear in mind the mission of cultivating new talents for society, keep pace with the forefront of science and technology, deeply integrate new information technology with education and teaching, reform educational methods, and promote the cultivation of top innovative talents (Xinhua News Agency, 2023).

To understand the current state of smart teaching competencies among university teachers, the research team, in conjunction with the industry standards of the Ministry of Education's "Teacher Digital Literacy" (Ministry of Education, 2022), has developed a survey questionnaire based on the basic elements of smart teaching competencies. The survey aims to analyze the data obtained from university teachers to explore the overall level of smart teaching competencies, identify existing problems, and provide empirical evidence and strategic suggestions for further enhancing the smart teaching competencies of university teachers.

2. MATERIALS AND METHODS

2.1 Design of the Survey Questionnaire

The survey questionnaire was designed through WenJuanWang. In addition to basic demographic information such as gender, age, teaching subject, professional title, educational degree, teaching experience, and whether the respondent had a teacher education background during their undergraduate studies, the questionnaire primarily focused on five dimensions of university teachers' smart teaching competencies: understanding and attitude towards smart teaching, application of the teaching environment, development of teaching resources, design and implementation of teaching, and teaching evaluation. Mind mapping was utilized to draw the research framework and questions, striving for comprehensiveness, scientific rigor, and ease of statistical analysis. The specific research framework and question distribution are shown in Table 1.

After the initial design of the survey questionnaire, it was reviewed by experts from the Academic Affairs Office and secondary college supervisory boards. A pilot survey was conducted in the School of Information Engineering to further optimize the questionnaire design. The final survey questionnaire was formed, striving to ensure good reliability and validity of the survey.

2.2 Distribution and Collection of Survey Questionnaires

Starting from September 1, 2024, the questionnaire was distributed via Wen Juan Wang, and teachers from our university completed the survey by scanning the QR code. The survey was closed on September 8, followed by data collection and analysis. A total of 146 questionnaires were collected within the 7-day period, all of which were valid.

Table 1. Research Framework and Question Distribution

First-level Dimension	Second-level Dimension	Details	Survey Questions
A Understanding	Understanding of Smart Teaching	Understanding of the concept, characteristics, significance, elements included, capabilities included, and the role of teachers in smart teaching.	Q8~Q13
B Environmental Application	B1 Teachers' Ability to Apply Smart Teaching Environments	The composition of smart teaching environments, supported teaching models, the ability to use smart teaching media and platforms, and the ability to guide students in their correct use.	Q14~Q20
	B2 Teachers' Ability to Guide Students in Using Smart Teaching Environments	Teachers' ability to guide students in using smart applications, teaching platforms, and related skills, as well as students' willingness to use them.	Q21、Q22
C Resource Development	C1 Teachers' ability to search for, optimize, create, and configure teaching resources.	Teachers' ability to search for and select appropriate digital teaching resources, to optimize and create digital teaching resources, and to update the teaching content system and optimize the allocation of teaching resources.	Q23~Q25
	C2 Ability to Construct Ideological and Political Education Resources	Teachers' ability to excavate ideological and political elements and integrate them into teaching.	Q26
D Design and Implementation	D1 Smart Teaching Design Ability	The ability to devise smart teaching methods, strategies, media, and learning scenarios.	Q27~Q30
	D2 Smart Teaching Implementation Ability	In teaching implementation, the ability to design and implement hybrid teaching, as well as the ability to guide students to use smart teaching media and platforms for interaction, assessment, problem-solving, and planning, documenting, and evaluating their own learning.	Q31~Q37
E Teaching evaluation	E1 Approaches to Smart Teaching Evaluation	In a smart teaching environment, the ways to obtain students' learning situations.	Q39
	E2 Methods for smart teaching evaluation	Methods for Analyzing and Evaluating Collected Learning Data Using Smart Educational Technology in a Smart Teaching Environment	Q40
F Attitude towards enhancing abilities	Attitude Towards Smart Teaching	Willingness to Participate in Training to Enhance Smart Teaching Competencies and Suggestions for Training Content	Q41~Q43

3. OVERVIEW OF SURVEY DATA

The questionnaire results show that 146 teachers from 14 disciplines including engineering, science, management, education, arts, economics, etc., participated in the survey at our school. The largest group was from engineering with 33 participants, accounting for 22.6%, followed by management with 23 participants, accounting for 15.8%, and science with 17 participants, accounting for 11.6%. There were 56 male teachers, representing 38.4%, and 90 female teachers, representing 61.6%. A total of 68 teachers, or 46.6%, had a teacher education background from undergraduate studies; 78 teachers, or 53.4%, did not have such a background.

Most of the teachers who participated in the survey held master's and doctoral degrees, with 67 doctors accounting for 45.9%, and 60 masters accounting for 41.1%; 19 teachers held bachelor's degrees, accounting for 13%.

Among the surveyed teachers, 20 were under the age of 35, representing 13.7%; 59 were between 35 and 45 years old, representing 40.4%; and 67 were over 45 years old, representing 45.9%. There were 4 people with primary titles, accounting for 2.7%; 57 people with intermediate titles, accounting for 39.0%; 70 people with associate senior titles, accounting for 47.9%; and 15 people with full professor titles, accounting for 10.3%.

The teaching experience was diversely distributed, with 19 teachers having 1-5 years of experience, representing 13.0%; 17 with 6-10 years, representing 11.6%; 22 with 11-15 years, representing 15.1%; 30 with 16-20 years, representing 20.5%; 29 with 21-25 years, representing 19.9%; and 29 with over 25 years, representing 19.9%.

From the data, it can be seen that the participating teachers are reasonably distributed in terms of age, title, education, and disciplines, and the data has a certain degree of typicality and representativeness.

4. RESULTS AND DISCUSSION

Based on the five dimensions of the research framework, a statistical analysis of 146 questionnaires is conducted, and the summary is as follows:

4.1 Correctly Understand Smart Teaching and have Some Reflections on it

In terms of understanding the concept of smart teaching, 91.8% of teachers believe that smart teaching is a teaching process in which teachers and students participate together, with teachers as the leaders, students as the main body, learning as the center, and teaching serving learning; 85.6% of teachers believe that smart teaching is a physical teaching environment provided to students with the main body of students, leveraging the internet and big data, integrating cutting-edge technologies such as cloud computing, big data, and interactive clouds in the educational informatization teaching model; 82.2% of teachers believe that smart teaching is the mutual extension, penetration, and supplementation of the two teaching processes of smart classroom teaching and autonomous inquiry by teachers and students outside of class; 77.4% of teachers believe that smart teaching includes teachers' smart teaching and students' smart learning; 76.0% of teachers believe that smart teaching is a blended teaching that combines online virtual teaching with offline face-to-face classroom teaching.

In terms of understanding the elements of smart teaching, 95.2% of teachers believe it includes a smart teaching environment; 94.5% believe it includes teachers with high digital literacy and smart teaching capabilities; 93.8% believe it includes digital teaching resources; 84.9% believe it includes a student body with smart learning and collaborative abilities; 72.6% believe it includes the ethical application of smart technology.

In terms of understanding the characteristics of smart teaching, 95.2% of teachers believe it includes the interconnection and sharing of educational resources; 86.3% believe it includes scientific analysis and evaluation based on big data; 88.4% believe it includes the deep integration of information technology with subject teaching; 84.0% believe it includes multidimensional interaction between people and resources, environment, equipment, and technology; 74.7% believe it includes personalized student development.

In terms of self-role positioning in smart teaching, 95.2% of teachers believe that teachers are guides, collaborators, and service providers for student learning; 92.5% believe that teachers

are co-teachers, co-researchers, and co-learners with artificial intelligence; 85.6% believe that teachers are integrators and developers of digital resources; 77.4% believe that teachers are guardians of educational humanistic values.

Despite the rich connotations and diverse features of smart teaching, university teachers, as a professional group in the field of education, generally possess high academic cultivation and an open learning attitude (Yan, 2024). They can correctly understand the core concepts, elements, and characteristics of smart teaching, have some thoughts on it, and have a clear positioning of their own roles in smart teaching.

4.2 Actively Conduct Daily Teaching Based on the Actual Smart Environment of the School

The smart teaching environment includes smart terminals, smart classrooms, smart campuses, smart laboratories, and smart education clouds (Lu & Tang, 2023). The questionnaire shows that 67.1% of teachers believe they have a fair ability to use the smart teaching environment, and 17.1% of teachers believe they can easily master and handle the smart teaching environment with ease; 89.0% of teachers use intelligent devices, smart applications, and teaching platforms in their daily teaching. Among them, smart applications mainly include WeChat, QQ, etc., and smart teaching platforms mainly include China University MOOC, Chaoxing Learning Platform, Smart Tree, and EduCoder, etc.; for the use of intelligent devices, 78.8% of teachers use tablets, smartphones, and other tools to allow students to explore and learn independently, 61.6% of teachers utilize students' mobile phones, digital cloud screens, and other tools to organize group cooperation and communication activities for students., 56.2% of teachers use the writing and annotation functions of whiteboards for teaching, 45.2% of teachers use students' handheld tablets, smart pens, buzzers, and other response tools for teaching focused on exercises, 29.5% of teachers use VR glasses, 3D display platforms, and other virtual technologies for demonstrations, in addition, 93.8% of teachers also use multimedia projectors to play PPT slides, Word documents for lectures, 68.5% of teachers still use traditional paper materials, such as textbooks, dictionaries, etc. for lectures, which may be influenced by the actual teaching environment and conditions of some public classrooms. At the same time, the smart teaching environment is an inclusive concept (Gu et al., 2021), teachers can optimize and integrate various teaching resources according to the actual teaching and student needs, including the flexible use of traditional teaching materials and courseware, thereby providing more personalized guidance for students.

College students demonstrate a high level of ability and adaptability in using smart applications and teaching platforms, and they are capable of utilizing these programs and platforms to complete assignments, participate in discussions, watch instructional videos, and take online tests and assessments (Li, 2023). The questionnaire shows that 80.8% of teachers believe students are willing to use smart applications and teaching platforms, and 11.0% of teachers believe students are very willing to use them; regarding the ability to use smart applications and teaching platforms, 65.8% of teachers think students have a decent ability to use them, and 24.0% of teachers believe students can use them with ease. Although college students are eager to embrace new technologies, they may also encounter confusion or challenges when using smart applications and teaching platforms, requiring teachers to actively guide students in engaging in safe and responsible online learning behaviors. In classroom teaching, 84.2% of teachers explain the basic norms of safe and responsible behavior in online environments, 82.2% of teachers inform students to be cautious when sharing personal information online, 74.7% of teachers organize discussions and adhere to online behavior rules, and 56.2% of teachers systematically develop students' social norms in different smart learning environments.

4.3 Strong Capability in Developing Smart Teaching Resources, and Willingness to Use New Technologies for Digital Resource Development

In long-term teaching practice, university teachers have accumulated rich experience in developing teaching resources. With the continuous development of information technology, they are also improving their technical literacy and striving to explore and apply new technologies to innovate the forms and content of teaching resources (Mei, 2024). The questionnaire shows that 64.4% of teachers are willing to appropriately update the teaching content system and optimize teaching resources in line with the development of their profession

and courses, and 34.9% of teachers can keep pace with the times to update and even reconstruct the teaching content system and optimize the allocation of teaching resources. In the specific development of smart teaching resources, 72.6% of teachers said they would use computers to organize and download digital teaching resources, 63.0% of teachers said they would create digital resources such as graphics, images, charts, audio, and animations, 74.7% of teachers said they would create courseware and integrate relevant digital teaching resources into the courseware, 50.0% of teachers said they would create micro-courses and integrate relevant digital teaching resources into the micro-courses, and 22.6% of teachers said they could set up and modify complex and interactive digital resources.

4.4 Carefully Considering the Elements of Smart Teaching and Conducting Smart Teaching Design

Smart teaching design is the cornerstone of smart teaching, determining its direction, content, and methods (Liu, 2016). The questionnaire shows that during lesson preparation, 68.7% of teachers sometimes engage in smart teaching design, and 26.7% of teachers often do so. When designing their teaching, 30.1% of teachers will try to use all available smart devices, smart applications, and teaching platforms to carry out smart teaching, while 41.1% of teachers will choose the best smart devices, smart applications, and teaching platforms based on the needs of the course content and smart teaching methods; 41.8% of teachers occasionally or only when there are competitions or presentations will plan how to create smart teaching situations, and 54.1% of teachers will try to use existing smart teaching concepts and environments to plan how to create smart teaching situations. The above data indicate that in order to provide students with a richer, more personalized, and efficient learning experience, teachers are willing to thoughtfully consider the elements of smart teaching and engage in smart teaching design.

4.5 Actively Guiding Students to Utilize Smart Environments for Personalized Learning

The questionnaire shows that during the implementation of smart teaching, 45.2% of teachers often encourage students to use smart devices, applications, and teaching platforms for multi-dimensional interaction; 43.8% of teachers often encourage students to use smart platforms and applications for immediate assessments and to analyze the results in real-time, adjusting classroom activities as needed; 42.5% of teachers often encourage students to try using smart platforms and applications to overcome obstacles or challenges in the learning process, and 16.4% of teachers can systematically integrate tasks to promote students' creative use of smart platforms and applications to solve problems; 26.0% of teachers sometimes use smart platforms and applications to monitor students' learning activities in real-time, 39.7% of teachers often monitor and analyze, evaluate students' learning activities through smart platforms and applications, and motivate or correct student behavior; 32.2% of teachers sometimes use chat tools, self-assessment questionnaires, quizzes, digital portfolios, etc., to allow students to plan, record, and assess their own learning, 24.0% of teachers use various smart technologies and tools to enable students to plan, record, or reflect on their learning, and 21.9% of teachers can systematically integrate various smart technologies and tools to enable students to plan, monitor, and reflect on their progress. As guides, supervisors, and facilitators of the learning process, teachers play a key role in the smart teaching environment. The above data indicate that teachers are able to guide students to actively and properly utilize the smart teaching environment to achieve personalized learning (Rinzin, 2023).

4.6 Capable of Analyzing and Assessing Learning data Collected Online, Providing Feedback, and Guiding Student Learning

The questionnaire shows that 61.0% of teachers will analyze students' online learning data, provide assessments, and feedback to students in appropriate forms. Additionally, 40.4% of teachers can systematically compare and analyze students' online learning data, record the assessment results as a source of data for teaching reflection, and provide feedback to students in appropriate forms to accurately guide their learning.

5. INSUFFICIENCIES IN SMART TEACHING CAPABILITIES OF UNIVERSITY TEACHERS

Although university teachers possess the aforementioned strengths in smart teaching

capabilities, there are still some deficiencies and challenges from other data and practical applications.

5.1 The Concept and Design Ability of Smart Teaching Need Further Improvement

Although university teachers have a high awareness of smart teaching and are willing to use smart teaching environments for smart teaching, most of them focus on scientific research and have limited time and energy to devote to teaching. 26.7% of teachers engage in smart teaching design during lesson preparation, and 49.3% of teachers can choose smart teaching methods based on the characteristics of students and courses. 40.1% of teachers try to select the best smart devices and teaching platforms. Especially for young teachers, who face greater work and life pressures, the lack of teaching input is particularly evident. Although they are more proficient in using environments like smart classrooms compared to older teachers, their understanding of smart teaching, especially in terms of teaching design, still has a certain gap compared to older teachers. Data shows that among teachers who often engage in teaching design during lesson preparation, only 20% are under 35 years old; while those between 35 and 45 years old account for 38.98%. In the process of teaching implementation, teachers who try to use existing smart teaching concepts and environments to plan how to create smart teaching situations, only 45% are under 35 years old; while those between 35 and 45 years old account for 54.23%.

In universities, there are numerous disciplines, and only 46.6% of teachers have a teacher education background at the undergraduate level. Most teachers only learn higher education studies and modern educational technology courses during pre-service teacher training for college qualifications, which can be described as learning while practicing. As a result, they may lack certain capabilities in systematic teaching design for smart teaching and the development of teaching resources. Data shows that teachers with a teacher education background at the undergraduate level have higher capabilities in choosing teaching methods before class, creating teaching situations, and developing teaching resources compared to those without such a background.

5.2 The Smart Teaching Environment Affects the Effective Implementation of Teachers' Smart Teaching

The teaching environment is systematic and objective, fundamentally affecting the design and implementation of teaching activities, with a particularly noticeable impact on smart teaching (Singh & Singhwal, 2024). The collection and analysis of classroom data by teachers, as well as virtual simulation experiments, are inseparable from the hardware construction and software applications of smart classrooms. Survey data shows that 93.8% of teachers use multimedia courseware, Word, etc., for teaching, 29.5% of teachers can use virtual technology, and 39.7% of teachers frequently use smart platform data analysis to evaluate students' learning activities. This indicates that schools have provided teachers with a basic digital teaching environment, but there is still a certain gap compared to the requirements of a smart teaching environment.

5.3 The ability to Develop High-Quality and Personalized Smart Teaching Resources Needs to be Strengthened

The development and utilization of high-quality personalized smart teaching resources are of great significance for improving the quality of education and meeting students' diversified learning needs. According to the survey data, 51.3% of teachers directly use the resources provided by textbooks; 49.3% of college teachers can improve the resources provided by textbooks according to the actual teaching and students' needs, 33.6% of teachers have their own SPOC online courses, and 21.9% of teachers provide additional digital learning resources for students during classroom teaching. Regarding online video resources for teachers, most teachers use direct screen recording methods based on the PPT courseware they have made, and there are fewer animation and comprehensive micro-course resources. Due to the lack of development environment and technology, there are basically no new information technology educational resources such as virtual simulation and augmented reality.

5.4 Precise Evaluation of Smart Teaching and Learning Lacks Big Data Technology Support

Big data not only provides comprehensive and accurate data support for educational evaluation, but also makes personalized evaluation possible. Survey data statistics show that 15.8% of teachers only judge students' learning through classroom interaction performance without analyzing students' online learning data. 39.7% of teachers can view students' online learning data, but do not analyze and evaluate it. Only 40.4% of teachers can analyze students' learning data and provide precise guidance for students' learning. It can be seen that some college teachers have relatively weak data awareness, and most teachers lack support for big data collection, processing, and analysis technology.

6. SUGGESTIONS FOR ENHANCING THE SMART TEACHING CAPABILITIES OF UNIVERSITY TEACHERS

6.1 Strengthen Infrastructure and Optimize the Smart Teaching Environment

Focus on the construction and optimization of services to build a comprehensive and systematic intelligent campus infrastructure support system. Gradually cover various scenarios of the intelligent campus, expand the scale of intelligent classroom construction, and achieve full coverage of smart teaching environments such as interactive whiteboards and online learning platforms. Fully support real-time interaction and data collection between teachers and students, and improve classroom interaction rates and learning outcomes (Liu et al., 2023).

6.2 Strengthen Policy Support and Establish Incentive Mechanisms for Smart Teaching

The school should introduce policies related to smart teaching, clarify development goals, key tasks, and implementation pathways, providing policy guidance and protection for smart teaching. Encourage social capital to participate in the construction of intelligent campuses and the development of intelligent educational resources, forming a diversified investment mechanism (Wang et al., 2023). Encourage teachers to actively explore new models and methods of smart teaching under the background of digital transformation, fund and support innovative and experimental teaching projects, and promote the deep integration of intelligent applications with education and teaching.

6.3 Strengthen Teacher Training to Enhance Comprehensive Competence in Smart Teaching

Conduct multi-level and multi-form teacher information technology training activities, including smart teaching design, artificial intelligence content generation, digital collection and evaluation in smart teaching, use of smart teaching platforms, and ethics in smart teaching, enabling teachers to proficiently use various intelligent educational tools and platforms (Zhang et al., 2024). Organize activities such as observation of high-quality smart teaching classes, online teaching research, virtual teaching research, and smart teaching competitions to promote the enhancement of teachers' research and teaching competencies in smart teaching. Strengthen training in data awareness and engineering ethics, enabling teachers to master data collection and analysis methods in intelligent environments, leverage the functions of intelligent decision-making and intelligent push of big data, achieve precise teaching, and provide personalized precise guidance to students.

6.4 Strengthen Inter-School and School-Enterprise Cooperation to Promote Co-construction and Sharing of Smart Teaching Resources

To strengthen inter-school exchanges and cooperation, education authorities should promote the establishment of an inter-school cooperation committee or working group, which will clarify the goals, content, and methods of smart teaching cooperation. This committee or group will be responsible for planning, coordinating, and supervising the implementation of smart teaching cooperation projects. Based on course objectives and the needs of enterprises and society, schools with similar majors or courses should jointly develop high-quality teaching resources to achieve co-construction, sharing, and complementarity of smart teaching resources. Additionally,

strengthen cooperation between universities and high-tech enterprises to develop teaching resources such as virtual simulation and augmented reality, expanding the development field of smart educational resources. This will enhance students' practical experiences and immersion in learning, promoting personalized and efficient learning (Chen & Ai, 2024).

7. CONCLUSION

Multiple factors influence the development of college teachers' smart teaching competencies. Enhancing these competencies is a long-term systemic project that requires the joint efforts of education authorities, schools, enterprises, teachers, and all sectors of society. By strengthening the construction of smart teaching environments, formulating policies to establish incentives for smart teaching, enhancing training for teachers' smart teaching competencies, and reinforcing inter-school and school-enterprise cooperation to jointly build and share smart teaching resources, we can effectively promote the comprehensive improvement of college teachers' smart teaching competencies, laying a solid foundation for cultivating high-quality talents who meet the needs of the digital society.

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DISCLAIMER (ARTIFICIAL INTELLIGENCE)

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

Chen, Y., & Ai, X. (2024). The connotation, characteristics, and practical requirements of digital and intelligent teaching ecology. *Academic Exploration, (07)*, 148-156.

Gu, X., Du, H., Peng, H., & Zhu, Z. (2021). Theoretical framework, practical path, development trajectory, and future vision of smart education. *Journal of East China Normal University (Educational Sciences Edition), 39*(08), 20-32.

Li, R. (2023). Analysis of AI-driven smart classrooms. *Heilongjiang Research on Higher Education, 41*(07), 1-5.

Liu, B. (2016). Research on the design and implementation strategies of smart classroom teaching in the "Internet+" era. *China Educational Technology, (10)*, 51-56+73.

Liu, B., Zhuo, H., Wu, S., & Yin, H. (2023). Intelligent technology to assist in reducing teaching burden and enhancing efficiency: Analytical framework and typical scenarios. *Journal of E-Education Research, 44*(03), 56-62.

Lu, L., & Tang, W. (2023). Research and practice on the construction of smart teaching environments in universities. *China Informatization, (02)*, 69-72.

Mei, B. (2024). Enhancing digital literacy of university teachers: Current issues and system construction. *China Higher Education, (12)*, 50-54.

Ministry of Education. (2022, December 2). Notice on the release of the education industry standard "Teachers' digital literacy". *http://www.moe.gov.cn/srcsite/A16/s3342/202302/t20230214_1044634.html*.

Rinzin, K. (2023, October). Impact study of SMART TV and SMART classroom on the academic performance of students at Rangjung PS, under Trashigang District in Bhutan. *Asian Journal of Education and Social Studies, 49*(1), 106-117.

Singh, S., & Singhwal, B. K. (2024, September). Smart phone addiction: Enhanced or diminished meta-cognitive skill in pupil teacher. *Asian Journal of Education and Social Studies, 50*(10), 82-90.

Wang, X., Gao, N., Zheng, Q., & Guo, Y. (2023). Future pathways for the transformation of higher education driven by information technology. *Heilongjiang Research on Higher Education, 41*(01), 76-83.

Xinhua News Agency. (2023). Xi Jinping: Persist in promoting education development, scientific and technological innovation, and talent cultivation as an integrated whole. *China Talent, (02)*, 4.

Yan, Q. (2024). Research on teacher-student interaction in the online teaching environment in universities (Master's thesis). Shandong Normal University.

Yang, X., & Xie, Y. (2019). Smart teaching ability: The dimension of teachers' ability in the era of smart education. *Educational Research, 40*(08), 150-159.

Zhang, D., Nie, Z., Wang, L., & Shi, Y. (2024). A realistic reflection on the digital development of school education: Taking smart schools as an example. *Journal of E-Education Research, 45*(05), 35-41.

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