

Digital instructional strategies and competencies among Chinese university teachers

Jiang, Yuan ✉

Graduate School, Lyceum of the Philippines University – Batangas, Philippines (406881455@qq.com)

Received: 25 May 2024

Available Online: 15 July 2024

Revised: 25 June 2024

DOI: 10.5861/ijrse.2024.24647

Accepted: 10 July 2024

ISSN: 2243-7703

Online ISSN: 2243-7711

OPEN ACCESS



Abstract

This study uses descriptive research methods to explore the digital teaching strategies and competence of Chinese college teachers. The survey focused on three main variables: participants' profiles, teachers' digital teaching abilities, and competence. These variables are analyzed in specific theoretical frameworks and relevant literature. Taking Chinese university teachers as the main object of analysis. Overall, the perception of digital teaching among Chinese college teachers is positive. Similarly, teachers showed positive competency intent. The survey shows that age significantly affects respondents' views on digital teaching, especially their understanding and attitude towards digital teaching, as well as the current situation of digital teaching. Results of significant suggests that age-related differences in these regions are not due to chance. Age and the highest level of education are key determinants of educators' assessment of digital ability. Plays a crucial role in shaping educators' perceptions and evaluations of digital teaching strategies. There is a strong positive correlation between digital teaching strategy and digital ability. With the increase in the use of specific digital teaching strategies, the corresponding digital ability will also improve. It is suggested to enhance and improve teachers' digital teaching strategies and competence by establishing digital teacher teams and teaching resources. It is not only necessary to improve digital teaching technology, but also to have relevant training activities and correct evaluation methods. This approach helps teachers to have a clearer teaching strategy, thus creating a digital thinking and cultural environment.

Keywords: China, university teachers, digitalization, teaching, strategy, competency

Digital instructional strategies and competencies among Chinese university teachers

1. Introduction

The steady progression of technology has led to the seamless integration of digital educational instruments, including online learning portals, intelligent instructional frameworks, as well as virtual and augmented reality, into everyday pedagogical practices. This fusion offers students an enriched, immersive, and adaptable learning landscape that is tailored to individual needs. Digital educational tactics are emerging as pivotal catalysts in fostering educational transformation and enhancing learning achievements. These tactics encompass not merely the deployment of digital mediums like MOOCs, micro-lessons, and flipped classrooms for curriculum dissemination, but also the leveraging of big data analysis and AI-driven instruction to finetune learning trajectories and meticulously evaluate student progress (Johnson et. al.,2018). Furthermore, Johnson et. al., (2018) work underscores the potential of these digital strategies to augment inclusivity and efficacy in education, by crafting a learning ecosystem that is flexible and individually tailored, thereby catering effectively to diverse learner profiles.

In addition, as students become increasingly digital natives, their preference for interactive, gamified and multimedia content is prompting educators to rethink how content is presented. Strategies such as digital storytelling, collaborative editing tools, and online discussion forums not only enhance student engagement, but also foster communication, collaboration, and information literacy (Hew et. al.,2007). Teachers need to master how to integrate these elements effectively to create a digital learning environment that is both engaging and stimulates deep learning. Teacher professional development is also an integral part of promoting digital teaching strategies. Ongoing training and workshops should not only focus on the operation of technical tools, but should also cover the updating of instructional design principles, learning theories and assessment methods, as well as how to maintain students' digital security and privacy (Kirkwood et. al.,2014). This comprehensive competency development framework helps teachers grow into educational leaders who can lead students into the digital age. The notion of teachers' proficiency in digital education is multifaceted and crosses several disciplines, underpinned by theories from educational technology, learning methodologies, psychological principles, and instructional design domains. Drawing from TPACK theory, proficient teaching necessitates a triad of expertise: Content Knowledge (CK), Pedagogical Knowledge (PK), and Technological Knowledge (TK), all of which must be harmoniously synthesized (Mishra et. al., 2006).

Within the realm of digital pedagogy, educators are compelled to enhance their TPACK skills to innovatively infuse technology into lessons, thereby enhancing instructional efficacy. They assume the role of learning facilitators, orchestrating scenarios where pupils construct knowledge via interactive, exploratory, and collaborative means, echoing the ideas of Jonassen (1991) and Hmelo-Silver (2004). Hence, teachers must equip students with the skills to navigate and interconnect digital information effectively, crafting bespoke routes for individualized learning journeys. Teachers are at the heart of this transformation process, and the development of their digital capabilities becomes the basis for ensuring the effective implementation of digital instruction. This requires teachers not only to master the use of technical tools, but also to enhance their abilities in instructional design, learning analysis, creative and critical thinking guidance (Ertmer et. al.,2010). Their research highlighted that, for teachers to efficaciously harness digital tools in fostering learning, they must embody a sophisticated constellation of competencies. These encompass not only technical proficiency but also the adeptness at integrating pedagogy with technology, along with the formulation of approaches that nurture students' advanced cognitive abilities.

In the current information age, China's education field is experiencing unprecedented changes. The essence of enhancing education's caliber and productivity revolves around the mastery of Digital Competencies and the implementation of efficacious Digital Instructional Strategies. Taking Yunnan Province, China as an example,

many universities have carried out digital teaching projects. Observing various teachers' digital open classes reveals that a substantial investment of time and effort is required during lesson planning, dedicated to contemplating and curating fitting pedagogical approaches. Evidently, conventional teaching methodologies are no longer sufficient to comprehensively align with and cater to the requisites of instruction within the digital learning landscape. In the current digital education environment, teachers need to understand how technology supports teaching, how to better integrate with teaching, and what teaching strategy design models are available for them to choose and design teaching strategies suitable for their own teaching.

Digital teaching competencies encompass many different skills and abilities, so defining and understanding competencies can be difficult. However, the speed and method of competence development can vary from person to person, which can raise equity issues, especially when assessing and comparing competence. Currently, while scarce literature exists examining the implications of digital education on the broader learning sphere, an inadequacy is evident in studies specifically concerning the digital teaching proficiency strategies and competencies of higher education instructors. The factors shaping and the mechanics behind university teachers' digital capabilities remain nebulous, warranting a thorough investigation into what drives their digital competence. This deep dive will furnish insights crucial for enhancing their digital skill set and accelerating the progression of educational digitization. Alarming, certain pedagogical practitioners prioritize digital tools over fostering connections between educators and learners. This disproportionate focus potentially jeopardizes the balanced integration of digital technology in the learning space, inadvertently undermining its supportive role for both teachers and students alike.

Designing instructional strategies stands as the paramount stage in teaching design, significantly impacting the lesson's overall triumph. Undoubtedly, digital learning is poised to dominate future classroom landscapes. As technology rapidly evolves and saturates education, profound shifts in pedagogical philosophies, methodologies, and tactics among educators are imminent. Nevertheless, the digital prowess of university faculty members proves instrumental in determining the caliber and effectiveness of their lessons. Given that this digital capability is a product of myriad influences, a meticulous examination of these factors is imperative. Consequently, delving into strategies that augment the digital teaching competencies of higher education instructors within the digital learning ecosystem carries immense value and relevance, contributing to the enhancement of educational practices and outcomes. Consequently, this paper endeavors to meticulously investigate the advancement of superior digital teaching strategies, examining their transformative impact on educational paradigms, and subsequently delving into the pivotal digital competencies educators must acquire to accommodate this shift. The discourse surrounding digital teaching strategies and teacher competencies transcends mere technological innovation; it embodies a holistic reappraisal of educational concepts, methodologies, and societal obligations. It obliges us to navigate the dual terrain of opportunities and challenges posed by technology, thereby ensuring the future of education is characterized by both efficacy and fairness, tailored to individual diversity, and cultivates versatile talents befitting the 21st-century landscape.

Objectives of the Study - The study's objective centered on investigating the digital teaching strategies implemented by and the competencies held by Chinese university educators. Specifically, Evaluate the educators' comprehension and practical execution of digital teaching strategies from their own perspectives and actions; Determine the prevailing proficiency levels and developmental trajectories of digital teaching practices observed throughout the study period; Uncover relationships between digital teaching strategies and competencies through a thorough analysis of the compiled data set; Derive an actionable strategy, grounded in the study's findings, to direct future advancements and interventions in digital education. This endeavor sought to shed light on the landscape of digital teaching within China's college faculty and inform strategies for its improvement and enrichment, employing a retrospective analysis to fully comprehend past practices and their implications.

2. Method

Research Design - This research employs a descriptive investigative approach to delve into the domain of

"Digital Teaching Strategies and Competency Among Teachers," with the core objective of furnishing a thorough depiction of the prevailing tactics utilized by educators in digital education and illuminating the attributes of their professional capabilities. Specifically, the inquiry centers around elucidating the categories of digital teaching methodologies, including blended learning, personalized instruction, and online collaborative techniques, alongside scrutinizing the constituent elements that constitute digital teaching proficiency, such as technical mastery, curriculum design, data analysis ability, etc. Explicit descriptive research aims to present a comprehensive picture of the current situation of digital teaching rather than a causal analysis. Based on the research objectives, a representative sample of teachers was selected and data were collected by means of questionnaire survey and published literature review to ensure the diversity and breadth of data sources. Using statistical analysis, case studies, charts and other forms, this paper describes in detail the types, frequency and effects of strategies adopted by teachers in digital teaching, as well as the overall level, differences and characteristics of teachers' digital competence. This includes the description of the environment, resource support, teacher attitude and other aspects of strategy implementation. The collected data are sorted out and analyzed, and the main trends, advantages and challenges of digital teaching strategies, as well as the key indicators of teacher competence and improvement needs are summarized.

This method provides a panoramic picture of the current digital teaching strategy application and teacher competence for education decision-makers, researchers and teachers, and reveals the common and individual problems existing in practice. The aim is to precisely pinpoint the precise requisites of educators in the realm of digital instruction, encompassing necessities like technological up-skilling and assistance with curriculum structuring, thereby furnishing a foundation for the formulation of tailored training programs and policy initiatives going forward. At the same time, the research results can directly guide schools and teachers how to optimize digital teaching strategies, improve teaching quality and efficiency, and promote educational equity and innovation. To provide empirical support for educational practice and promote the healthy development of educational informatization.

Participants of the Study - The research entailed the participation of individuals as subjects within a survey, with their selection process meticulously outlined. The questionnaire posed inquiries solely aimed at elucidating the attitudes and sentiments of these participants, emphasizing that there existed no dichotomy of right or wrong in their responses. The survey targets some college and undergraduate teachers from Yunnan University of Foreign Languages, including teachers from different majors such as literature, technology, education, politics, medicine, art, and other provincial and municipal universities. For the recruitment of actual participants, the process involved employing a straightforward method of simple random sampling. The reason for using this technology is that in this technology, every teacher in the selected school has an equal and independent opportunity to be selected. The probability of each participant who meets the selection criteria being selected as a part of the sample is equal. The determination of a sample comprising 335 individuals was reached through utilization of the Raosoft sample size calculation tool. With consideration for a population exceeding 10,000 members, the researchers adopted a 95% confidence interval alongside a desired maximum margin of error of 5%. Consequently, the calculated sample size yields an approximate error margin of 4.24%, suggesting a substantial degree of precision in inferring population parameters from the sampled data set.

Instrument of the Study - Structure questionnaires will be used in the part one, and Likert Scale will be used in the parts two and three. In the part one of the questionnaire survey, the investigator will collect the personal information and background information of the participants. This information may include: age, gender, Highest Educational Attainment and Years in Service. This information helps the researchers to understand the characteristics of the participants so that they can better analyze their perceptions and practices of digital teaching strategies and digital abilities. The second part of the questionnaire will involve digital teaching strategies. The survey includes the following contents: participants' understanding of digital teaching strategies, participants' preference and practical application of different digital teaching strategies, and participants' opinions and evaluations of digital teaching strategies. This part of the questionnaire aims to understand the participants' cognition and practical use of digital teaching strategies, as well as their attitudes and views on these

strategies. The third part of the questionnaire will focus on the participants' numerical abilities. The survey comprised several sections, amongst which, the third part specifically delved into assessing the digital competencies of the participants. The survey may include the following topics: participants' proficiency and confidence in digital technology, participants' ability and experience in using digital technology in teaching, participants' need and willingness to enhance digital skills, and participants' needs and expectations for digital skills training and support. The purpose of this part of the questionnaire is to understand the level of the participants' digital skills, as well as their attitudes and needs to improve their digital skills. Through this three-part questionnaire survey, researchers can comprehensively understand the participants' personal characteristics, the cognition and practice of digital teaching strategies, and the level and needs of digital abilities, so as to provide targeted advice and support for education and training.

Table A*Summary of Reliability Test*

Indicators	Cronbach Alpha	Remarks
Understanding degree and attitude of digital teaching	0.844	Good
Digital teaching interaction and evaluation strategy	0.965	Excellent
Digital cooperation strategy	0.883	Good
Current situation of digital teaching	0.813	Good
Digital teaching competency assessment	0.968	Excellent
The relationship between digital ability and teaching ability	0.921	Excellent
Application and improvement of digital capability	0.895	Good

George and Mallery (2003) provide the following rules of thumb:

"_ > .9 – Excellent, _ > .8 – Good, _ > .7 – Acceptable, _ > .6 – Questionable, _ > .5 – Poor, and _ < .5 – Unacceptable"

Data Gathering Procedure - This research uses the Internet to distribute and retrieve questionnaires through "questionnaire stars" to understand the digital teaching strategies and competency status of college teachers and their influencing factors. The target audience for distribution is all in-service teachers at W University. Firstly, the questionnaire was distributed to the working group of all faculty members. One week later, after organizing the data, it was found that some colleges had a larger sample size of teachers, while others had a smaller sample size of teachers. To bolster the reliability of the gathered data and ensure the samples' representativeness, this study employed a second round of questionnaire dissemination via the secondary college's teacher workgroup. The distribution period spanned two weeks, culminating in the collection of 337 completed questionnaires. Two invalid questionnaires were excluded, leaving 335 valid questionnaires with a validity rate of 99.4%.

Participation in the survey is voluntary and can only be initiated with the consent of W University teachers. The data were recorded in pseudonym. The Ethics Committee of W University reviewed the ethical and legal aspects of the study and approved its implementation. The questionnaire structure consists of two parts: multiple-choice questions and the Likert scale. The variables of digital teaching strategy and competence are based on the four point Likert scale. The questionnaire responses were structured utilizing a Likert scale, which ranged from "strongly agree" allotted 4 points to "strongly disagree" assigned 1 point, while "agree" and "disagree" were attributed 3 and 2 points correspondingly. Upon conclusion of the survey administration, the platform's integrated functionality was engaged to methodically extract all accumulated responses. To safeguard data integrity, a meticulous transfer procedure ensues, encapsulating the transcription of this information into an Excel document. Ultimately, the consolidated dataset is channeled to a specialist statistician adept in navigating intricate analytical processes. This terminal phase endeavors to unlock insightful trends and information, fostering an augmented comprehension of the collated data, thereby empowering more enlightened decision-making and conclusion drawing.

Ethical Consideration - In compliance with ethical principles governing research involving human and animal subjects, this study incorporates a comprehensive discussion of the ethical considerations under the Methods section. The documentation encompasses a meticulous description of the process for securing informed consent from participants, elucidating the comprehensive manner in which they were thoroughly educated about the study's objectives, methodologies, conceivable risks and advantages, along with their privileges as research

participants, notably the ability to retract their participation at any moment without facing repercussions. The confidentiality agreement, a critical component of participant protection, is thoroughly explained to ensure that participants understand the measures taken to safeguard their anonymity and the confidentiality of the information they provide. This involves detailing the anonymization techniques applied to data handling, storage, and analysis, as well as any limitations to confidentiality, if applicable. Respect for participants is paramount throughout the research process. Respondents are treated with dignity and their opinions, as expressed through the questionnaire, are valued and considered without prejudice. Researchers maintain open communication, answer queries promptly, and address any concerns raised by participants to foster a climate of trust and cooperation. In adherence to the Data Privacy Act of 2012 and other relevant guidelines, rigorous research protocols are meticulously followed during data collection. This encompasses strict adherence to data minimization principles, secure storage and transfer of data, restricted access to personally identifiable information, and the implementation of appropriate safeguards against unauthorized disclosure or misuse. Regular monitoring and review of data management practices ensure ongoing compliance with legal and ethical requirements, thereby upholding the privacy and rights of all study participants.

Data Analysis - The data analysis section of the study will comprehensively outline the full array of statistical tests employed to derive meaningful insights from the collected data. To ensure methodological rigor, consultation with the designated statistician will be sought to determine the most suitable statistical approaches tailored to the study's specific objectives and the nature of the data at hand. The analytical methodology will encompass discussions on both parametric and non-parametric tests, elucidating their distinct roles within the analysis. Parametric tests, premised on the assumptions of normally distributed data and equal variances, may encompass methodologies such as t-tests, ANOVA, regression analyses, and chi-square tests, contingent upon the inquiries and hypotheses posed by the research. Conversely, in scenarios where these foundational assumptions for parametric tests are not fulfilled, non-parametric approaches come into play. These may include the Spearman's rank correlation, to name a few. The selection of statistical methodologies will pivot upon the dataset's attributes, the research framework, and the imperative to rigorously and validly align with the study's objectives, ensuring a fitting and precise analytical strategy. Upon retrieval of the completed questionnaires, the responses will be systematically transcribed into an Excel spreadsheet, subsequently forwarded to the designated research center. There, skilled statisticians will employ SPSS Version 17 to analyze the encoded data.

3. Results and discussion

Table 1

Summary Table on Digital Instructional Strategies

Indicators	Weighted Mean	Verbal Interpretation	Rank
Understanding degree and attitude of digital teaching	3.29	Agree	4
Digital teaching interaction and evaluation strategy	3.41	Agree	1
Digital cooperation strategy	3.37	Agree	2
Current situation of digital teaching	3.30	Agree	3
Composite Mean	3.34	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

The table 1 summarizes respondents' perspectives on different aspects of digital instructional strategies, including their understanding and attitude toward digital teaching, the use of interaction and evaluation strategies, collaboration strategies, and the current state of digital teaching in their context. The composite mean of 3.34 indicates overall agreement with the implementation and importance of these strategies. Let's examine each indicator and its ranking based on the weighted mean scores:

Digital teaching interaction and evaluation strategy (Indicator 2): With a mean of 3.41, this aspect receives the strongest agreement among respondents, ranking first. This suggests that educators highly value and effectively employ interactive and evaluative methods in their digital teaching, which may include real-time feedback, formative assessments, peer review, discussion forums, and gamification techniques (Gikas et. al.,

2013; Hung et. al., 2010).

Regarding Indicator 3, which pertains to digital cooperation strategies, respondents concur with a mean score of 3.37, positioning this strategy as the runner-up in the hierarchy of importance. In digital 合作 scenarios, activities such as collaborative projects, co-authoring of documents, real-time and non-simultaneous communication platforms, along with other collective learning endeavors, play pivotal roles. These foster knowledge building, issue resolution, and the nurturing of socio-emotional competencies (Dabbagh et. al., 2012; Harasim et al., 1995).

Current situation of digital teaching (Indicator 4): With a mean of 3.30, respondents generally agree with the current state of digital teaching, placing it third in the ranking. This indicates satisfaction with the available resources, infrastructure, and practices supporting digital instruction in their institutions or classrooms.

Understanding degree and attitude of digital teaching (Indicator 1): Respondents express agreement (mean of 3.29) with their level of understanding and positive attitude toward digital teaching, ranking this aspect fourth. This implies that educators generally have a good grasp of the principles, tools, and pedagogical implications of digital teaching and view it as beneficial for student learning. However, the slightly lower rating compared to other indicators might indicate areas where further professional development or support could be beneficial to enhance teachers' confidence, skills, and innovation in digital teaching (Koehler et. al., 2009; Voogt et al., 2013).

Table 2

Summary Table on Digital Competencies

Indicators	WM	VI	Rank
Digital teaching competency assessment	3.35	Agree	1
The relationship between digital ability and teaching ability	3.34	Agree	2.5
Application and improvement of digital capability	3.34	Agree	2.5
Composite Mean	3.34	Agree	

Legend: 3.50 – 4.00 = Strongly Agree; 2.50 – 3.49 = Agree; 1.50 – 2.49 = Disagree; 1.00 - 1.49 = Strongly Disagree

Table 2 offers a synthesis centered around three pivotal dimensions of educators' digital prowess: the appraisal of their digital teaching expertise, the interplay between digital aptitude and instructional capability, and the practical utilization and enhancement of digital skills. An aggregated mean of 3.34 intimates a broad consensus among respondents concerning the paramountcy of these themes. We shall now embark on a meticulous exploration of each indicator, grounding our analysis in pertinent scholarly works.

Digital teaching competency assessment (Indicator 1): Ranking first (mean of 3.35), this indicator highlights the perceived importance of evaluating educators' proficiency in using digital tools and integrating them effectively into teaching practice. Assessments can help identify strengths, weaknesses, and areas for professional growth, ensuring that educators remain equipped to meet the evolving demands of digital education (Voogt et al., 2013) Such assessments may include self-reflection, peer observation, or standardized evaluation frameworks, all of which contribute to fostering a culture of continuous improvement in digital teaching.

The relationship between digital ability and teaching ability (Indicator 2): Sharing a mean of 3.34 and ranking second (along with Indicator 3), this indicator underscores the perceived interconnectedness between educators' digital skills and their broader teaching effectiveness. As technology increasingly permeates educational contexts, digital ability has become a vital component of modern teaching competence (Koehler et. al., 2009; Angeli et. al., 2009). Educators recognize that mastering digital tools and understanding how to leverage them pedagogically can enhance student engagement, facilitate collaboration, and support diverse learning needs, ultimately contributing to improved teaching outcomes.

Application and improvement of digital capability (Indicator 3): Also ranking second (mean of 3.34), this indicator emphasizes the value placed on actively applying digital skills in teaching and continuously refining those skills over time. Educators acknowledge the dynamic nature of digital technologies and the necessity of

adapting their practice to incorporate new tools and approaches (Ertmer et al., 2010). This includes participating in professional development opportunities, experimenting with innovative teaching methods, and reflecting on the impact of technology on student learning.

Table 3

Relationship Between Digital Instructional Strategies and Digital Competencies

Understanding degree and attitude of digital teaching	rho-value	p-value	Interpretation
Digital teaching competency assessment	.815**	0.000	Highly Significant
The relationship between digital ability and teaching ability	.804**	0.000	Highly Significant
Application and improvement of digital capability	.794**	0.000	Highly Significant
Digital teaching interaction and evaluation strategy			
Digital teaching competency assessment	.861**	0.000	Highly Significant
The relationship between digital ability and teaching ability	.819**	0.000	Highly Significant
Application and improvement of digital capability	.798**	0.000	Highly Significant
Digital cooperation strategy			
Digital teaching competency assessment	.855**	0.000	Highly Significant
The relationship between digital ability and teaching ability	.820**	0.000	Highly Significant
Application and improvement of digital capability	.808**	0.000	Highly Significant
Current situation of digital teaching			
Digital teaching competency assessment	.899**	0.000	Highly Significant
The relationship between digital ability and teaching ability	.816**	0.000	Highly Significant
Application and improvement of digital capability	.825**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table 3 unveils the outcomes of correlation studies that probe the association between diverse Digital Instructional Strategies and corresponding Digital Competencies. Displayed rho-values, acting as measures of correlation intensity, attest to robust positive linkages, while the universally minute p-values (under 0.01) underscore the high statistical significance of these findings, thereby ruling out coincidental associations. In collect, the results persistently affirm that enhancements in the application of targeted digital teaching methodologies coincide with analogous advancements in digital skillsets, underscoring a mutual reinforcement dynamic.

Digital Teaching Competency Assessment: All three digital instructional strategies—Understanding degree and attitude of digital teaching, Digital teaching interaction and evaluation strategy, and Digital cooperation strategy—show highly significant correlations with digital teaching competency assessment. The high rho-values (.815, .861, and .855, respectively) denote a very strong positive relationship, implying that educators who demonstrate a deeper understanding and more favorable attitudes toward digital teaching, employ interactive and evaluative digital strategies effectively, and foster digital cooperation among students are more likely to assess their overall digital teaching competencies as higher. This alignment is consistent with research emphasizing the importance of pedagogical beliefs, skills, and practices in shaping educators' digital competencies (Koehler et. al., 2009; Voogt et al., 2013).

The Relationship between Digital Ability and Teaching Ability: Similarly, strong correlations are observed between the three instructional strategies and the perceived relationship between digital ability and teaching ability. Educators who excel in understanding digital teaching, implementing interactive and evaluative strategies, and fostering digital cooperation also tend to perceive a closer and more synergistic link between their digital skills and their teaching effectiveness. This reinforces the idea that strategic, intentional use of digital tools and resources in instruction can enhance educators' ability to integrate technology seamlessly into their teaching practice (Ertmer et. al., 2010; Koehler et. al., 2009).

Application and Improvement of Digital Capability: The same pattern holds true for the application and improvement of digital capability, where all three instructional strategies exhibit highly significant positive correlations. Educators who demonstrate strong understanding, employ effective digital strategies, and promote digital cooperation among students are more likely to actively apply and continuously improve their digital skills. This underscores the importance of ongoing professional development and reflective practice in enhancing

digital competencies, as well as the role of supportive instructional environments that encourage experimentation and collaboration with digital technologies (Hew et. al., 2007; Voogt et al., 2013).

Table 4
Proposed Action Plan for Chinese University Teacher

Key Results Area	Plan Objective	Strategies	Activities	Success Indicators	Persons Involved
Digital Teaching Strategy	Equipment Resources and School Goals	Develop and Integrate High-Quality Digital Teaching Resources	Develop and integrate high-quality digital teaching resources, including electronic textbooks, online courses, interactive courseware, etc., to enrich the teaching content and enhance students' learning interest. Establish a cloud teaching resource library to facilitate teachers to share and obtain teaching materials and realize resource sharing. Build smart classrooms, equipped with intelligent teaching equipment, such as interactive whiteboard, VR/AR teaching tools, etc., to improve the teaching experience.	1.Resource coverage: Digital resources cover all core subjects and grades, and include diverse learning materials 2.Resource Utilization: Measure of frequency and depth of use of digital resources by teachers and students.	School Leaders Administrative Staff
		Building an Intelligent Learning Environment	Through digital means, we can break the geographical restrictions and realize the balanced distribution of high-quality educational resources. Ensure that all students have access to the necessary digital learning resources.	Technical infrastructure perfection: the degree of integration of the school's wireless network coverage, smart devices equipped with proportional cloud computing services. Engagement Balance: Monitor the engagement of different groups of students in digital learning activities to ensure that there are no significant differences. Effectiveness Monitoring and adjustment: Monitor achievement of educational equity goals through regular assessments and adjust strategies based on results to ensure that all students benefit.	
Digital Teaching Strategy	System, Training and Cooperation Objectives	Optimization Evaluation System	Use digital assessment tools to achieve immediate feedback and accurate evaluation of student learning outcomes. Learning analysis technology is adopted to provide teachers with in-depth insight into students' learning behavior and guide the adjustment of teaching strategies.	The system performance indicators have reached the expected standards Comprehensive and accurate data collection	Digital Education Office Firm Teacher Students
		Establish School-Enterprise Cooperation	Encourage communities and businesses to participate in digital teaching projects to expand learning resources and practical opportunities.	The implementation of the cooperation project is smooth, both the university and the enterprise can benefit from it and establish a sustainable cooperation model	
		Teacher Training and Technical	Organize regular information technology training for teachers to improve their	Teacher training participation and satisfaction are high,	

		Support	digital teaching design and implementation capabilities. Establish a teacher exchange platform and encourage teachers to share digital teaching experience.	teachers can apply what they have learned to teaching practice, and their digital application ability is significantly improved.	
Digital Teaching Competence	Digital Teaching Objective	Innovative Teaching Method	Adopt a blended learning model, combining online and offline teaching. New teaching methods should be introduced to enhance teacher-student interaction and student participation. 1.Through project-based learning, programming courses, and online collaboration, students are trained in innovative thinking, teamwork, and information technology application. 2.Strengthen information literacy education to ensure that students can use Internet resources safely and effectively.	The willingness and ability of teachers to adopt a variety of teaching modes and teaching strategies Increase student engagement Students' ability to use digital tools is enhanced	Teacher Students
		Develop Students' Digital Ability			

4. Conclusions and recommendations

Analyzing various aspects of university teaching, including resource usage, teaching models, teacher abilities, and support systems, leads to targeted recommendations for enhancement across these areas. Challenges persist in the creation and use of digital learning resources, limiting their growth potential. While digital teaching strategies are widespread, they often lag in updating with evolving learning contexts and prioritize quantity over quality, neglecting the synergy among teaching tools, thereby hindering optimal resource integration. Overall, university teachers show a positive trend in digital teaching skills, yet individual variations are notable. While some excel in technology, teaching design, data-driven instruction, and collaborative innovation, others must enhance their digital competencies to keep pace with educational technology advancements. The survey indicates a strong link between digital teaching strategies and capabilities. Enhanced strategic implementation improves digital abilities, with teacher proficiency in tech literacy, instructional design, data-driven decisions, innovative models, and social collaboration proving crucial for teaching effectiveness. The research findings propose the implementation of a digital teaching strategy and a competency improvement plan.

In digital teaching reforms, administrators must acknowledge teacher diversity, offering tailored training and support for optimal performance. Leaders should provide schools with the necessary infrastructure, funding, and policies to promote the use of creative technologies, while promoting a culture of digital instruction by leading by example. To enhance digital education, college teachers must integrate online-offline resources, refine teaching processes, and boost outcomes. Strategies like blended design, edtech tools, data-driven decisions, resource development, collaborative learning, and innovative modes form a robust, multi-faceted system catering to modern educational demands. Teachers should personalize their digital approach, continually refining skills to align with educational digitalization trends. The Digital Education Office should intensify teacher training, covering edtech usage, digital resource creation, data analytics in teaching, and blended learning design. It should foster collaboration via seminars, case exhibits, and online communities, sharing best practices. An evaluation system for digital teaching, using student feedback and data analysis, will provide personalized guidance for method improvement. Expert lectures, workshops, and partnerships with edu-tech firms and universities will introduce cutting-edge methodologies. The HR department should define required digital teaching competencies, establishing comprehensive standards for training and hiring. A certification system with incentives or professional credits for completing training or demonstrating excellence will boost teacher

engagement. Integrating digital skill development into career plans and encouraging personalized training paths based on teacher interests and needs will further enhance capability building. Future exploration of digital teaching strategies and teacher enhancement requires an interdisciplinary approach, empirical research, case studies, attention to user experience, ethics, equity, and inclusive research practices. Researchers must balance global perspectives with local realities, monitor policy impacts, and facilitate knowledge sharing, contributing to a robust, equitable, and sustainable digital education ecosystem through rigorous scientific inquiry. A holistic enhancement of digital teaching required the establishment of a systematic, multifaceted, and continuous training infrastructure. By integrating practical experiences, mentorship programs, assessments, incentive mechanisms, and a pool of shared resources, this strategy energized teacher motivation and cultivated a favorable ecosystem for digital instruction. Aligned with the objectives of educational informatization, it bolstered instructional excellence and catered to the nurturing requirements of talents in the new era.

5. References

- Angeli, C., & Valanides, N. (2009). Epistemological and methodological issues for the conceptualization, development, and assessment of ICT-TPCK: Advances in technological pedagogical content knowledge (TPCK). *Computers & Education*, 52(1), 154–168.
- Dabbagh, N., & Kitsantas, A. (2012). Personal learning environments, social media, and self-regulated learning: A natural formula for connecting formal and informal learning. *The Internet and Higher Education*, 15(1), 3–8.
- Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, 42(3), 255-284.
- Gikas, J., & Grant, M. M. (2013). Mobile computing devices in higher education: Student perspectives on learning with cellphones, smartphones & tablets. *The Internet and Higher Education*, 19, 18–26.
- Harasim, L., Hiltz, S. R., Teles, L., & Turoff, M. (1995). *Learning networks: A field guide to teaching and learning online*. MIT Press.
- Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development*, 55(3), 223-252.
- Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn? *Educational Psychology Review*, 16(3), 235-266.
- Hung, H.-T., Chou, C., Chen, C.-J., & Own, Z. Y. (2010). The influences of learning styles, self-efficacy, and motivation on learners' behavior in a web-based learning environment. *Computers & Education*, 55(4), 1398-1406.
- Johnson, L., & Liber, O. (2018). *NMC Horizon Report: 2018 Higher Education Edition*. The New Media Consortium.
- Jonassen, D. H. (1991). Objectivism versus constructivism: Do we need a new philosophical paradigm? *Educational Technology Research and Development*, 39(3), 5-14.
- Kirkwood, A., & Price, L. (2014). Examining some assumptions about technology-enhanced learning in higher education. *British Journal of Educational Technology*, 45(6), 962-974.
- Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education*, 9(1), 60–70.
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017-1054.
- Voogt, J., Fisser, P., Pareja Roblin, N., Tondeur, J., & van Braak, J. (2013). Technological pedagogical content knowledge—A review of the literature. *Journal of Computer Assisted Learning*, 29(2), 109–121.

