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Teachers' digital competence, innovative teaching strategies, and student course engagement in Chinese universities

Zheng, Xiaorui
Graduate School, Lyceum of the Philippines University - Batangas, Philippines

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Abstract

In the digital era, global emphasis on digital competence is increasingly evident, with various organizations and countries recognizing its importance as a crucial skill. In Chinese universities, integrating teachers' digital competence with innovative teaching methods is crucial for promoting student engagement and optimizing learning outcomes. This study explored these dynamics, involving 325 participants from four Chinese universities. Also, descriptive research was utilized to determine the relationship among these aforementioned variables. The findings indicated that majority of respondents were females aged 26 to 35 years old, with 11 years and above teaching experience and bachelor's degree holders. Overall, university teachers demonstrate good performance in digital competence, showing positive attitudes and high levels of competence in areas such as computer information, communication and collaboration, digital content creation, security, and troubleshooting. However, there is still significant room for improvement in digital content creation. Regarding innovative teaching strategies, university teachers show positive attitudes and high levels of competence in critical thinking, creativity, social skills, and ICT skills. Nonetheless, there are opportunities for enhancing students' sense of accountability towards their own learning and utilizing ICT as an effective means of engaging students. Student course engagement indicates their ability to actively participate in learning. However, students may lack the ability to relate course content to their daily lives and apply it practically, which may reflect limitations in traditional teaching methods in sparking students' interest and emotional investment. Additionally, there exists significant difference of responses on teacher's digital competence, innovative teaching strategies and student course engagement when grouped according to profile variables except sex. This implies that the factors other than sex significantly influence teacher's digital competence, use of innovative teaching strategies, and ultimately, student course engagement. Also, there is a highly significant relationship among the three variables. This indicates that teachers who are both digitally competent and utilize innovative teaching strategies can create a strong learning environment that fosters high student course engagement. This ultimately leads to better student outcomes and potentially

improved academic achievement. Hence, a professional development program was proposed for Chinese university faculty members. Further exploration is needed on how to integrate teachers' digital competence with innovative teaching strategies to enhance student course engagement and optimize learning outcomes and improve the caliber and efficiency of higher education in China.

Keywords: teachers' digital competence, innovative teaching strategies, student course engagement

Teachers' digital competence, innovative teaching strategies, and student course engagement in Chinese universities

1. Introduction

Since the onset of the 21st century, the swift evolution of digital technology has utterly reshaped the educational sphere. With the widespread availability of information and the internet, educators and students are facing unprecedented challenges and opportunities. In this digital age, the digital competence of teachers and innovative teaching strategies are crucial for enhancing students' course engagement and optimizing learning outcomes. An increasing number of studies emphasize the importance of the digital era for education, particularly the digital competence of teachers. Many countries and international organizations have proposed frameworks for "21st-century skills," considering digital competence as one of the indispensable skills for future society. Among these frameworks, models from the United States and the European Union underscores the significance of fostering capabilities in education and creativity, proficiency in handling information and technology, and the development of life and career competencies, providing invaluable guidance for nurturing future talents.

The European Union defines digital competence as "the prudent, wise, and accountable utilization and interaction with digital technologies for educational purposes, professional endeavors, and societal participation. This entails mastery in understanding information and data, effective communication and cooperation, literacy in media, creation of digital content (including programming), safeguarding measures (encompassing digital well-being and cybersecurity skills), consideration of intellectual assets, analytical thinking, and problem-solving abilities" (European Council, 2018, p. 9). Teachers' Digital Competence pertains to their capacity to integrate digital technology into educational activities in a critical, ethical, and responsible manner, aiming to facilitate complex problem-solving and the development of students' advanced cognitive abilities. This encompasses various aspects such as knowledge, skills, motivation, attitudes, values, and personal traits. Despite diverse definitions, there is a fundamental consensus emphasizing that teachers must possess pedagogical and technical knowledge to effectively apply digital technology (Silva et al., 2018). Furthermore, Durán (2019) additionally highlights that Teachers' Digital Competence encompasses a combination of knowledge, competencies, and mindsets that empower educators to proficiently utilize ICT. These abilities cover various aspects including technology, information, multimedia, communication, collaboration, and ethics. This viewpoint assumes that teachers need to meet a series of standards to effectively integrate ICT into educational practices, applicable to both formal and informal teaching contexts. In this aspect, Castañeda et al. (2022) emphasize the necessity for Teachers' Digital Competence to be thorough, focused, methodical, trainable, and consistently evolving. Moreover, it entails the fusion of proficiencies, mindsets, and understanding essential for educators to empower students as dynamic contributors in the digital environment.

Innovative teaching strategies aim to utilize advanced methods and technologies to facilitate students' learning and development. These strategies include but are not limited to leveraging modern technology and multimedia resources, implementing problem-based learning, nurturing students' innovative thinking and analytical reasoning, interdisciplinary learning, as well as personalized and differentiated teaching methods. Their goal is to improve the standard of education, stimulate students' interest and participation, cultivate students' comprehensive abilities, and meet the growing demands of learning. Innovative teaching strategies integrate technology into teaching methods, providing students with rich learning experiences while also offering meaningful teaching experiences for educators. In practice, through innovative teaching strategies, strengthening interaction between teachers and students can boost students' enthusiasm for learning and foster their holistic growth (Zhang,et. al., 2023).

Student course engagement refers to the degree of active participation in the course during the learning

process, including their level of attention in class, frequency of participation in discussions, timeliness of completing assignments, as well as the depth of understanding and application of course content. This level of engagement reflects students' degree of involvement in learning tasks and their interaction with course content (Cui, 2022). Yang, et. al., (2020) argues that highly engaged students invest a considerable amount of effort in their studies, devoting considerable time on campus, engaging actively in student associations, and regularly interacting with instructors and peers. The level of student course engagement directly influences their learning outcomes and academic achievements. Therefore, inspiring and promoting student course engagement is crucial for educators.

China's education system is gradually emphasizing the application of digital competence and innovative teaching methods to adapt to the evolving student population and societal needs. However, current research primarily focuses on specific strategies to enhance Teachers' Digital Competence, and there is insufficient in-depth studies investigating the correlation among the digital competence of Chinese university teachers, innovative teaching strategies, and student course engagement. Therefore, further exploration is needed on how to integrate Teachers' Digital Competence with innovative teaching strategies to enhance student course engagement and optimize learning outcomes. This research endeavors to address this gap in the literature by investigating the relationship between the digital competence of Chinese university teachers, innovative teaching strategies, and student course engagement, providing practical recommendations to improve the caliber and efficiency of higher education in China. Through in-depth research on the interaction between these factors, we will gain a deeper comprehension of how teachers' competence in digital skills influences the adoption of innovative teaching strategies and how they affect student course engagement. Additionally, the researchers will explore how to establish a more favorable and efficient educational atmosphere by improving teachers' digital competence and innovative teaching strategies, as well as actively encouraging student participation, to enhance teaching effectiveness and student performance.

Objectives of the Study - This study aimed to determine the relationship among teachers' digital competence, innovative teaching strategies and students course engagement in Chinese universities. Specifically, it described the profile of respondents in terms of sex, age, teaching experience and educational attainment; assessed the teachers' digital competence with regard to computer information and literacy, communication and collaboration, creating digital content, security, troubleshooting; identified the innovative teaching strategies as to critical thinking, creativity, social skills, information communication and technology skills; determined the student course engagement as regards skills, emotion, part and performance; tested the significant differences of responses in digital competence, innovative teaching strategies and student course engagement when profile variables are grouped; tested the significant relationship among the three variables; and finally, proposed a professional development program for Chinese university faculty based on the results of the study.

2. Methods

Research Design - The researcher employed a descriptive research to explore the correlation among Teachers' Digital Competence, Innovative Teaching Strategies, and Student Course Engagement in Chinese Universities. Descriptive research aims to describe individuals, events, or conditions as they naturally occur without manipulating any variables. It focuses on examining the characteristics of populations, identifying issues within units, organizations, or populations, and examining differences in attributes or methodologies among institutions or even across nations. This study conducted a comprehensive review of relevant literature to synthesize existing knowledge on Teachers' Digital Competence, innovative teaching strategies, and student course engagement (Siedlecki, 2020). Data were collected through a questionnaire survey administered to teachers, segmented by sex, age, teaching experience, and educational background. The questionnaire assessed teachers' levels of digital competence, utilization of innovative teaching strategies, and perceptions of student course engagement. Subsequently, mathematical analytical techniques were utilized to examine the gathered data and explore the relationships between the variables of interest. The survey method was chosen for data collection because of its comparative cost-efficiency and straightforward implementation. However, potential challenges to

both internal and external validity, including the reliability of questionnaire items and respondents' honesty in answering, were addressed through rigorous testing of the survey instrument's validity and reliability. In conclusion, this descriptive research design comprehensively explores the relationship between Teachers' Digital Competence, Innovative Teaching Strategies, and Student Course Engagement in Chinese Universities, providing valuable insights for educational application and further research.

Participants of the Study - The study recruited its participants from four public universities in Guangdong Province: Jiangmen Polytechnic, WuYI University, Guangdong Jiangmen Chinese Medicine College, and Guangdong Jiangmen Preschool Teachers College. These institutions collectively employed 2080 full-time teachers. Participant selection depended on their accessibility and willingness to participate in the study. The sample size of 325 teachers was determined utilizing the Raosoft calculator, aiming to attain a 5% margin of error with a 95% confidence level. For data collection, the study utilized the "Questionnaire Star" platform to distribute electronic surveys via the Internet. The surveys primarily targeted teachers from various disciplines across the three universities. A total of 325 surveys were distributed and collected, achieving a 100% response rate, with all 325 surveys considered valid.

Instrument of the Study - This study employed a modified questionnaire as its primary tool to gather researcher information. Three questionnaires were utilized: the Teachers' Digital Competence, Innovative Teaching Strategies, and Student Classroom Engagement Model Evaluation Scales, all evaluated on a 4-point Likert scale. To design an effective questionnaire, the researcher created a four-part questionnaire after reviewing relevant literature. The first part captured respondents' profiles, including gender, age, teaching experience, and education level. The second part addressed digital competence issues, utilizing a scale by Tourón et al. (2018) encompassing five facets of digital competence: Computer information and literacy, Communication and collaboration, Creating digital content, Security, and Troubleshooting, totaling 54 items. The third part explored innovative teaching strategies using a scale developed by RUSTICO (2020), consisting of four dimensions: Critical Thinking, Creativity, Social Skills, and Information Communication and Technology Skills. A total of 40 questions were used.. Finally, the fourth part focused on student classroom engagement, employing a scale by MITCHELL (2005) with four dimensions: Skills, Emotional, Part, and Performance. There were a total of 23 questions, primarily studying classroom engagement from the perspective of teachers.

Aside from demographic data, the other three sections of the entire questionnaire adopted a 4-point Likert scoring method, with each question offering four options. Regarding the Teachers' Digital Competence Scale, responses varied from Strongly Agree (4 points) to Strongly Disagree (1 point); for the Innovative Teaching Strategies Scale, responses ranged from Always (4 points) to Never (1 point); for the Student Classroom Engagement Scale, responses ranged from Very Characteristic (4 points) to Not at All Characteristic (1 point). To ensure questionnaire validity, a pilot study was conducted, and feedback from professors and subject matter experts was incorporated. The reliability was evaluated through Cronbach's alpha, yielding coefficients ranging from 0.868 to 0.961, denoting substantial internal consistency. Upon completion of the tool construction and validation, approval was sought from the local university for administering the questionnaire to target respondents. The electronic questionnaire was then distributed via the Questionnaire Star platform, accompanied by a statement clarifying the research's purpose and the expectation of sincere and honest responses from participants. Following the online questionnaire management, responses were sorted and analyzed using Microsoft Excel. Finally, the results were systematically interpreted and analyzed. Response scoring was conducted, with responses transmitted and interpreted using scale range and verbal interpretation.

Data Gathering Procedure - The specific steps to complete this study are as follows: Firstly, the questionnaire was created on the Questionnaire Star platform, and QR codes for filling out the questionnaire were generated. Subsequently, the online questionnaire was published via the WeChat platform, and the researchers collected 30 questionnaires for the first time to validate and ascertain the reliability of the questionnaire. Then, a large-scale questionnaire distribution was conducted, and the questionnaire was sent to

selected university teachers through WeChat. These questionnaires were primarily distributed to teachers at four public universities in Guangdong Province. During the distribution of the questionnaire, the researchers elucidated the intent behind the survey in detail and obtained the consent and support of the teachers to ensure the authenticity and reliability of the gathered data. Finally, using the data collection function of the Questionnaire Star platform, all data were exported to EXCEL spreadsheets and checked to ensure accuracy. After exporting the survey data, the researchers used Excel to validate the data, eliminate abnormal and invalid data, to ensure the accuracy of the questionnaire. A total of 341 survey responses were received, 16 invalid responses were excluded, and ultimately 325 valid responses were obtained. The criteria for invalid data included incomplete questionnaires and questionnaires with excessively short completion times. The researchers set the valid completion time for the questionnaire to be 120 seconds, thus, responses completed in less than 120 seconds were considered invalid based on monitoring by the Questionnaire Star platform.

Data Analysis - The gathered data underwent organization and analysis employing the recommended statistical methodologies or analytical instruments. Frequency distribution was utilized to express the profile variable frequencies as a percentage of the total frequency. Weighted mean ranking to measure Teachers' Digital Competence, Innovative Teaching Strategies and Student Course Engagement. The assessment of Teachers' Digital Competence was conducted using Analysis of Variance (ANOVA). Pearson Correlation Coefficient was used to show the relevance among Teachers' Digital Competence, Innovative Teaching Strategies, and Student Course Engagement among Chinese universities teachers with the aim of improving Teachers' Performance.

Ethical Considerations - In our research, we carefully considered ethical issues to ensure everyone's integrity and well-being. We obtained informed consent from all participants, maintained confidentiality to protect anonymity, and ensured data security. Any ethical concerns were promptly addressed. These measures aimed to uphold research integrity and protect participants' rights and welfare.

3. Results and discussion

Table 1

Summary Table on Teachers' Digital Competence

Indicators	Weighted Mean	Verbal Interpretation	Rank
Computer Information and Literacy	3.38	Agree	3.5
Communication and Collaboration	3.45	Agree	1
Creating Digital Content	3.34	Agree	5
Security	3.38	Agree	3.5
Troubleshooting	3.43	Agree	2
Composite Mean	3.40	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 1 provides a summary of teachers' participation based on their digital competence, yielding an average score of 3.40. They exhibited favorable attitudes and relatively elevated levels of competence in computer information, communication and collaboration, digital content creation, security, and troubleshooting. However, among these dimensions, teachers achieved the highest scores in communication and collaboration, with digital content creation receiving the lowest ratings.

According to statistics, various levels and types of schools in China have established basic information educational environments. The number of schools with wireless networks exceeds 210,000, and 86.2% of educational institutions have attained complete integration of multimedia instructional resources. Universities have even more comprehensive digital infrastructure. However, material readiness does not necessarily translate into effective utilization. Without the support of up-to-date digital competence, teachers may not effectively utilize these facilities. Yang, et. al., (2019) conducted a survey on the information technology application levels

of local university teachers and found that while these teachers exhibit high ethical awareness and strong information consciousness, their information application abilities are lacking. Hence, it is imperative to bolster the digital proficiency of university educators (Li, 2023). The central challenge concerning educators' digital proficiency stems from the deficiency in contemporary educational technology and professional development opportunities (Wang, 2022). There is a need to improve information technology application abilities, particularly concerning the utilization of emerging technologies such as data analytics and artificial intelligence. Curriculum design and teaching methods need to be more aligned with digital characteristics. Insufficient digital competence awareness is also a prominent issue that requires attention through training and educational avenues (Liu, et. al., 2023). Despite significant achievements in the construction of information education infrastructure in China, university teachers still face shortcomings in coping with online teaching and utilizing digital resources. Especially during the pandemic, some teachers encountered difficulties due to inadequate technical proficiency, further highlighting the urgency of improving digital competence. To address this issue, educational institutions can strengthen teachers' digital skills training, provide online learning platforms and resources, encourage teachers to actively participate in digital teaching practices, and regularly assess and update training plans to ensure that Teachers' Digital Competence keep pace with advancements. Therefore, further enhancing the digital teaching capabilities of university teachers remains an urgent issue to be addressed.

To elevate the digital proficiency of university educators, the following approaches can be employed: Developing an understanding of digital education trends and concepts, including exploring the benefits and practical applications of digital teaching through academic journals, training sessions, and following expert blogs. Acquiring proficiency in digital teaching tools and platforms by actively participating in training courses and online learning platforms. This involves mastering the basic operations and application skills of various digital teaching tools. Engaging in digital course design and teaching practice. This entails redefining course objectives, enhancing digital teaching design and implementation, and continuously experimenting, adjusting, and refining teaching methods. Keeping abreast of new technologies by continuously learning and staying updated on developments in the field of digital education. Utilizing MOOC platforms and online learning resources from both domestic and international sources to acquire new technologies and integrate them into teaching practice (Ma, 2019). Participating in professional development plans and projects to enhance digital awareness. This involves engaging in research projects to gain insights into cutting-edge knowledge and trends in digital education, and integrating theoretical knowledge with practical application. Providing continuous support and feedback mechanisms within schools and educational institutions. This includes offering professional training, consulting services, and regular assessments to promote teacher professional development and enhance digital competence.

Table 2

Summary Table on Innovative Teaching Strategies

Indicators	Weighted Mean	Verbal Interpretation	Rank
Critical Thinking	3.56	Always	1
Creativity	3.33	Often	3.5
Social Skills	3.36	Often	2
Information Communication and Technology Skills	3.33	Often	3.5
Composite Mean	3.40	Often	

Legend: 3.50 – 4.00 = Always; 2.50 – 3.49 = Often; 1.50 – 2.49 = Seldom; 1.00 - 1.49 = Never

Table 2 summarizes the participation of teachers from the perspective of innovative teaching strategies, achieving an aggregate score of 3.40, suggesting a favorable mindset and a considerable degree of proficiency among them. Particularly noteworthy is the highest score in critical thinking (3.56), demonstrating outstanding performance in cultivating students' critical thinking abilities. The score for social skills is 3.36, indicating commendable achievements in fostering students' social interaction skills. Additionally, teachers have demonstrated a certain level of ability in creativity and information communication skills, with scores of 3.33

each. Based on the data analysis results, we can see that university teachers demonstrate a positive attitude and high level of competence in innovative teaching strategies. This aligns with their role as important guides in students' growth. The mission of university teachers is not only to impart knowledge but more importantly, to cultivate high-quality talents to serve society. Through emotional communication, sharing experiences, knowledge exchange, and interactive engagement with students, teachers continuously challenge themselves, striving for personal innovation in the teaching process. They not only interact with students but also undergo self-growth while aiding students in their development. This complements their demonstrated ability in innovative teaching strategies (Lu, 2020).

Here are some methods to enhance teachers' innovative teaching strategies: Providing Personalized Professional Training and Development Plans. Universities should utilize modern technology to improve teacher training methods, standardize training, and design personalized training plans based on teachers' needs and skill levels. At the same time, training content should encompass leveraging digital tools, strategies for online instruction, and innovative teaching methods to meet evolving teaching requirements. Additionally, establishing a multi-channel, multi-specification, and multi-form teacher training system is essential to enhance the efficiency and quality of training (Wang, 2022). Encouraging Teacher Collaboration and Cooperation. Principals should leverage multi-party cooperation to comprehensively enhance teachers' professional development. Collaborating with government, social organizations, and enterprises to customize professional development plans expands teachers' international exchanges and cooperation while promoting the application of information technology in teaching. Research indicates that emphasizing information and communication technology applications helps elevate China's teacher training level to meet the challenges of professional competence in the new era (Zheng, 2022). Providing Resource Support. Schools should strengthen the construction and integration of teaching platforms to meet teachers' needs in both online and offline teaching. In top-level design, schools should prioritize student learning needs, establish a modern education technology service guarantee system, promote the transformation of teacher technology teams, and ensure the effectiveness and quality of teaching services. Additionally, schools should provide resource support for teacher professional development, such as training courses, teaching equipment, and teaching materials, to stimulate teachers' innovation awareness and teaching abilities (Xue, et. al., 2020). Establishing Teaching Evaluation and Feedback Mechanisms. It is recommended to establish a scientifically sound and operationally strong internal quality assessment system, improve the multi-dimensional teaching quality evaluation and assurance system, and run it regularly. Schools should establish effective teaching evaluation mechanisms, including student feedback, peer review, and teaching observation, to provide timely feedback and guidance, promoting the optimization of innovative teaching strategies by teachers. Encouraging teachers to engage in teaching reflection and professional development activities facilitates continuous growth. Utilizing modern technologies such as teaching management systems and online evaluation tools enhances evaluation efficiency and accuracy, further advancing the improvement of teaching quality (Zhang,et. al., 2023).

Table 3

Summary Table on Student Course Engagement

Indicators	Weighted Mean	Verbal Interpretation	Rank
Skills	3.35	Characteristics	1
Emotion	3.15	Characteristics	4
Part	3.23	Characteristics	3
Performance	3.29	Characteristics	2
Composite Mean	3.26	Characteristics	

Legend: 3.50 – 4.00 = Very Characteristics; 2.50 – 3.49 = Characteristics; 1.50 – 2.49 = Not Really Characteristics; 1.00 - 1.49 = Not at all Characteristics

Table 3 summarizes the participation of teachers from the perspective of Student Course Engagement, with a composite average score of 3.26. The skill dimension scores relatively high (3.35), indicating success in

fostering student skills. This may be related to the traditional educational philosophy in Chinese universities that emphasizes imparting subject knowledge. Cui (2022) believes that learners' behavioral engagement reflects the actual effort individuals put in, demonstrating responsibility in practicing, operationalizing cognitive and emotional engagement processes, and outcomes, which is the most significant external manifestation of "individual engagement". However, compared to other dimensions, the emotional dimension (3.15) scores slightly lower. The lower score in the emotional dimension may reflect the limitations of traditional teaching methods in inspiring student interest and emotional involvement. Cui (2022) believes that learners' emotions assist cognition in better regulating behavior to achieve higher quality behavioral engagement. During the classroom teaching process, teachers should give students more encouragement so that students can effectively enhance their cognitive abilities in a relaxed and pleasant classroom atmosphere (Wang, 2022).

Course Engagement is considered a behavioral tendency, encompassing both guided learning under the teacher's instruction and students' subjective autonomous learning. To better promote student course engagement, teachers can adopt innovative teaching strategies and enhance digital competence. Firstly, educators have the capacity to leverage modern technologies such as online learning platforms and virtual laboratories to develop course content that is not only more captivating but also fosters interactive learning experiences and generates enthusiasm for the subject matter. Secondly, cultivating students' learning motivation is essential as students' behavior is heavily influenced by motivation, and their understanding of learning directly affects their level of course engagement. Psychology suggests that needs are internal unmet states that become internal drivers only when triggers occur. Therefore, teachers should ensure that students realize the significance of learning and increase learning satisfaction through engaging trigger-based learning activities. Additionally, teachers can use various methods to stimulate students' curiosity for learning, such as setting cognitive conflicts, varying learning activities, and providing new information. Thirdly, enhancing classroom interest is crucial. Teachers should utilize lively and interesting teaching methods, interactive tools, and technologies, design challenging tasks, incorporate students' interests and hobbies, and improve course engagement and learning effectiveness. Fourthly, creating a Classroom Atmosphere that Promotes Active Student Participation is vital. The role of the teacher is crucial; they should foster an egalitarian environment and encourage student participation in discussions. Research shows that the organizational atmosphere significantly influences student engagement. Avoiding a top-down teaching style, teachers should create learning situations conducive to teacher-student interaction, guiding students to think actively and enhancing their awareness of participation (Yang, et. al., 2020). Lastly, strengthening feedback mechanisms is essential. Establishing feedback mechanisms for students and teachers in digital platforms allows students to understand their performance in the classroom, receive timely encouragement or advice, and stimulate confidence and motivation. These strategies help enhance Teachers' Digital Competence, stimulate student interest, increase participation, and encourage students to better apply their knowledge, thus achieving the educational goal of cultivating students' comprehensive and in-depth abilities.

Table 4 delineates the correlation between educators' digital proficiency and innovative teaching methodologies. The computed r-value denotes a moderate positive correlation, while the p-value falling below the alpha level signifies a substantial association. This implies that heightened digital competence among teachers correlates with enhanced innovative teaching strategies. Liu, et. al., (2023) emphasizes that continual advancements in digital technology necessitate the enhancement of university educators' digital proficiency to align with the evolving landscape of digital education trends. This enables teachers to more effectively utilize various teaching tools and platforms, providing rich, diverse, and personalized learning experiences, thereby improving teaching effectiveness. Therefore, cultivating the ability to utilize digital teaching resources should be an ongoing process, stimulating teachers' intrinsic professional development needs through initiatives such as project advancement and curriculum reform.

Table 4

Relationship Between Teacher's Digital Competence and Innovative Teaching Strategies

Creating Information and Literacy	r-value	p-value	Interpretation
Critical Thinking	.341**	0.000	Highly Significant
Creativity	.465**	0.000	Highly Significant
Social Skills	.543**	0.000	Highly Significant
Information Communication and Technology Skills	.464**	0.000	Highly Significant
Communication and Collaboration			
Critical Thinking	.417**	0.000	Highly Significant
Creativity	.628**	0.000	Highly Significant
Social Skills	.517**	0.000	Highly Significant
Information Communication and Technology Skills	.562**	0.000	Highly Significant
Creating Digital Content			
Critical Thinking	.502**	0.000	Highly Significant
Creativity	.643**	0.000	Highly Significant
Social Skills	.499**	0.000	Highly Significant
Information Communication and Technology Skills	.543**	0.000	Highly Significant
Security			
Critical Thinking	.482**	0.000	Highly Significant
Creativity	.454**	0.000	Highly Significant
Social Skills	.484**	0.000	Highly Significant
Information Communication and Technology Skills	.515**	0.000	Highly Significant
Troubleshooting			
Critical Thinking	.526**	0.000	Highly Significant
Creativity	.533**	0.000	Highly Significant
Social Skills	.517**	0.000	Highly Significant
Information Communication and Technology Skills	.603**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

In the digital era, university teachers urgently need to actively recognize, adapt to, and explore changes to enhance their innovative teaching strategies. They must continuously strengthen their awareness of applying information technology in teaching, update teaching philosophies, enhance information technology teaching capabilities, actively develop new teaching resources, and fully utilize digital tools to enhance the efficiency and quality of classroom teaching (Wu, 2022).

Table 5 showcases the correlation between teachers' digital aptitude and student course engagement. The computed r-value suggests a moderate positive correlation, with the p-value falling below the alpha threshold, indicating a significant relationship. These findings imply that heightened digital proficiency among educators corresponds to increased levels of student course engagement. In the context of Chinese universities, this finding suggests that enhancing Teachers' Digital Competence dimensions may contribute to increased student course engagement. Le (2024) suggests that teachers with strong digital competence can provide students with richer and more diverse learning experiences, thereby helping them better understand and grasp knowledge, consequently stimulating students' interest and participation in learning. Therefore, university management can encourage teachers to better utilize technological tools by providing relevant training, support, and digital

teaching resources, thereby stimulating student interest and active participation. Tian (2023) argues that to better utilize digital teaching and enhance student participation in the classroom, teachers need to not only master the use of instructional media but also analyze students' digital culture in curriculum design and teaching arrangements.

Table 5

Relationship Between Teacher's Digital Competence and Student Course Engagement

Creating Information and Literacy	r-value	p-value	Interpretation
Skills	.513**	0.000	Highly Significant
Emotion	.426**	0.000	Highly Significant
Part	.420**	0.000	Highly Significant
Performance	.352**	0.000	Highly Significant
Communication and Collaboration			
Skills	.519**	0.000	Highly Significant
Emotion	.515**	0.000	Highly Significant
Part	.395**	0.000	Highly Significant
Performance	.392**	0.000	Highly Significant
Creating Digital Content			
Skills	.493**	0.000	Highly Significant
Emotion	.402**	0.000	Highly Significant
Part	.456**	0.000	Highly Significant
Performance	.319**	0.000	Highly Significant
Security			
Skills	.531**	0.000	Highly Significant
Emotion	.385**	0.000	Highly Significant
Part	.470**	0.000	Highly Significant
Performance	.327**	0.000	Highly Significant
Troubleshooting			
Skills	.559**	0.000	Highly Significant
Emotion	.533**	0.000	Highly Significant
Part	.439**	0.000	Highly Significant
Performance	.411**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Additionally, teachers should be attentive to new ethical issues brought about by the digital age, including disparities among student populations due to different geographical and family backgrounds, the potential educational deprivation faced by vulnerable groups, and how to use data responsibly to protect student privacy.

Table 6

Relationship Between Innovative Teaching Strategies and Student Course Engagement

Critical Thinking	r-value	p-value	Interpretation
Skills	.467**	0.000	Highly Significant
Emotion	.499**	0.000	Highly Significant
Part	.338**	0.000	Highly Significant
Performance	.532**	0.000	Highly Significant
Creativity			
Skills	.460**	0.000	Highly Significant
Emotion	.469**	0.000	Highly Significant
Part	.499**	0.000	Highly Significant

Performance	.166**	0.003	Highly Significant
Social Skills			
Skills	.572**	0.000	Highly Significant
Emotion	.271**	0.000	Highly Significant
Part	.406**	0.000	Highly Significant
Performance	.420**	0.000	Highly Significant
Information Communication and Information Literacy			
Skills	.575**	0.000	Highly Significant
Emotion	.539**	0.000	Highly Significant
Part	.480**	0.000	Highly Significant
Performance	.376**	0.000	Highly Significant

Legend: Significant at p-value < 0.01

Table 6 delineates the correlation between innovative teaching strategies and student course engagement. The computed r-value suggests a moderate positive correlation, with the p-value falling below the alpha threshold, indicating a significant relationship. These findings suggest that improved innovative teaching strategies correspond to heightened levels of student course engagement. Therefore, university management can encourage teachers to utilize innovative teaching strategies by providing training, support, and educational resources to foster a more dynamic and interactive learning environment. According to Li (2021), teachers should conduct lively classroom lectures that emphasize practicality and novelty. They need to possess teaching innovation skills and strong language expression abilities to facilitate active participation from students in the classroom and promote teacher-student interaction. Additionally, educators should prioritize the development of students' learning capabilities, utilizing various media tools and flexible teaching methods to avoid traditional lecture-style teaching, thereby enhancing student course engagement. Zhang (2023) points out that there is a close correlation between college students' intrinsic motivation and teaching reform, the latter of which can promote the enhancement of students' intrinsic motivation and autonomous learning abilities. By employing innovative teaching strategies and strengthening teacher-student interaction, student intrinsic motivation can be enhanced, thus improving the quality of talent cultivation.

Table 7

Proposed Professional Development Program for Chinese University Faculty

Key Result Areas/ Objectives	Program/ Strategies	Success Indicators	Persons Involved
Teachers' Digital Competence a.1 Creating Digital Content *Objective: To enhance teachers' Creating Digital Content ability*	*Level Up: Digital Content Creation (emphasizes skill development)* 1.Gain insights into current trends, benefits, and models of digital content creation by staying updated with the latest research in educational journals, attending academic conferences, seminars, and workshops. 2.Engage in training sessions specifically aimed at mastering the skills required for creating digital content, including multimedia tools, graphic design software, and content management systems. 3.Enroll in courses focused on digital content creation practices, continually adapt and refine skills, and strive for ongoing improvement to elevate teaching quality. 4.Participate in collaborative digital content creation projects and initiatives to gain hands-on experience and enhance creativity and innovation. 5.Take advantage of professional development opportunities	90% of teachers attended conferences, training seminars and workshops.	University leaders and teachers

	provided by the school, including regular assessments, to support continuous enhancement of digital content creation abilities.		
Innovative Teaching Strategies B.1 Creativity B.2 Information Communication and Technology Skills *Objective: To enhance teachers' Creativity and Information Communication and Technology Skills*	*The Innovation Lab: Reimagining Teaching with Creativity & ICT (emphasizes a collaborative space for growth)* 1.Organize dynamic workshops and seminars aimed at guiding teachers to delve into the significance and methodologies of fostering creativity. 2.Introduce interdisciplinary collaborative projects and assignments to inspire teachers to experiment with novel pedagogical approaches and curriculum designs. 3.Establish an interactive platform for exchanging innovative ideas, enabling educators to showcase and exchange their inventive teaching methodologies and insights. 4.Cultivate teachers' aptitude in design thinking and problem-solving, empowering them to integrate inventive teaching techniques seamlessly into their instructional practices. 5.Provide targeted technical training programs to equip teachers with the proficiency to leverage diverse digital tools and platforms effectively. 6.Launch comprehensive online courses dedicated to acquainting educators with the latest online teaching tools and methodologies. 7.Encourage active participation of teachers in digital teaching initiatives and research endeavors to enrich their hands-on experience in applying technology in education. 8.Extend personalized technical assistance and guidance to support educators in overcoming technical hurdles and challenges encountered during digital teaching endeavors.	90% of teachers obtained a rating of very satisfactory and above performance evaluation Improved.	University leaders and teachers
Student Course Engagement C.1 Emotion *Objective: To enhance the Emotion dimension of student course engagement*	*The Student Spark: Igniting Passion and Curiosity (focuses on positive emotions that drive learning)* 1.Innovate teaching using digital tools to inspire active student engagement. 2.Foster students' intrinsic motivation, enhancing their initiative and involvement in learning. 3.Emphasize classroom enjoyment by designing vivid and lively teaching content. 4.Implement personalized learning strategies to meet students' diverse learning needs and ability levels. 5.Enhance teachers' digital skills through training and effectively apply them in teaching practice. 6.Establish an effective feedback mechanism to promptly adjust teaching methods and improve teaching effectiveness.	85% of students attained a GWA of above the passing mark.	University leaders, teachers, and students

4. Conclusions and recommendations

The majority of respondents were females aged 26 to 35 years old, with 11 years and above teaching experience and bachelor's degree holders. Overall, university teachers demonstrate good performance in digital

competence, showing positive attitudes and high levels of competence in areas such as computer information, communication and collaboration, digital content creation, security, and troubleshooting. However, there is still significant room for improvement in digital content creation. Regarding innovative teaching strategies, university teachers show positive attitudes and high levels of competence in critical thinking, creativity, social skills, and ICT skills. Nonetheless, there are opportunities for enhancing students' sense of accountability towards their own learning and utilizing ICT as an effective means of engaging students. Student course engagement indicates their ability to actively participate in learning. However, students may lack the ability to relate course content to their daily lives and apply it practically, which may reflect limitations in traditional teaching methods in sparking students' interest and emotional investment. There exists significant difference of responses in teacher's digital competence, innovative teaching strategies and student course engagement when respondents were grouped according to profile variables except sex. This implies that the factors other than sex significantly influence teacher's digital competence, use of innovative teaching strategies, and ultimately, student course engagement. There is a highly significant relationship among teachers' digital competence, innovative teaching strategies, and student course engagement. This indicates that teachers who are both digitally competent and utilize innovative teaching strategies can create a strong learning environment that fosters high student course engagement. This ultimately leads to better student outcomes and potentially improved academic achievement. A professional development program was proposed to enhance the digital competence competence, innovative teaching strategies, and student course engagement in Chinese universities.

The Human Resource and Development Office may implement comprehensive training plans to elevate the digital proficiency of university teachers, with a focus on improving their ability in digital content creation. This may involve conducting workshops, seminars, and online courses covering various aspects of digital technology and content creation. The university administrators such as the dean and department chairs may promote innovative teaching strategies among university teachers. They may encourage and support university teachers to adopt innovative teaching strategies that foster critical thinking, creativity, social skills, and effective communication. Also, they may provide resources, incentives, and recognition for educators who demonstrate creativity and innovation in teaching methods. University teachers may incorporate ICT (information and communications technology) into their instructional methodologies. They could aid in the incorporation of ICT tools and resources into instructional methodologies to engage students more effectively. This may include providing access to digital learning platforms, encouraging the use of multimedia materials, and promoting interactive teaching methods. University students may actively engage in practical activities directly related to their major, such as internships, practical projects, or case studies. Through these practical opportunities, learners have the opportunity to apply theoretical knowledge to practical scenarios, thereby refining their problem-solving abilities and ability to tackle challenges. Additionally, it is suggested that students may actively seek guidance from professionals in the field to gain practical experience and industry insights, preparing them for future career development. Future researchers may explore additional variables that could impact or influence digital competence, innovative teaching strategies and student course engagement such job satisfaction, teaching effectiveness and work conditions. The proposed professional development program for Chinese university faculty may be tabled for discussion, implementation, and further evaluation.

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