Interdisciplinary Academic and Research Journal, 5 (5), September-October 2025
Old ISSN 2774-0374: New ISSN 2985-2749
Website: https://so03.tci-thaijo.org/index.php/IARJ/index

Digital Competency Development Model for College Teachers in Inner Mongolia, China

Wang Xiao[1], Sombat Teekasap[2*], Nainapas Injoungjirakit[3] and Prapai Sridama[4]
Digital Technology Management for Education, Graduate School, Bansomdejchaopraya Rajabhat University, Thailand
[1]E-mail: xiaoxiao_email@163.com, ORCID ID: https://orcid.org/0009-0002-5757-004X
[2*]Corresponding E-mail: sombat.teekasap@gmail.com, ORCID ID: https://orcid.org/0000-0002-2101-5637
[3]E-mail: Nainapas_I@gmail.com, ORCID ID: https://orcid.org/0009-0001-5342-7724
[4]E-mail: prapaikmutnb@gmail.com, ORCID ID: https://orcid.org/0000-0002-1453-9221
Received 28/01/2025 Revised 30/01/2025 Accepted 01/03/2025

Abstract

Background and Aims: The purposes of this research were to 1) study the current problems on digital competency of college teachers in Inner Mongolia, China, 2) design a digital competency development model for college teachers in Inner Mongolia, China, and 3) evaluate the digital competency development model.

Methodology: The study used an expert survey and a two-round Delphi process to design a digital competency development model for college teachers in Inner Mongolia, which was recognized by experts.

Results: This model had a rectangular structure, dividing the five dimensions of "Digital Awareness," "Knowledge and Skills of Digital Technology," "Digital Application," "Digital Social Responsibility," and "Professional Development" into three continuous digital competency levels: "Knowledge Acquisition," "Knowledge Application" and "Knowledge creation."

Conclusion: This model can help teachers and colleges evaluate teachers' digital competency levels, promote teaching reflection and innovation, and take targeted measures to improve digital competency.

Keywords: Digital Competency Development; Teacher Professional Development; Education Technology in Inner Mongolia; Development Model; College Teacher

Introduction

Digital transformation has drastically changed education worldwide, improving accessibility, individualized learning, and innovative teaching methodologies. Nonetheless, it continues to widen the digital divide, especially in underdeveloped areas (Zawacki-Richter et al., 2019). Addressing these gaps is essential for equal educational opportunities. The advent of the digital age has promoted many changes in the field of education. Digitalization and informatization of education have become an irreversible trend of the times. The direction of teachers' professional development should adapt to the changes of the times. Research in the field of higher education is increasingly focusing on digital competency. The development of teachers' digital competency

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

stems from the requirements for students' digital competency in the digital age. Based on the explorations made by scholars in the research of teachers' digital competency, frameworks or models at the national and regional organizational levels have also been introduced one after another. Digital competency is a dynamic concept. With the development of technology, evaluation methods need to be constantly adjusted and updated. When measuring and evaluating digital competency, the characteristics of different subjects, different teaching stages, and different teaching objectives should be considered comprehensively. College teachers undertake various responsibilities such as teaching, researching, education, and social services, and their job requirements are significantly different from those of K-12 teachers. While significant studies have been conducted on the digital competency of K-12 educators, research on higher education instructors remains limited despite their critical role in shaping students' digital skills in the modern era (Redecker, 2017; Tondeur et al., 2017). This gap is particularly evident in underdeveloped regions like Inner Mongolia, China, where digital competency among college teachers varies significantly due to disparities in educational resources and infrastructure. Therefore, assessing and enhancing their digital competency through targeted models is essential for improving higher education in these regions.

Digital competency is crucial for college teachers to improve instructional efficacy, promote student engagement, and incorporate technology-enhanced teaching methodologies (Redecker, 2017). It facilitates adaptive teaching methods and encourages digital literacy among students, ensuring that higher education corresponds with advances in technology. Inner Mongolia is an underdeveloped area in western China, with a relatively backward education level and uneven digital competency of college teachers. Assessing the digital competency of college teachers and the areas of low ability will help teachers improve their digital competency in a targeted manner.
Research Questions

How to evaluate and improve the digital competency of college teachers in Inner Mongolia, China?

Objectives

1) To study the current problems for the improvement of the digital competency of college teachers in Inner Mongolia, China.

2) To design a digital competency development model for college teachers in Inner Mongolia, China.

3) To improve the digital competency development model.

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

Literature Review

"Digital Competency" or "Digital Literacy"?

In 1997, Paul Gilster (Paul Gilster, 1997) first proposed the term 'digital literacy' in his book 'Digital Literacy'. In 2012, the American Library Association (ALA) defined 'digital literacy' as "the ability to retrieve, understand, evaluate, create, and exchange digital information by using information and communication technology, which requires cognitive and professional skills." Digital competency includes a wider array of skills, such as technical expertise, educational integration, and critical digital engagement, while digital literacy pertains to basic ICT skills and information processing (Ilomäki et al., 2016). International research on 'digital literacy' and 'digital competency' had already formed a certain scale in 2006. There is a close connection between them, but sometimes they are referred to together and used to underpin each other, even though they have different meanings. There are regional differences in referring to those concepts that studies concerning digital competency are often conducted in European countries outside the UK, while those on digital literacy in English-speaking countries (Anusca Ferrari, n.d.; Esteve-Mon et al., 2020; Instefjord & Munthe, 2017; Redecker & Punie, 2017; Sillat et al., 2021). However, in some countries, for some reasons, such as translation, the distinction between digital competency and digital literacy is blurred (Hinrichsen & Coombs, 2014). There is still some controversy over the concept of expression and its connotation. The research on teachers' digital competency has significantly increased since 2018. It can be seen that digital competency has gradually become a key ability for future teachers to adapt to the development of the digital age, and researchers are more concerned about the diverse and comprehensive abilities of teachers or pre-service teachers. To promote students' autonomy, teachers need to develop new teaching strategies (Paethrangsi et al., 2024).

In China, there is no statement about 'digital competency' in official documents. With the deepening development of digital education, the keyword 'digital competency of teachers' first appeared in 2019. In 2022, the Ministry of Education of China enacted professional standards for teachers, which used 'digital literacy' rather than 'digital competency.'

Types of Teachers' Digital Competency Model / Framework

Based on current research, teachers' digital competency models or frameworks can be divided into conceptual models and content models, and the latter can be further divided into list models and development models.

The conceptual models focus on analyzing the connotation, elements, and their interrelationship from the perspective of conceptual cognition, such as SAMR, Technology Integration Matrix (TIM), Technological Pedagogical Content Knowledge (TPACK), Teacher Education Information Literacy (TEIL), etc. The content-based models emphasize the orientation

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

of educational practice. Among them, the list models focus on clearly listing the serialization standards, indicators, stages, and strategies of teachers' digital competency, such as the International Society for Technology in Education (ISTE), Teacher Educator Technology Competencies (TETCs) and US International Training Performance and Teaching Standards Council (IBSTPI) standards, Association for Educational Communication and Technology (AECT) standards, and Digital Literacy of Teacher.

The developmental models are based on the list model and present the development level and performance of teachers' digital competency in a matrix structure, such as ICT-CFT, ICT in school education maturity model (ICTE-MM), and DigComEdu (Redecker & Punie, 2017).

Current Problems of Teachers' Digital Competency

Compared with K-12 teachers, the number of related studies on the digital competency of college teachers is relatively small. Scholars' researches mainly focus on the participants' perception of digital competency, the level of digital competency, and influencing factors.

From existing research, the main problems with teachers' digital competency included weak digital application ability in teaching (Demeshkant et al., 2020; Dias-Trindade et al., 2020; Sailer et al., 2021; Fernández-Batanero et al., 2021; Zhao et al., 2021; Zimmer & Matthews,2022; Hu Jiehui et al. 2023), insufficient digital knowledge and skills (Artacho et al., 2020; Demeshkant et al., 2020; Sailer et al., 2021; Fernández-Batanero et al., 2021; García-Vandewalle García et al., 2023,), and lack of digital awareness (Artacho et al., 2020; Scherer et al., 2021; Rubach & Lazarides, 2021; Pongsakdi et al., 2021; Antonietti et al., 2022).

In addition, some researchers also mentioned teachers' professional development (Artacho et al., 2020; Fernández-Batanero et al., 2021; Scherer et al., 2021; Zimmer & Matthews,2022), empowering learners (Dias-Trindade et al., 2020; Zimmer & Matthews,2022), environment or management system (Scherer et al., 2021), and Internet security (Zhao et al., 2021; García-Vandewalle García et al., 2023).

TPACK Model

The TPACK model provides a standardized curriculum design guide for teacher training, greatly alleviating the disconnect between technical knowledge, professional knowledge, and educational knowledge. However, researchers have also found that the experimental results and intervention measures of the TPACK theoretical model may not be replicated in different educational contexts due to the specificity of the particular course. (Miguel-Revilla et al., 2006).

From 2011 to 2022, the research hotspots of TPACK in China mainly focused on teacher education issues, such as the status quo and development paths of information-based teaching capabilities of normal students, pre-service teachers, or teachers in various disciplines under the information

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

Interdisciplinary Academic and Research Journal, 5 (5), September-October 2025
Old ISSN 2774-0374: New ISSN 2985-2749
Website: https://so03.tci-thaijo.org/index.php/IARJ/index

environment. The ultimate goal is to improve the level of TPACK in teaching and promote teachers' professional development.

ICT-CFT

As an international organization leading the reform and innovation of global education/vocational education, UNESCO developed the 'ICT Competency Framework for Teachers (ICT-CFT)' in 2008, which was updated to the third edition in 2018. This framework aims to cultivate qualified citizens in the information age and the skills required for industrial digital upgrading through the improvement of teachers' information-based teaching capabilities.

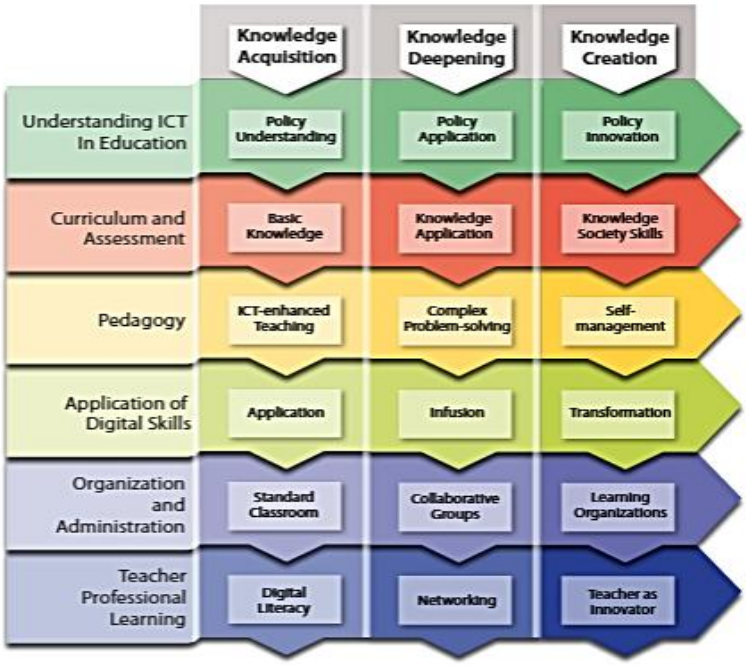

Figure 1 The UNESCO ICT Competency Framework for Teachers
Source: https://unesdoc.unesco.org/ark:/48223/pf0000265721

ICT-CFT has designed three stages for teachers' information technology application capabilities to support student learning: knowledge acquisition, knowledge deepening, and knowledge creation. In the knowledge acquisition stage, teachers support students to use information technology to acquire knowledge and learn effectively; in the knowledge deepening stage, teachers deeply integrate information technology into teaching practice to promote students' in-depth understanding of the knowledge they have learned and strengthen their ability to solve problems in real scenarios; In the knowledge creation stage, teachers cultivate students

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

with a developmental perspective, enabling them self-construct new knowledge needed by the times and society during their learning and work.

Conceptual Framework

The research framework focuses on evaluating and enhancing the digital competency of college teachers in Inner Mongolia through five core components. Digital awareness emphasizes understanding the importance and implications of technology in education. Knowledge and skills of digital technology address teachers' technical proficiency with tools and platforms. Digital application highlights the practical integration of technology into teaching and administrative tasks, while digital social responsibility ensures ethical, equitable, and responsible use of digital tools. Finally, professional development promotes continuous learning and adaptation to evolving digital trends. Together, these elements aim to provide a comprehensive approach to addressing regional challenges and advancing digital competency, as shown in Figure 2.

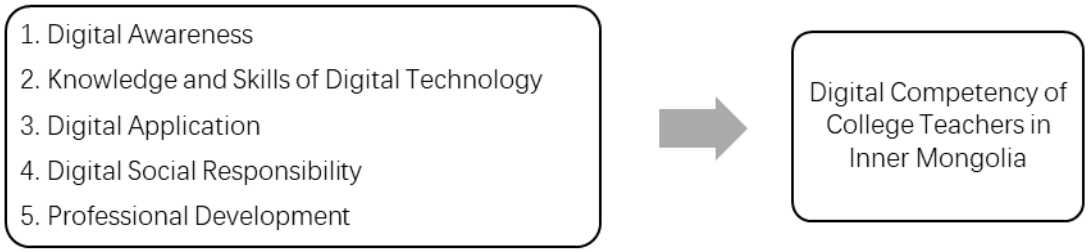

Figure 2 Research Conceptual Framework

Methodology

The authors employed the Delphi method because this approach helps experts reach a consensus on Inner Mongolian college teachers' digital competency. The method ensures a robust, context-sensitive approach to developing and refining a digital competency model by leveraging educational digital technology experts. The iterative Delphi process allows experts to reassess their views based on collective feedback, ensuring the final model matches theoretical frameworks like UNESCO's ICT-CFT and Inner Mongolia's unique social and cultural factors. The study was performed through a two-round Delphi consultation process with experts, which is often used to gather insights, predictions, or judgments on complex or uncertain topics where there is no single definitive answer. The Delphi method aims to reach a consensus or convergence of opinions among a group of experts. The research procedure and processes were as follows:

Step 1: Expert Survey for Objective 1

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

Nine experts in the field of educational digital technology in Inner Mongolia were purposively selected, with the following qualifications: 1) at least 10 years of college work experience in Inner Mongolia, 2) have extensive experience in educational digital technology, 3) graduated with a Master's degree or above, 4) academic title is associate professor or above.

The questionnaire was designed based on 'Digital Literacy of Teachers' enacted by the Chinese Ministry of Education, which includes five dimensions and 33 indicators. It was refined through expert feedback to ensure content validity, reliability, and cultural appropriateness, aligning with the educational context of Inner Mongolia (Table 1)

Experts were asked to write down their own opinions about each item: "What problems exist in each one? What are the solutions to these problems? What are the reasons if there is no problem?"

Table 1 Dimensions of "Digital Literacy of Teachers"

Dimensions	Sub-Dimensions
Digital Awareness	Digital Understanding
	Digital Willingness
	Digital Will
Knowledge and Skills of Digital Technology	Knowledge of Digital Technology
	Skills of Digital Technology
Digital Applications	Digital Teaching Design
	Digital Teaching Implementation
	Digital Academic Evaluation
	Digital collaborative education
Digital Social Responsibility	Legal and moral norms
	Digital security protection
Professional Development	Digital learning and training
	Research and Innovation in Digital Teaching

Step 2: Design A Digital Competency Development Model for Objective 2

A college teacher's digital competency development model was designed based on the results of an experts' opinion survey. And compared with the relevant indicators of 'Digital Literacy of Teacher' enacted by the Chinese Ministry of Education. Referring to the structure of ICT-CFT (UNESCO, 2018), taking into account the social and cultural factors of China and the reality

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

of higher education in Inner Mongolia, the model will distinguish the different development stages of teachers' digital competency and provide guiding suggestions.

Step 3: Two-Round Delphi Process for Objective 3

Twenty-one experts in the field of educational digital technology in Inner Mongolia were purposively selected, with qualifications as follows: 1) at least 5 years of college work experience in Inner Mongolia, 2) have extensive experience in educational digital technology, and 3) graduated with a Master's degree or above.

In the first round, experts were asked to provide their individual opinions or recommendations on the college teachers' digital competency development model. These responses will be collected and summarized by the researcher. The initial model was modified based on expert survey results.

In subsequent rounds, experts were provided with a summary of the collective opinions from the previous round (anonymously) and the modified model. They were then asked to review and revise their responses based on the group's feedback. The model was modified again based on the experts' feedback.

Results

Results of the Experts' Survey

To obtain more comprehensive and accurate information, nine experts from four universities in Inner Mongolia were selected to participate in the expert survey. According to the results of the expert survey, among the five dimensions of " Digital Literacy of Teachers," only "Digital Social Responsibility" had fewer problems, while the other four dimensions had more problems. The details are as follows:

In the dimension of "Digital Awareness," college teachers generally had problems such as insufficient digital awareness, shallow understanding of the role of digital technology in education, lack of innovation awareness and motivation, low enthusiasm for actively learning technology, and insufficient confidence in meeting the challenges of digital education.

In the dimension of "Knowledge and Skills of Digital Technology," the main problems of college teachers included insufficient understanding of digital technology knowledge, single resource selection strategies, frequent updates of technology resources without continuous support, and insufficient ability to use and integrate digital technology.

The dimension of "Digital Applications" revolves entirely around the application of digital technology in teaching and student education. The main problems of "Digital Teaching Design" were: rarely using digital technology to analyze learning situations, single channels for obtaining

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

digital educational resources, single forms of digital teaching activities, difficulty in technology integration, lack of systematic teaching design methods, and digital technology application abilities. The main problems of “Digital Teaching Implementation” were: college teachers' digital technology abilities do not match teaching needs, digital technology is difficult to integrate with teaching content, teaching process design is unreasonable, and data analysis and feedback mechanisms are insufficient. Teachers have not mastered personalized teaching strategies and find it difficult to use digital technology to provide personalized guidance. The main problems of “Digital Academic Evaluation” were: low frequency of using digital tools to collect academic evaluation data, difficulties in operating and using these tools, difficulties in model selection, poor data quality, and insufficient preprocessing in data analysis, which affect the reliability and accuracy of analysis results. In terms of data visualization, teachers used fewer visualization tools and lacked relevant skills and data interpretation abilities. The main problems of “Digital Collaborative Education” were that college teachers generally neglect the cultivation of students' digital literacy, and their levels of digital literacy vary, making it difficult to effectively guide students to use digital resources. In addition, teachers lack innovation in using digital resources for moral education and mental health education. Teachers and families do not have a strong sense of responsibility for collaborative education, family participation is low, and there are issues with privacy protection and data security.

There were relatively few problems in the dimension of “Digital Social Responsibility.” Most teachers can use the Internet and digital technology legally and in compliance with regulations, maintain data security, comply with online communication rules, and have a high level of digital security awareness. Also, the institutional policies and regulatory frameworks in China emphasize responsible digital behavior, data security, and ethical considerations, reinforcing compliance among educators. Teachers are generally well-informed about legal and moral norms, including internet laws, cybersecurity, and digital communication ethics, due to national initiatives promoting online safety and data privacy. However, there were still some problems, such as weak awareness of privacy protection, insufficient information management, and inadequate ability to respond to network risks and data security to a certain extent.

In the dimension of “Professional Development,” college teachers had difficulties in updating learning resources, continuous learning, and technological improvement. Digital technology was mainly used in professional fields, with fewer applications in education and teaching management. In addition, teachers also performed poorly in teaching reflection, online training participation, and digital teaching research, mainly due to technical problems, insufficient data processing abilities, lack of innovation awareness, and ability etc.

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

Interdisciplinary Academic and Research Journal, 5 (5), September-October 2025
Old ISSN 2774-0374: New ISSN 2985-2749
Website: https://so03.tci-thaijo.org/index.php/IARJ/index

Initial Digital Competency Development Model for College Teachers

This model was organized over three successive stages or levels of a teacher's digital competency (Table 2).

Table 2 Digital Competency Development Model for College Teachers in Inner Mongolia, China

	Knowledge Acquisition	Knowledge Application	Knowledge Creation
Digital Awareness	Understanding Digitalization of Education	Responding to the Digitalization of Education	Promoting Digitalization of Education
Knowledge and Skills of Digital Technology	Knowledge of Digital Technology	Application of Digital Skills	Innovation of Digital Knowledge
Digital Application	Knowledge of PCK, TCK & TPK	Implementation of TPACK	Empowering Students
Digital Social Responsibility	Knowledge of Digital Citizenship	Digital Citizenship Behavior	Digital Citizenship Education
Professional Development	Teacher as Learner	Teacher as Collaborator	Teacher as Innovator

The first level is "Knowledge Acquisition," where teachers acquire knowledge about using digital technology and basic digital competencies. The Knowledge Acquisition level demands that teachers be aware of national development goals, how these correspond to education, and their role in achieving these ends.

Competencies in Level 1 are:

"Understanding Digitalization of Education": This aspect encourages teachers to understand the impact of digital technology on the development of international digital economy competition and the significance of digital technology in promoting the digital transformation of education.

"Knowledge of Digital Technology": This aspect encourages teachers to understand the connotations and characteristics of common digital technologies, as well as the procedures and methods for solving problems.

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

"Knowledge of PCK, TCK & TPK": This aspect encourages teachers to acquire the knowledge to effectively integrate technology into the teaching of specific subject content (TCK), the knowledge to use technology to support and improve teaching methods during the teaching process (TPK), and the knowledge to integrate teaching strategies with subject content (PCK).

"Knowledge of Digital Citizenship": This aspect encourages teachers to understand internet laws and regulations; understand the principles of legitimate necessity, informed consent, clear purpose, and security assurance; understand the management and protection methods of personal information and private data; and have the basic knowledge of identifying, preventing, and handling network risk behaviors.

"Teacher as Learner": This aspect encourages teachers to use digital technology resources to carry out learning according to personal development needs. Use digital technology resources to analyze personal teaching practices and support teaching reflection and improvement.

The second level is "Knowledge Application," where teachers can effectively integrate digital technology into various aspects of teaching, research, and professional development with good digital competency.

Competencies in Level 2 are:

"Responding to Digitalization of Education": This aspect encourages teachers to actively understand the functions and roles of digital technology resources and realize that the application of digital technology resources in the education and teaching process will generate innovative requirements in teaching theory, teaching mode, and teaching methods. Teachers have the desire to use them in education and teaching, have the initiative to implement the integration of digital technology and education and teaching, and are willing to carry out innovative practices in education and teaching.

"Application of Digital Skills": This aspect encourages teachers to master the principles and methods of selecting digital equipment, software, and platforms in education and teaching, and be proficient in using digital equipment, software, and platforms to solve common problems.

"Implementation of TPACK": This aspect encourages teachers to comprehensively apply knowledge of technology, teaching methods, and content in the teaching process to achieve effective teaching practice. Teachers are encouraged to dynamically adjust the combination of technology, teaching methods, and content based on students' feedback and learning needs in the actual teaching process.

"Digital Citizenship Behavior": This aspect encourages teachers to comply with internet laws and regulations and consciously regulate various online behaviors. Teachers should respect intellectual property rights and manage and protect personal information and privacy data

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

effectively. Pay attention to data security maintenance when collecting, storing, using, and disseminating data from students, parents, and others at work. Be able to effectively identify, prevent, and deal with network risk behaviors.

"Teacher as Collaborator": This aspect encourages teachers to participate in or host online training communities to learn together, share experiences, seek help, solve problems, and use digital technology resources to support teaching research activities in response to digital teaching issues.

The third level is "Knowledge Creation," where teachers have excellent digital competency and a strong sense of innovation and are willing to innovate in teaching, scientific research, etc., to improve teaching effectiveness and effectively promote students' development.

Competencies in Level 3 were:

"Promoting Digitalization of Education": This aspect encourages teachers to be able to predict the ethical and moral issues that may arise in the use of digital technology in education and teaching. Teachers are encouraged to overcome the difficulties and challenges faced in the use of digital technology resources and the innovation of teaching methods in the practice of digital education.

"Innovation of Digital Knowledge": This aspect encourages teachers to be able to continuously update digital technology knowledge, identify problems with digital tools and technologies based on usage experience, improve or refine the use of digital tools, optimize usage processes, etc.

"Empowering Students": This aspect encourages teachers to help students enhance their self-confidence, ability, and autonomy through support, guidance, and motivation in all aspects of education and teaching so that they can take the initiative to control their learning process and life and become more confident and autonomous people.

"Digital Citizenship Education": This aspect encourages teachers to strive to cultivate students into citizens with safety awareness, responsibility and ethics, effective communication, critical thinking, technical literacy, and active participation in the digital society.

"Teacher as Innovator": This aspect encourages teachers to use digital technology resources to continuously innovate teaching models, improve teaching activities, and transform students' learning methods.

Results of the Two-Round Delphi Method

The first round of the expert survey questionnaire consisted of all open-ended questions, consisting of six parts. The first part was the basic information of the expert, and the following five parts were 51 competency descriptions of three levels for each dimension. Experts were

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

required to provide their own opinions and suggestions for each dimension. Before the expert survey was implemented, five experts were invited to conduct a Content Validity Index (IOC) evaluation of the questionnaire. Experts evaluated each item, +1 means the item is congruent with the objectives, zero means uncertain, and -1 means the item is not congruent with the objectives. The items that obtained the IOC between 0.6 and 1.0 were deemed acceptable. The quality of the questionnaire met the research requirements.

Twenty-one experts from 6 universities in Inner Mongolia were selected to participate in a two-rounds Delphi process to improve the initial model. The main conclusions of the first round of expert surveys are that the division of the five dimensions into three stages of the questionnaire is generally reasonable, but the descriptions of some dimensions are difficult to evaluate and are recommended to be further specified. Finally, four descriptions of the dimension “Digital Awareness,” 3 descriptions of the dimension “Knowledge and Skills of Digital Technology,” one description of the dimension “Digital Application,” six descriptions of the dimension “Digital Social Responsibility,” and one description of the dimension “Professional Development” were modified.

The second round of expert survey questionnaire was a semi-structured questionnaire with 50 competency descriptions in 5 dimensions. Experts were asked to evaluate whether the descriptions of each competency were clear and reasonable based on their own experience. The questionnaire used a five-point Likert scale: 1 represented very unreasonable, 2 represented relatively unreasonable, three represented uncertainty, 4 represented relatively reasonable, and 5 represented very reasonable. The IOC value of each item in the second round of the expert survey questionnaire was above 0.6, and the content validity of each dimension was high. The quality of the questionnaire met the research requirements. The results of the first round of expert survey and the modified survey questionnaire were sent again to the 21 experts for the second round of survey.

The mean (Mean), median (Md), mode (Mo), and interquartile range (IQR) were used to evaluate the effectiveness and acceptability of the model. The mean values of all competency descriptions were greater than 3.40, indicating that the questionnaire was highly recognized by experts as a whole. In terms of "Digital Awareness," the IQR of ten descriptions was between 0 and 1, indicating that the experts’ opinions were relatively consistent. One description was removed because the IQR was greater than 2, which indicates that experts had different opinions. The results are shown in Table 3

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

Table 3 Competency Description of "Digital Awareness"

Digital Awareness	
Knowledge Acquisition	1. Be able to understand that digital technology plays a vital role in international digital economic competition and promotes the transformation and development of the global economic structure.
	2. Be able to understand the significance of digital technology in improving the quality of education, increasing accessibility and personalization of education, and adapting to the needs of modern society and economy.
	3. Recognize that digital technology is driving innovation in education.
	4. Be able to understand that the proper use of digital technology resources can improve the quality of teaching, learning, management, and assessment.
Knowledge Application	5. Actively understand the functions and roles of digital technology resources.
	6. Be able to realize that the application of digital technology resources in the education and teaching process will generate innovative requirements in terms of teaching theories, teaching models, and teaching methods.
	7. Desire to use digital technology in education and teaching.
	8. Have the initiative to implement the integration of digital technology and education and teaching.
	9. Willing to carry out innovative practices in education and teaching.
Knowledge Creation	10. Be able to overcome the difficulties and challenges in the use of digital technology resources and innovative teaching methods in the practice of education digitalization.

In terms of "Knowledge and Skills of Digital Technology", the IQR of the six descriptions was 1, indicating that experts' opinions were relatively consistent. The IQR value of the second item was 2. The experts' disagreement mainly focused on whether descriptions 1 and 2 needed to be merged, so the researchers decided to retain both descriptions.

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

Interdisciplinary Academic and Research Journal, 5 (5), September-October 2025
Old ISSN 2774-0374: New ISSN 2985-2749
Website: https://so03.tci-thaijo.org/index.php/IARJ/index

Table 4 Competency Description of "Knowledge and Skills of Digital Technology"

Knowledge and Skills of Digital Technology	
Knowledge Acquisition	1. Be able to understand the connotation and characteristics of multimedia, the Internet, big data, virtual reality, artificial intelligence, and other technologies.
	2. Be able to understand the procedures and methods of solving problems with multimedia, the Internet, big data, virtual reality, artificial intelligence, and other technologies.
Knowledge Application	3. Be able to master the principles and methods of selecting digital equipment, software, and platforms in education and teaching.
	4. Proficient in using digital equipment, software, and platforms to solve common problems.
Knowledge Creation	5. Be able to continuously update digital technology knowledge.
	6. Be able to discover problems with digital tools and technologies based on usage experience.
	7. Be able to improve or refine the use of digital tools, optimize the usage process, etc.

In terms of "Digital Application", the IQR of the twelve descriptions was 1, indicating that experts' opinions were relatively consistent. The IQR of the rest three items was 2; two descriptions of the three were modified, and one was deleted. The results were shown in Table 5

Table 5 Competency Description of "Digital Application"

Digital Application	
Knowledge Acquisition	1. Be able to use digital evaluation tools to analyze students' learning situations.
	2. Be able to design teaching activities that integrate digital technology resources based on teaching objectives.
	3. Be able to use digital technology resources to organize teaching activities in an orderly manner, enhance student participation, and communication initiatives.

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

	Digital Application
	4. Be able to use digital tools to collect real-time student feedback, improve teaching behavior, optimize teaching processes, and regulate teaching progress.
	5. Be able to reasonably select and use digital tools to collect student academic evaluation data in various forms, including text, images, audio, video, etc.
Knowledge Application	6. Be able to use digital technology resources to identify students' learning differences and provide targeted guidance.
	7. Be able to collect data from multiple channels, and select, manage, and produce digital educational resources based on teaching needs.
	8. Be able to design teaching activities that integrate digital technology resources based on teaching objectives.
	9. Be able to use digital technology resources to break through the limitations of time and space, and create a learning environment that integrates online and physical learning spaces.
	10. Be able to select and apply appropriate data analysis models for academic data analysis.
	11. Be able to use digital tools to visualize and present academic data analysis results and provide reasonable explanations.
Knowledge Creation	12. Be able to guide students to appropriately select and use digital technology resources to support learning, and focus on cultivating students' computational thinking and digital social responsibility.
	13. Be able to use digital technology resources to broaden moral education pathways and innovate moral education models.
	14. Being able to use digital technology resources to assist in various forms of mental health education activities, such as mental health diagnosis, group counseling, psychological training, situational design, role-playing, game counseling, etc.

In terms of “Digital Social Responsibility”, the IQR of all the competency descriptions was between 0 and 1, indicating that the experts’ opinions were relatively consistent. (Table 6)

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

Interdisciplinary Academic and Research Journal, 5 (5), September-October 2025
Old ISSN 2774-0374: New ISSN 2985-2749
Website: https://so03.tci-thaijo.org/index.php/IARJ/index

Table 6 Competency Description of "Digital Social Responsibility"

Digital Social Responsibility	
Knowledge Acquisition	1. Understand Internet laws and regulations.
	2. Understand the principles of legitimate necessity, informed consent, clear purpose, and safety assurance.
	3. Understand the management and protection methods of personal information and privacy data.
	4. Have Basic knowledge of identifying and preventing online rumors, cyber violence, telecommunications fraud, information theft, and other network risk behaviors.
Knowledge Application	5. Comply with Internet laws and regulations, and consciously regulate all online behaviors.
	6. Use digital products and services by the principles of legitimate necessity, informed consent, clear purpose, and security protection, and respect intellectual property rights.
	7. Be able to comply with the order of online communication and maintain a positive and healthy online environment.
	8. Manage and protect personal information and privacy data effectively.
	9. Pay attention to data security when collecting, storing, using, and disseminating data from students, parents, and others at work.
	10. Be able to effectively identify, prevent, and deal with online rumors, cyberbullying, telecommunications fraud, information theft, and other network risk behaviors.
Knowledge Creation	11. Use the internet to spread positive energy
	12. Be able to pay attention to students' physical and mental health, and be able to guide and help students identify, prevent, and deal with online risk behaviors.
	13. Be able to spread digital citizenship knowledge to students in the process of education and teaching.

In terms of "Professional Development", the IQR of all the competency descriptions was 1, indicating that the experts' opinions were relatively consistent. (Table 7)

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

Table 7 Competency Description of “Professional Development”

Professional Development	
Knowledge Acquisition	1. Being able to utilize digital technology resources to assist in various forms of mental health education activities, such as mental health diagnosis, group counseling, psychological training, situational design, role-playing, game counseling, etc.
	2. Be able to use digital technology resources to analyze personal teaching practices and support teaching reflection and improvement.
Knowledge Application	3. Participate in or host online learning communities, learn together, share experiences, seek help, and solve problems.
	4. Be able to use digital technology resources to support teaching research activities in response to digital teaching issues.
Knowledge Creation	5. Be able to use digital technology resources to continuously innovate teaching models, improve teaching activities, and transform students' learning methods.

Discussion and conclusion

In China, there was still limited research on the digital competency of college teachers. Although the "Digital Literacy of Teachers" issued by the Chinese Ministry of Education had clear indicators, it lacked evaluation criteria. The relevant experts invited for this study had not yet reached a consensus on some issues. The digital competency development model designed for college teachers has not been applied on a larger scale and needs to be further improved.

Conclusion

The digital competency of college teachers in Inner Mongolia had certain problems in the five dimensions of "Digital Awareness", " Knowledge and Skills of Digital Technology ", "Digital Application", "Digital Social Responsibility", and "Professional Development". The main manifestations were the lack of digital knowledge and skills, the difficulty in effectively integrating digital technology with education, teaching, and professional development, and the lack of innovation awareness and ability.

This study drew on the ICT-CFT framework to design a digital competency development model for college teachers in Inner Mongolia and used a two-round Delphi process to evaluate and improve the model. The model included 5 dimensions and 3 levels, with 49 competency descriptions, which can be used by teachers and colleges to evaluate the digital competency

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

level of teachers and promote teachers' self-reflection and professional development. The research model follows UNESCO's ICT-CFT in categorizing digital competency into three stages: knowledge acquisition, application, and creation. Both focus on pedagogical integration and professional development. However, the research model focuses on regional socio-cultural factors in Inner Mongolia, whereas ICT-CFT maintains a universal, globally applicable framework. Results from the research provices information on the policy, set competency benchmarks, and train teachers in digital skills by aligning with frameworks like UNESCO's ICT-CFT. National policies can include digital assessments in teacher certification, career progression, and continuous learning programs to meet global educational standards and regional needs.

Recommendations

For College Teachers

College teachers could use the Digital Competency Development Model to know their own level of digital competency and identify weak links in the five dimensions. Problems at the knowledge acquisition level are recommended to be improved by learning relevant knowledge, and problems at the knowledge application level are recommended to be improved by participating in specialized training and actively applying relevant skills. Problems at the knowledge creation level are recommended to be improved through peer communication, expert guidance, etc.

For Colleges

Colleges are recommended to promote the application of digital technology and increase investment in educational digital infrastructure. Provide more technical support and digital resources to optimize the use of resources. Improve teachers' digital skills through systematic training and simplified technology use process. Support teachers' innovation in teaching and research, and establish a mentor system. Establish an effective feedback mechanism and provide psychological support to enhance teachers' sense of participation and motivation. Improve teachers' awareness of data privacy protection, strengthen security training and risk assessment. Additionally, colleges can adopt the digital competency development model to foster innovation in teaching and research by embedding digital literacy training into faculty development programs.

Further Studies

The next study should include comparative studies in various regions of China or globally to assess the applicability and efficacy of the proposed digital competency development model across diverse educational and cultural settings. Additionally, ongoing research examining the

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480

model's effects on teacher performance and student learning outcomes would provide insights into its long-term sustainability and advantages.

References

Antonietti, C., Cattaneo, A., & Amenduni, F. (2022). Can teachers' digital competence influence technology acceptance in vocational education? *Computers in Human Behavior*, *132*. https://doi.org/10.1016/j.chb.2022.107266

Anusca Ferrari. (n.d.). *Digital Competence in Practice: An Analysis of Frameworks*. https://doi.org/10.2791/82116

Artacho, E. G., Martínez, T. S., Ortega Martín, J. L., Marín Marín, J. A., & García, G. G. (2020). Teacher training in lifelong The importance of digital competence in the encouragement of teaching innovation. *Sustainability (Switzerland)*, *12(7),* 2852; https://doi.org/10.3390/su12072852.

Demeshkant, N., Potyrała, K., Tomczyk, Ł., & Demeshkant, N. (2020). Levels of academic teachers' digital competence: Polish case-study. Proceedings of the 28th International Conference on Computers in Education. at: Asia-Pacific Society for Computers in Education. https://www.researchgate.net/publication/346023046

Dias-Trindade, S., Moreira, J. A., & Ferreira, A. G. (2020). Assessment of university teachers on their digital competences. Qwerty, 15(1), 50–69. https://doi.org/10.30557/QW000025

Esteve-Mon, F. M., Llopis-Nebot, M. A., & Adell-Segura, J. (2020). Digital Teaching Competence of University Teachers: A Systematic Review of the Literature. Revista Iberoamericana de Tecnologias Del Aprendizaje, 15(4), 399–406. https://doi.org/10.1109/RITA.2020.3033225

Fernández-Batanero, J. M., Román-Graván, P., Montenegro-Rueda, M., López-Meneses, E., & Fernández-Cerero, J. (2021). Digital teaching competence in higher education: A systematic review. In Education Sciences, 11(11), 689; https://doi.org/10.3390/educsci11110689

García-Vandewalle García, J. M., García-Carmona, M., Trujillo Torres, J. M., & Moya Fernández, P. (2023). Analysis of digital competence of educators (DigCompEdu) in teacher trainees: the context of Melilla, Spain. Technology, *Knowledge and Learning*, 28(2), 585–612. https://doi.org/10.1007/s10758-021-09546-x

Hinrichsen J., & Coombs A. (2014). The five resources of critical digital literacy: a framework for curriculum integration. *Research in Learning Technology*, *21*. https://doi.org/10.3402/rlt.v21.21334

Hu Jiehui, & Zhang Tiefu. (2023). Chinese College Foreign Language Teachers'Digital Literacy Beliefs and Practices. *Foreign Languages and Their Teaching*, 5, 73-85.

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104; DOI: https://doi.org/10.60027/iarj.2025.285480

Ilomäki, L., Paavola, S., Lakkala, M., & Kantosalo, A. (2016). Digital competence–an emergent boundary concept for policy and educational research. *Education and information technologies,* 21, 655-679.

Instefjord, E. J., & Munthe, E. (2017). Educating digitally competent teachers: A study of integration of professional digital competence in teacher education. *Teaching and Teacher Education*, 67, 37–45. https://doi.org/10.1016/j.tate.2017.05.016

Miguel-Revilla, D., Martínez-Ferreira, J. M., & Sánchez-Agustí, M. (2020). Assessing the digital competence of educators in social studies: An analysis in initial teacher training using the TPACK-21 model. *Australasian Journal of Educational Technology*, *36*(2), 1–12. https://doi.org/10.14742/ajet.5281

Paethrangsi, N., Teekasap, S., & Khiewpan, R. (2024). Empowering Students' Autonomous Learning through Self-regulation, Metacognitive Strategies, and Collaborative Learning Environments. *Journal of Liberal Arts RMUTT*, 5(1), 69-79.

Paul Gilster. (1997). *Digital Literacy*. Wiley Computer Pub.

Pongsakdi, N., Kortelainen, A., & Veermans, M. (2021). The impact of digital pedagogy training on in-service teachers' attitudes towards digital technologies. *Education and Information Technologies,* 26(5), 5041–5054. https://doi.org/10.1007/s10639-021-10439-w

Redecker, C. (2017). European Framework for the Digital Competence of Educators: DigCompEdu , EUR 28775 EN, Publications Office of the European Union, Luxembourg. https://doi.org/10.2760/178382

Rubach, C., & Lazarides, R. (2021). Addressing 21st-century digital skills in schools – Development and validation of an instrument to measure teachers' basic ICT competence beliefs. *Computers in Human Behavior*, 118, 106636. https://doi.org/10.1016/j.chb.2020.106636

Sailer, M., Murböck, J., & Fischer, F. (2021). Digital learning in schools: What does it take beyond digital technology? *Teaching and Teacher Education*, 103, 103346. https://doi.org/10.1016/j.tate.2021.103346

Scherer, R., Howard, S. K., Tondeur, J., & Siddiq, F. (2021). Profiling teachers' readiness for online teaching and learning in higher education: Who's ready? *Computers in Human Behavior*, 118, 106675. https://doi.org/10.1016/j.chb.2020.106675

Sillat, L. H., Tammets, K., & Laanpere, M. (2021). Digital competence assessment methods in higher education: A systematic literature review. *Education Sciences*, 11(8), 402; https://doi.org/10.3390/educsci11080402

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104; DOI: https://doi.org/10.60027/iarj.2025.285480

Tondeur, J., Van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: A systematic review of qualitative evidence. Educational technology research and development, 65, 555-575.

UNESCO. (2018). UNESCO ICT Competency Framework for Teachers: version 3. https://unesdoc.unesco.org/ark:/48223/pf0000265721

Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education–where are the educators?. International Journal of Educational Technology in Higher Education, 16(1), 1-27.

Zhao, Y., Pinto Llorente, A. M., & Sánchez Gómez, M. C. (2021). Digital competence in higher education research: A systematic literature review. *Computers and Education,* 168, 104212. https://doi.org/10.1016/j.compedu.2021.104212

Zimmer, W. K., & Matthews, S. D. (2022). A virtual coaching model of professional development to increase teachers' digital learning competencies. *Teaching and Teacher Education*, 109, 103544. https://doi.org/10.1016/j.tate.2021.103544

Citation: Wang, X., Teekasap, S., Injoungjirakit, N., & Sridama, P. (2025). Digital Competency Development Model for College Teachers in Inner Mongolia, China. Interdisciplinary Academic and Research Journal, 5 (5), 83-104;
DOI: https://doi.org/10.60027/iarj.2025.285480