



Digital Competency Model Development for Public High School Teachers in Nanning

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Abstract

Background and Aims: With the rapid development and popularization of technology, the application of digital technology in education is increasingly widespread, and the digital competency of teachers has become the key to promoting education modernization and innovation. The objectives of this study include: 1) To study the situation of digital competency of public high school teachers in Nanning. 2) To develop a model for improving the digital competency of public high school teachers in Nanning. 3) To evaluate the model for improving the digital competency of public high school teachers in Nanning.

Methodology: This study is based on the latest research results and widely adopts the opinions of experts in the field of digital education by employing the Delphi method and the focus group method.

Results: The digital competency model for teachers in public high schools in Nanning was successfully developed. Important measures and suggestions have been provided to promote the improvement of the digital competency of teachers in public high schools in Nanning.

Conclusion: An important development in educational practices is indicated by the development of a digital competency model for teachers in public high schools in Nanning, which was completed with success. The strategies and recommendations offered are meant to improve educators' digital literacy, promoting efficient instruction in the digital era and improving the educational experiences of students.

Keywords: Public High School Teachers; Digital Competency Model



Introduction

The arrival of the digital era has changed production methods and talent standards. The development of Big data, cloud computing, artificial intelligence, and other technologies is promoting human development towards the digital age and technological change is subverting the previous teaching methods. Teachers not only need to master the basic usage methods of diversified educational tools but also need to cultivate the needs of job competency and digital survival in the future digital society (Zhu, 2022).

The digitization of education has risen to the height of strategic deployment in various countries. The "21st Century Learning Framework" officially released by the United States in 2006 proposes that digital competency is one of the core competencies of 21st-century talents. The European Union has released the "Digital Education Action Plan (2021-2027)", which clarifies the EU's digital education strategy. At the same time, China has also released a series of policies to enhance citizens' digital competency, such as the "Digital Education 2.0 Action Plan" and "China Education Modernization 2035". (Office of the Central Committee of CPC, 2022)

The digital competency of public high school teachers is insufficient. Although China has made certain achievements in the construction of digital education, there is still great room for improvement in the digital competency of public high school teachers. Some of them have little experience in online teaching and the application level of digital technology varies greatly among schools, making it difficult for teachers to creatively use digital technology (Deng, 2021).

There is a lack of research on the digital competency of public high school teachers. At present, research on the digital competency of teachers in China is still in its infancy, especially among public high school teachers. Unable to effectively evaluate the level of digital competency of public high school teachers and lacking strategies and suggestions for developing digital competency of public high school teachers.

Nanning has a moderate level of economic development in Chinese cities, with 28 public high schools and over 3000 teachers, thus possessing a rich database. Studying the digital competency model of public high school teachers in Nanning is not only an inevitable requirement to adapt to the development trend of the Internet era and promote the cultivation of digital citizens but also provides a reference for the development of digital competency of public high school teachers in other cities.





Research Question

How to develop the digital competency model for public high school teachers in Nanning?

Objectives

1. To study the situation of digital competency of public high school teachers in Nanning.
2. To develop a model for improving the digital competency of public high school teachers in Nanning.
3. To evaluate the model for improving the digital competency of public high school teachers in Nanning.

Literature Review

Digital Competency Research

1. Research on the Concept of Digital Competency

Digital competency was first formally proposed in the report "On Key Competencies for Lifelong Learning" issued by the European Union in 2006. The report points out that digital competency is based on basic skills in the use of digital technology, such as the ability to use computers to retrieve, evaluate, store, generate, present, and exchange information, as well as the ability to communicate and participate in collaboration through the internet and collaborative networks. Although this definition is relatively broad, it also sets expectations for work, life, and learning in a knowledge-based society from three aspects: knowledge, skills, and attitudes (European Parliament and the Council, 2006).

2. Research on the Theory of Digital Competency

2.1 TPACK theory

TPACK is the abbreviation for Technological Pedagogical Content Knowledge, which refers to the integration of technical subject teaching knowledge. It includes three core elements, namely technical knowledge (TK), subject content knowledge (CK), and pedagogical knowledge (PK); The four composite elements include content knowledge in the teaching process (PCK), subject content knowledge of integrated technology (TCK), pedagogical knowledge of integrated technology (TPK) and technological pedagogical content knowledge (TPACK). (He, 2012).

2.2 Blended learning theory



Foreign scholar Margaret Driscoll regards "blended learning" as a combination of four different concepts: combining or blending multiple networked technologies (such as virtual classrooms, audio, text, etc.) to achieve educational goals; Combining multiple teaching methods to produce the best learning outcomes; Combining teaching techniques (multimedia, video, etc.) with face-to-face teacher guidance; Integrating or mixing teaching techniques with practical work tasks to promote synchronous teaching. The connotation of "blended learning" supported by information technology mainly refers to the combination of online learning (autonomous learning) for students and face-to-face teaching between teachers and students. Professor He Kekang, a renowned modern information technology scholar in China, believes that blended learning refers to the combination of traditional learning methods and online learning methods and promotes the combination of their advantages.

This study applies the above two theories to the design and analysis of questionnaires, as well as the setting of elements and the construction of models.

3. Research on the Standards of Teacher's Digital Competency

3.1 ISTE Standards for Educators

The International Society for Technology in Education (ISTE) of the United States released the Standards for Educators, which requires teachers to assume the roles of learners, leaders, citizens, collaborators, designers, facilitators, and analysts from two levels: empowering professional development and promoting student development.

3.2 Recommendation of the European Parliament and the Council on Key Competences for Lifelong Learning

Recommendation of the European Parliament and the Council on Key Competences for Lifelong Learning is a digital competency framework specifically designed for educators, with the main goal of describing, evaluating, training, and developing the digital competency of European teachers in the digital education environment. The framework includes the following six areas: 1) Professional Engagement. 2) Digital Resources. 3) Teaching and Learning. 4) Assessment. 5) Empowering Learners. 6) Facilitating Learners' Digital Competence.

3.3 Professional Digital Competency Framework for Teachers in Norway

The core indicators of Norway's professional digital competency framework for teachers include seven competency domains: 1) Discipline and basic abilities. 2) Schools in society. 3) Ethics. 4) Teaching methods and subject teaching. 5) Leadership in Learning. 6) Interaction and communication. 7) Change and development.





3.4 Digital Competency of Spanish Teachers

In 2017, the Spanish National Institute of Educational Technology and Teacher Training released the "Digital Competency of Spanish Teachers". This framework divides teachers' digital competence into five main areas, namely: 1) Information and data literacy. 2) Communication and collaboration. 3) Digital content creation. 4) Security. 5) Problem solving.

3.5 ICT Competency Framework for Teachers

UNESCO released the "ICT Competency Framework for Teachers" in 2018, abbreviated as the ICT-CFT framework. The ICT-CFT framework aims to assist countries in developing localized teacher ICT standards and related policies and it is recommended that countries make this framework an integral part of ICT in their overall education development plans. ICT-CFT targets teacher trainers, educational experts, educational decision-makers, educational tutors, and other providers of teacher professional development. It designs three stages for teacher information technology application capabilities to support student learning: knowledge acquisition, knowledge deepening, and knowledge creation. At the same time, the ICT-CFT framework also defines six practical dimensions: 1) Understanding policies for information technology education applications. 2) curriculum and evaluation. 3) teaching methods. 4) digital skills application. 5) organization and management. 6) teacher professional learning. Ultimately, it constructs 18 information technology education application capabilities, aiming to provide a basis for the formulation of teacher training policies and programs and promote innovative application of information technology education.

3.6 Digital Literacy Skills and Learning Report

New South Wales, Australia, released the Digital Literacy Skills and Learning Report in 2017. This report defines and clarifies from the perspective of ICT, clearly developing the competency of teachers in the state to carry out digital teaching work.

The ICT specification of the Australian National Teacher Standards includes seven aspects of standards: 1) Understanding students and how they learn. 2) Understanding the content taught and how to teach it. 3) Planning and implementing effective teaching and learning. 4) Creating a secure and supportive learning environment. 5) Evaluating and providing feedback on students' learning situation. 6) Participating in professional learning. 7) Interacting and communicating with colleagues, parents (guardians), and community members. Among these seven aspects, there are 32 explanations for the use of ICT, which are sufficient to support teachers' professional development and carry out digital teaching activities.



3.7 Digital Literacy for Teachers in China

China has not yet developed and released relevant standards or documents on teacher digital competency. The most relevant framework is the "Digital Literacy for Teachers" issued by the Chinese Ministry of Education in February 2023. This framework aims to solidly promote the national digital education strategy action, improve the digital education standard system, and enhance teachers' awareness, ability, and responsibility to optimize, innovate, and transform education and teaching activities using digital technology. It specifically includes 5 primary dimensions, 13 secondary dimensions, and 33 tertiary dimensions. The primary dimensions include 1) Digital awareness. 2) Digital technology knowledge and skills. 3) Application of digital technology. 4) Digital social responsibility. 5) Professional development. (Wei, 2023)

By analyzing the seven domestic and foreign standards related to digital competency for teachers, the author extracted high-frequency competency elements. Specifically, it includes 1) Awareness of Digital Technology. 2) Digital knowledge and skills. 3) Application of Digital Technology. 4) Digital ethics and morality. 5) Professional Development.

Background of Public High Schools in Nanning

The public high schools in Nanning refer to the high schools that are established, operated, and managed by the Nanning government within the scope of Nanning City, China, with low fees and the main goal of providing high-quality education. Nanning currently has 28 public high schools with a total of 3114 teachers (Nanning Enrollment Information Network, 2023). These public high schools uniformly follow the unified curriculum outline formulated by the Chinese national education department, providing a three-year full-time education. Nanning public high schools are responsible for cultivating students with the comprehensive quality of morality, intelligence, sports, and aesthetics.

Theoretical Basis

1. Delphi Method

Delphi method, also known as the expert survey method, was founded and implemented by the Rand Corporation in 1946 in the United States. It is essentially a feedback anonymous inquiry method, and its general process is based on a certain systematic program, using experts to anonymously express their opinions. Through several rounds of iterative expert opinion consultation, induction, and modification, reliable research results are formed based on experts reaching a basic consensus (Wang, 2011).



2. Focus Group

Focus group discussion is a commonly used qualitative research method in social science research. Generally, a researcher who has undergone research training leads a conversation with a group of respondents using a semi-structured approach (i.e., pre-set partial interview questions). Specifically, it refers to a survey method that extracts a certain number of observation objects from all the observation objects (population) determined by the research institute to form a sample and infers the overall characteristics based on the sample information. The main purpose of group interviews is to listen to the respondents' opinions on the research questions.

Conceptual Framework

This study applies the above seven standards to construct the conceptual Framework.

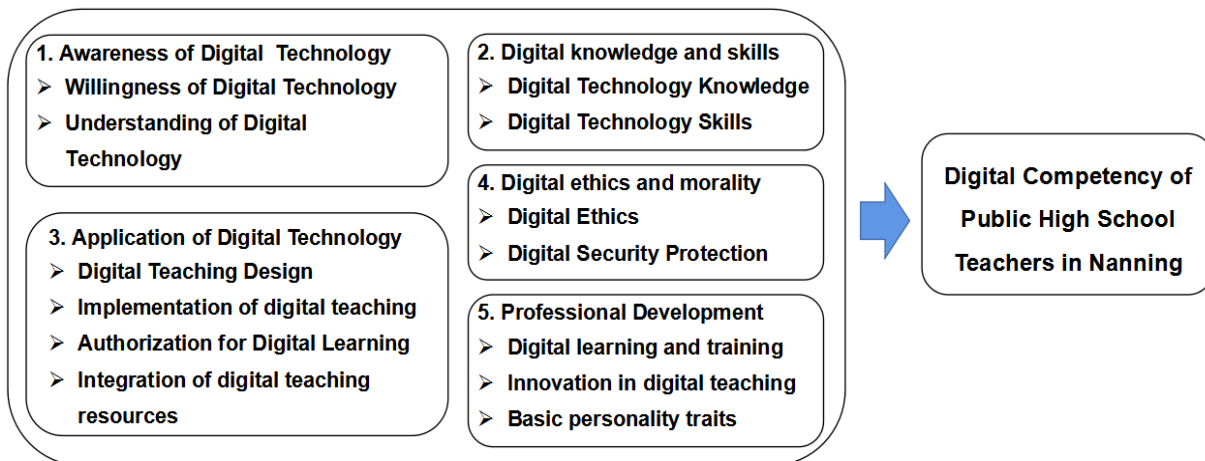


Figure 1 Conceptual Framework

Methodology

A sample group of the Delphi Method consists of 21 purposive selection experts with the following qualifications: 1) more than 10 years of teaching experience; 2) Having an intermediate or above professional title or a doctorate holder; 3) Being a school principal or teacher; and 4) Having rich knowledge and experience in one or more aspects of the awareness of digital technology, digital knowledge and skills, application of digital technology, digital ethics and morality, and professional development.



A sample of the Focus Group consists of 7 purposive selection experts with the following qualifications: 1) More than 10 years of teaching experience in public high schools in Nanning; 2) Having an intermediate or above professional title or a doctorate holder; 3) Being school principal or teacher; and 4) Having rich experience in using digital technology.

Expert Questionnaire Content

There are three versions of the expert questionnaire, corresponding to three rounds of expert opinion consultation:

(1) The first version is an expert interview form that includes open-ended questions: Inquiry about the current situation of digital competency of public high school teachers in Nanning; the elements of awareness of digital technology; the elements of digital knowledge and skills; the elements of application of Digital Technology; the elements of digital ethics and morality; the elements of professional Development.

(2) The second version is a five-level scale that combines the opinions of experts for open-ended questions. The specific content is the elements that affect the digital competency model of public high school teachers in Nanning.

(3) The third version is a five-level scale with the same content as the first round and includes the corresponding indicator values (median, interquartile range) for scoring results.

The construction process of the expert questionnaire:

Step 1: Construct the first round of the expert questionnaires (open-ended questions).

Step 2: Construct the second round of expert questionnaire (five-level scale) through literature analysis and expert interview results.

Step 3: Invite 5 experts to test the Objective Consistency Index (IOC) of the expert questionnaire.

Step 4: Modify the second round of expert questionnaire based on the results of IOC and distribute it to 21 experts.

Step 5: After collecting the opinions of experts, prepare the third round of expert questionnaires (five-level scale and indicators such as median and quartile from the previous round).

Discussion Outline: A discussion outline is a summary of the topics to be covered in the focus group meeting. The discussion outline generally includes two parts: Meeting rules and Questions about the model.



Research Procedure and Processes: This study is mainly divided into two research stages. The following will introduce the details of these two stages.

Stage 1: Employ the Delphi method to achieve objective 1 and objective 2.

- 1.1 Develop a list of 21 experts who can participate in three rounds of questioning.
- 1.2 The researchers requested that the Graduate School of Bansomdejchaopraya Rajabhat University issue a letter requesting the collection of 21 experts.
- 1.3 Implement three rounds of expert opinion surveys and feedback.
- 1.4 Analysis of expert opinions. After each round of expert feedback, opinions are gathered based on the content of the expert questionnaire, ultimately forming a consensus view.

Stage 2: Employ the focus group discussion to achieve objective 3.

- 2.1 Find different types of focus group experts and before inviting experts, briefly ask them over the phone about their understanding and attitude towards digital competency.
- 2.2 The questions of the model are structured and so the questions and order are determined through an outline before the discussion.
- 2.3 In the discussion, the host asks each expert to express their opinions on each issue, making the atmosphere lively and everyone speaking positively. However, the host cannot participate in the discussion themselves and cannot say persuasive words, otherwise it will lead to inaccurate results.

Results

1. The Result of the First Round of the Delphi Method

Through analyzing the answers to the open-ended questions regarding the current situation, the author has counted the relevant data frequency. The current situation of digital competency of public high school teachers in Nanning is obtained.

Regarding digital awareness, 57.1% of experts highly believe that the current public high school teachers in Nanning have insufficient digital awareness, 9.5% of experts give low recognition and 9.5% of experts do not mention this item. Regarding digital knowledge and skills, 85.7% of experts highly believe that the current public high school teachers in Nanning have insufficient learning of digital knowledge and skills. 4.8% of experts give a low recognition and all experts mention this. Regarding the application of digital technology, 95.2% of experts highly believe that



the current public high school teachers in Nanning have insufficient application of digital technology and no expert believes that application of digital technology is not important. Regarding digital ethics and morality, 52.4% of experts highly believe that the digital ethics and morality of public high school teachers in Nanning are insufficient, 4.8% of experts give low recognition and 14.3% of experts do not mention this. Regarding professional development, 47.6% of experts highly believe that the current professional development of public high school teachers in Nanning is insufficient, 14.3% of experts give low recognition and 23.8% of experts do not mention this.

2. The Result of the Second Round of the Delphi Method.

In the results of the second round of the Delphi method, from the average value, there were 7 elements with an average value of less than 4 points, and 50 elements with an average value greater than 4 points. From the mode perspective, there are a total of 6 elements with a mode of 3, which does not meet the importance criterion. From the interquartile range (IQR) perspective, there are 42 items with IQR less than or equal to 1.8, indicating that over 73.7% of all indicator items have reached a high level of consensus, indicating that expert opinions have not yet reached the standard of 75% consensus. The specific modification suggestions are as follows:

2.1 Experts unanimously agree that the secondary element of "digital awareness", "cognition and attitude towards the value, role, and management of big data", should be deleted. They believe that teachers' awareness of the value of big data is not closely related to their awareness of the use of digital technology. Four experts believe that the element of "actively using ICT for digital teaching to improve teaching quality and student learning efficiency" should be modified to "teachers have the inclination and willingness to use ICT for digital teaching".

2.2 Experts unanimously agree that there are five secondary elements of "digital knowledge and skills", like "learning and mastering digital signal processing techniques, involving sampling, quantization, coding, filtering, compression, and other processing techniques for digital signals." should be deleted because these digital knowledge and skills are too profound for high school teachers. High school teachers should focus on the use of digital technology rather than fully covering learning.





2.3 Experts unanimously agree that the second level element "playing a digital leadership role, responsible for the overall planning, motivating, and promoting the implementation of the entire digital teaching plan" included in the first level element "digital technology application" should be deleted. The reason is that this element is more important for school administrators, but not for ordinary teachers.

2.4 Experts unanimously agree that the secondary element of "respecting the privacy of others and not illegally obtaining, using, or disseminating their personal information." of the primary element "digital ethics and morality" should be deleted, as it is already included in the scope of another secondary element of "complying with the norms of digital society behavior, not engaging in unethical behaviors such as online fraud and spreading false information", and does not need to be specifically listed as an explanation.

2.5 Six experts believe that the secondary element of "professional development", "utilizing digital technology to innovate teaching models and improve teaching activities." should be revised to "tracking digital technology development and innovation, continuously optimizing digital education applications," because the original description emphasized independent innovation, which is similar to the secondary element "proposing new teaching ideas and plans for digital teaching problems through critical and innovative thinking," and does not need to be repeated. The revised description emphasizes the use of advanced and cutting-edge digital technologies for tracking and optimizing digital education.

3. The Result of the Third Round of the Delphi Method.

In the results for the third round of the Delphi method, the average value of all elements is greater than 4 points. The mode of all elements is greater than or equal to 4. The IQR values of all elements are less than or equal to 1.8, indicating that 100% of all indicator items have reached a high level of consensus, reaching the standard of 75% consistency, and there is no need to conduct the fourth round of survey.

4. The Result of the Focus Group Method.

To validate the model, the author chose to use the focus group method. After the implementation of the focus group method, the final version of the Nanning public high school teacher digital competency model was obtained by organizing the revised opinions discussed and



decided at the expert meeting, including 5 primary elements and 57 secondary elements, as shown below.

The first primary element is digital awareness, which includes seven secondary elements: (1) Teachers understand the value of digital technology in the field of education. (2) Teachers have a tendency and willingness to learn digital education. (3) Teachers have a tendency and willingness to use ICT. (4) Having the idea and concept of transforming and upgrading traditional education models based on digital technology. (5) To be able to recognize the impact of digital technology on the development of education in the whole society, that is, to have the development concepts of innovation, openness, sharing, and collaboration. (6) Recognizing the opportunities and challenges brought by current digital technology. (7) Having the confidence and determination to overcome the difficulties of digital education in practical applications.

The second primary element is digital knowledge and skills, which includes eight secondary elements: (1) Learning and mastering the basic knowledge of digital technology, including binary systems, computer architecture, software, and hardware. (2) Mastering data analysis skills, such as data mining, machine learning, and big data processing. (3) Mastering digital media skills such as audio editing, video editing, animation production, and virtual reality. (4) Mastering the knowledge of using digital tools for process analysis and systematic design of course design. (5) Having the ability to continuously debug and optimize course design in digital education. (6) Mastering mobile application skills, such as using smartphones, tablets, and other devices. (7) Understanding commonly used digital teaching methods and usage scenarios and knowing how to use digital technology to support the development of different teaching methods. (8) Mastering the methods of designing and creating digital learning environments and having the ability to integrate digital learning resources, devices, software, and contexts.

The third primary element is the application of digital technology, which includes twenty secondary elements: (1) Being able to collect and select teaching materials from multiple channels on the Internet and design and produce online digital teaching resources. (2) Utilizing digital technology to modify, optimize, or develop different forms of digital courses for different digital teaching activities. (3) Constructing relatively systematic disciplinary knowledge within a certain range. (4) Being able to utilize digital resources and platforms to evaluate the effectiveness





of teaching. (5) Being able to use digital tools to improve classroom management efficiency and maintain classroom discipline. (6) Effectively organizing online and offline teaching activities using digital tools to enhance student engagement and communication initiative. (7) Being able to reasonably select and proficiently use matching digital resources, tools, and software for specific digital teaching needs. (8) Being able to classify students according to their characteristics, adopting different digital teaching scenarios and methods for different types of students, and improving teaching efficiency. (9) Having the ability to utilize digital and intelligent equipment in classrooms to improve teaching effectiveness. (10) Using an online testing and evaluation system to assess teaching outcomes and form a table of student learning outcomes. (11) Using digital tools to analyze the learning situation of students and propose optimization for the next teaching plan. (12) Quickly assigning, collecting, and grading assignments using an electronic homework system. (13) Using a learning management system to track students' learning progress and using the learning resources to adjust teaching strategies. (14) Using digital interactive tools, such as classroom interactive software, online collaboration platforms, etc., as a basis for evaluating students' learning attitudes and abilities. (15) By using digital means such as points and rankings, students can be motivated to learn. (16) Guiding students to use online tools for course learning, allowing them to learn anytime and anywhere, breaking the limitations of time and space. (17) Guiding students to use digital tools to engage in online voice or video communication with teachers and grasping the learning progress and requirements of the class. (18) Guiding students to download, complete and upload electronic assignments online, and participate in online exams. (19) Guiding students to establish digital learning communities and encouraging interaction and cooperation among students. (20) Recommending relevant online learning resources, such as videos, articles, and practice questions, based on the learning needs and interests of students.

The fourth primary element is digital ethics and morality. Including nine secondary elements: (1) Being familiar with Internet-related laws and regulations, personal privacy protection law, and copyright law. (2) Adhering to the norms of digital society behavior and refraining from engaging in unethical behaviors such as online fraud and spreading false information. (3) Actively participating in the governance of digital space and jointly maintaining the order and security of digital space. (4) When using the works of others, one should respect their intellectual property





rights and comply with relevant copyright laws and regulations. (5) Taking appropriate measures to protect the data of teachers and students and preventing it from being illegally obtained, used, or tampered with. (6) Ensuring the security of digital teaching equipment and systems to prevent malicious attacks or virus infections. (7) Understanding the information security requirements during the resource collection process and being able to preliminarily identify simple security issues. (8) Paying attention to network security issues, possessing basic abilities and awareness in data protection, regular updates, and repairs. (9) Being able to use basic antivirus and security software to detect computer environments.

The fifth primary element is professional development, which includes twelve secondary elements: (1) According to the personal development needs of teachers, actively choosing digital resources to carry out continuous knowledge learning and personal cultivation improvement. (2) By participating in digital communities, communicating with other teachers and experts, and exploring ways to optimize digital teaching methods. (3) Being able to track the forefront of professional development and actively paying attention to the knowledge and experience of digital technology in promoting the development of students' core competencies. (4) Developing personalized learning paths for teachers based on teaching objectives and interests through online learning platforms. (5) Utilizing digital tools for interdisciplinary learning, enhancing the comprehensive quality of teachers, and adapting to the needs of educational reform and development. (6) Conducting in-depth research on the development of students' digital literacy and the teaching challenges they face using a teacher's online teaching and research platform. (7) Tracking the development and innovation of digital technology, and continuously optimizing the application of digital education. (8) Through critical and innovative thinking, proposing new teaching ideas and solutions for problems in digital teaching. (9) Believing that you can carry out digital teaching activities and achieve teaching objectives. (10) Being able to use digital technology tools consciously, proactively, and scientifically without the supervision of others. (11) To achieve common digital teaching goals, support and participate in related activities with others, and demonstrate a positive and cooperative attitude. (12) Pursuing achievements in the field of digital teaching and striving for it.





Conclusion

In this study "Development of digital competency model for public high school teachers in Nanning", the researchers draw the following conclusions.

1. Research on the current situation of Nanning public high school teachers' digital competency

1.1 Current Situation of Digital Awareness.

57.1% of experts believe that the current public high school teachers in Nanning lack digital awareness and some teachers may believe that digital technology is only an auxiliary tool for teaching, rather than a core element. Therefore, they often only mechanically apply digital tools in their daily teaching, without truly realizing the importance of digital technology in improving teaching effectiveness and promoting student development. This conservative attitude limits the widespread application and development of digital technology in the field of education.

1.2 Current Situation of Digital Knowledge and Skills.

85.7% of experts believe that current teachers lack a solid grasp of digital basic knowledge and skills. Many teachers have unsatisfactory computer skills. Some basic software operations, file processing, and network search skills have not been proficiently applied, which has caused considerable difficulties in daily teaching and office processes. For example, when creating electronic courseware or assigning homework online, the lack of these basic skills can directly affect work efficiency and student learning experience.

1.3 Current Situation of Application of Digital Technology.

95.2% of experts believe that teachers can not generally apply digital technology. Traditional teaching methods often focus on imparting knowledge, while in the digital age, instructional design needs to pay more attention to student participation and experience. However, due to the lack of innovative teaching concepts and the application of tools, many teachers' teaching designs remain at the traditional level, making it difficult to stimulate students' interest and creativity in learning. Although there are abundant teaching resources on the Internet, how to select the content suitable for students and integrate it effectively has become a difficult problem. Due to the lack of specialized training and guidance, many teachers appear inadequate





in this regard, resulting in uneven quality of teaching resources and difficulty in realizing their educational value.

1.4 Current Situation of Digital Ethics and Morality.

52.4% of experts believe that teachers have weak digital ethics and moral awareness. In the digital age, the speed of information dissemination is extremely fast and the words and actions of teachers have a great impact on students. However, some teachers may lack sensitivity to digital information and fail to demonstrate the necessary professional ethics and conduct online. For example, some teachers may inadvertently disclose student privacy information or make inappropriate comments on social media, which can damage the image of teachers and the trust of students.

1.5 Current situation of Professional development.

47.6% of experts believe that teachers lack motivation for professional development. Although the overall quality of public high school teachers in Nanning is relatively high, some teachers may lack the motivation to actively learn and progress in digital ethics, morality, and professional development. They may believe that they already have sufficient teaching abilities and do not need further training and learning. However, in the digital age, teachers need to constantly update and enhance their professional abilities, otherwise they may be eliminated by the times.

2. The digital competency model for public high school teachers in Nanning

After three rounds of the Delphi method and evaluation by focus group experts, the final digital competency model for public high school teachers was obtained. Due to limited space, the author will not repeat the detailed introduction here. Please refer to the description in the results section for details.

Discussion

After three rounds of the Delphi method and evaluation by the focus group experts, the final digital competency model for public high school teachers has been developed, which can be summarized into five aspects: 1) Digital Technology Awareness 2) Digital knowledge and skills 3) Application of Digital Technology 4) Digital Ethics and Ethics 5) Professional development. This





is in line with the content of the "Teacher Digital Literacy" framework issued by the Chinese Ministry of Education in February 2023. Teachers start by understanding and mastering digital technology and then apply it to teaching practice, constantly learning in practice to promote their professional development. At the same time, they fulfill their social responsibilities in terms of moral cultivation and behavioral norms in digital activities. Meanwhile, this study is consistent with the findings of scholars (Paethrangsi et al., 2023; Qiao et al., 2022; Phipek & Bucha 2022; Zheng et al., 2020) who believe that the digital competency model in educators includes dimensions such as personality traits, digital ethics, research and innovation ability, information collection and learning ability, teaching and organizational ability and other influencing factors

Recommendations

Based on the previous research results and combined with the current situation of the digital competency of public high school teachers in Nanning, corresponding countermeasures and suggestions are proposed for the development of the digital competency of public high school teachers in Nanning.

1. Accelerate the Development and Transformation from Literacy to Competency

The current public high school teachers in Nanning urgently need to further improve their digital teaching ability, digital learning, and innovation. We should not only focus on the development of information literacy, which mainly focuses on the application ability of teacher information technology but also comprehensively shift towards the development of teacher digital competence. Starting from the educational development needs and teacher career positioning of public high schools in Nanning, we should gradually use the digital competency model of (teachers) to replace information/digital literacy and even replace information technology application capabilities in the training plans of government and education departments for teachers. We should promote the research, practice, and training of teacher digital competency and develop comprehensive teacher abilities that meet the "Education 2.0 stage".

2. Develop Specialized Digital Competency Standards for Teachers





From an international perspective, the United States, the European Union, Norway, and Spain have all released relevant "standards" for teacher digital competence in 2017, all of which have put forward corresponding competency requirements for teachers in the digital age from the perspective of national needs. Whether from the perspective of Nanning's own needs or the international development trend, Nanning should quickly establish specialized digital competency standards for teachers.

3. Continuously Promote the Differentiation and Normalization of Teacher Training

In the training of digital competency for teachers, differentiated management of training content, methods, and frequency should be promoted according to the different needs of different teachers, to manage training methods more effectively.

Improve the quality of training. In addition, the speed of development and updating of digital technology is constantly accelerating and its application in education is becoming more diverse, extensive, and in-depth. The demand for digital competence of public high school teachers is also constantly evolving and changing. From this development trend, it is not only necessary for teachers to be able to continue active learning, but also for the education department to gradually promote and achieve the normalization of training based on implementing differentiated training for teachers, and continuously developing and enhancing the digital competency required for teachers to carry out digital education teaching activities.

4. Focus on Enhancing Teachers' Ability to Apply and Innovate Digital Technology

The digital technology application ability of teachers can be effectively improved in a relatively short period through the regular application of training methods and technical tools. However, digital innovation capabilities require longer periods of learning and practical exploration to achieve significant improvement. Therefore, in the training and development of digital competency for teachers, emphasis should be placed on their innovative digital teaching abilities.

5. Continuously Strengthening the Professional Pursuit of Teachers

Teacher digital competence is a comprehensive collection of abilities and traits that focus not only on meeting the basic needs of teaching activities but also on achieving excellent digital teaching results and contains strong professional competitiveness. Teachers should continuously strengthen their professional pursuits and develop positive personality traits.





6. Drawing on International Development Strategies for the Digital Competency of Teachers

Digital technology knows no borders and there is no difference in the demand for innovative and competitive talents among countries. Referring to the international experience of drawing on the digital competence of teachers, we aim to develop the comprehensive ability and characteristics of public high school teachers in Nanning to be competent in digital education and teaching work, gradually enhancing the competitiveness of Nanning teachers domestically and even internationally. This is also in line with the goals and needs of the strategic task of "building a high-quality, professional, and innovative teacher team" in "Modernization of Education in China 2035".

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