Strategies for Developing Teachers' Digital Teaching Competency in Fujian Higher Vocational Colleges

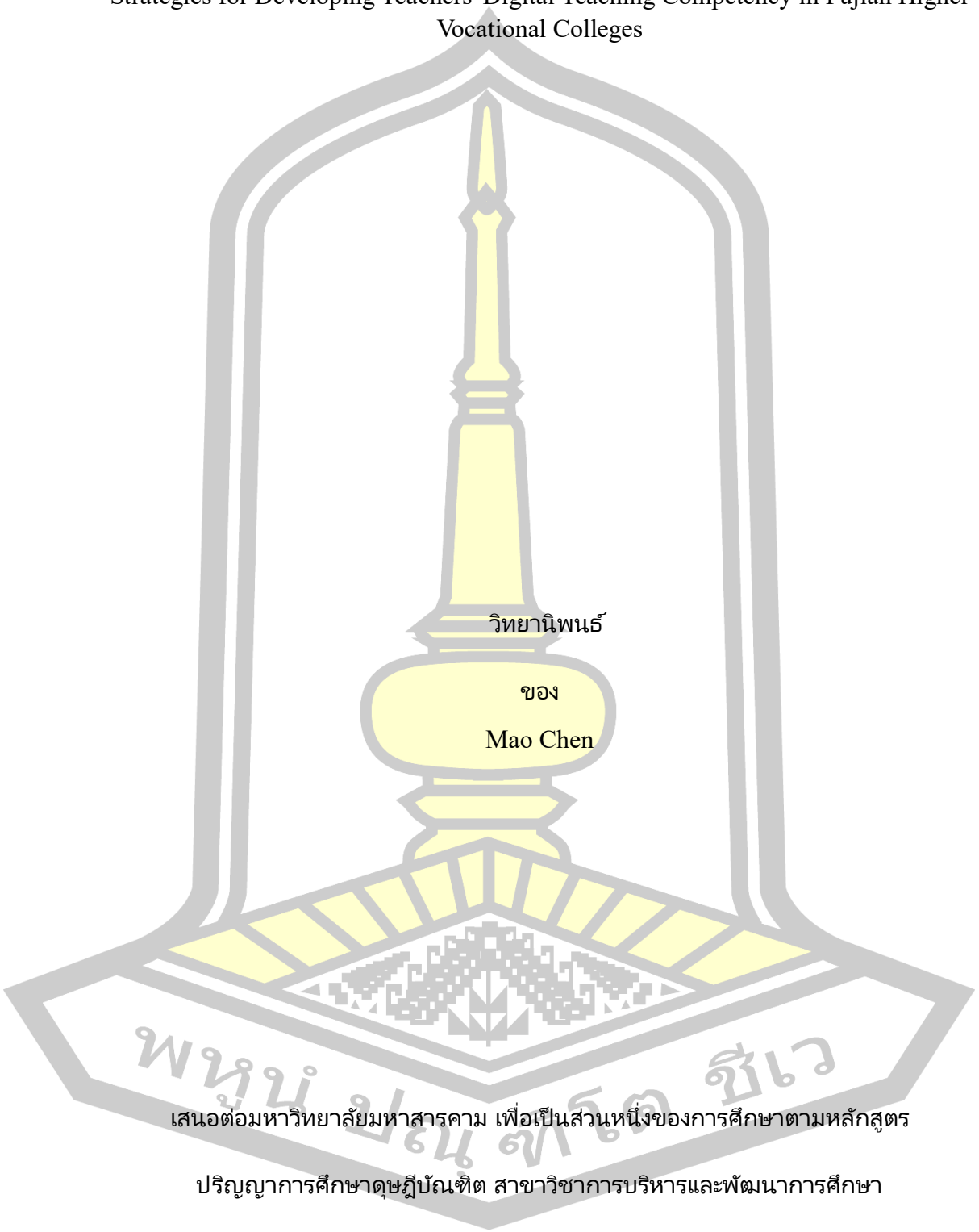
Mao Chen

A Thesis Submitted in Partial Fulfillment of Requirements for

degree of Doctor of Education in Educational Administration and Development

March 2025

Strategies for Developing Teachers' Digital Teaching Competency in Fujian Higher Vocational Colleges



วิทยานิพนธ์

ของ

Mao Chen

เสนอต่อมหาวิทยาลัยมหาสารคาม เพื่อเป็นส่วนหนึ่งของการศึกษาตามหลักสูตร

ปริญญาการศึกษาดุษฎีบัณฑิต สาขาวิชาการบริหารและพัฒนาการศึกษา

มีนาคม 2568

พหุน ปณฺ ฑิโต ชีเว

Strategies for Developing Teachers' Digital Teaching Competency in Fujian Higher Vocational Colleges

Mao Chen

A Thesis Submitted in Partial Fulfillment of Requirements

for Doctor of Education (Educational Administration and Development)

March 2025

พหุน ปณฺ ฑิโต ชีเว

The examining committee has unanimously approved this Thesis, submitted by Mr. Mao Chen , as a partial fulfillment of the requirements for the Doctor of Education Educational Administration and Development at Mahasarakham University

Examining Committee

..... Chairman
(Assoc. Prof. Thirasak Uppamaiathichai , Ph.D.)

..... Advisor
(Surachet Noirid , Ed.D)

..... Committee
(Assoc. Prof. Lakkhana Sariwat , Ph.D.)

..... Committee
(Assoc. Prof. Sinthawa Khamdit , Ed.D)

..... Committee
(Asst. Prof. Thatchai Chittranun , Ed.D)

Mahasarakham University has granted approval to accept this Thesis as a partial fulfillment of the requirements for the Doctor of Education Educational Administration and Development

....
(Assoc. Prof. Chowwalit Chookhampaeng , Ed.D)
Dean of The Faculty of Education

(Prof. Anongrit Kangrang , Ph.D.)
Acting Dean of Graduate School

TITLE Strategies for Developing Teachers' Digital Teaching Competency in Fujian Higher Vocational Colleges

AUTHOR Mao Chen

ADVISORS Surachet Noirid , Ed.D

DEGREE Doctor of Education **MAJOR** Educational Administration and Development

UNIVERSITY Mahasarakham University **YEAR** 2025

ABSTRACT

The present research aims to study the components and indicators of digital teaching competency in Fujian higher vocational colleges, explore the current state, the defined state and the priority needs index of digital teaching competency of teachers in higher vocational college teachers in Fujian Province and design and evaluate strategies for developing teachers' digital teaching competency in higher vocational colleges Fujian Province. The research is structured in three phases: firstly, identifying the components and indicators that of teachers' digital teaching competency; secondly, exploring the current and desired states of digital teaching competency in Fujian higher vocational colleges; thirdly, designing and evaluating the Strategies for developing teachers' digital Teaching Competency in Fujian Higher Vocational Colleges. The study encompasses a sample of 412 educators from three higher vocational colleges in Fujian. Data collection instruments include interview form, questionnaire, and evaluation forms. The data are analyzed by percentage (%), mean (X), standard deviation (S.D.), and Priority Needs Index modification (PNImodified).

The results indicate that.

1. The components and indicators of teachers' digital teaching competency consist of 4 main components and 14 indicators including: 1) Digital awareness and attitude with 3 indicators; 2) Digital skills and training with 5 indicators; 3) Institutional construction with 3 indicators, 4) Digital teaching application with 3 indicators. The assessment of the possibility level is very high, and the adequacy level is also very high.

2. The current state of digital teaching competency is at a medium level, the desired state is at a high level, and the priority needs index of the components from high

to low are followed by Institutional construction, Digital skills and training, Digital awareness and attitude, and Digital teaching application.

3. According to experts' evaluation, the mean of appropriateness of the goals and strategies is high, the mean of accuracy is high and the mean of feasibility is also high. The goals from high to low are: 1) Establish a comprehensive incentive, training, and evaluation system; 2) Build a sustained, effective, and comprehensive teaching capacity training and practical environment; 3) Continuously enhance teachers' awareness and confidence in digital teaching; 4) Teachers' digital teaching competency and experience have been enhanced. Each goal is designed with a corresponding development strategy. The strategies from high to low are: 1) Develop and implement comprehensive incentive, training, and evaluation strategies to bolster the advancement of digital teaching capabilities among teachers including 5 measures; 2) Enhance educators' proficiency in digital tools and methodologies through ongoing training and hands-on experience including 5 measures; 3) Foster a positive perception and proactive stance towards digital teaching among faculty to encourage innovative integration in educational practices including 5 measures; 4) Facilitate the accumulation of digital teaching application for teachers through active engagement and collaborative exchange including 6 measures.

Keyword : Educational Administration, Digital Teachers, Educational Strategic Management, Digital Teaching Competency, High Vocational Colleges

ACKNOWLEDGEMENTS

When I had the idea of pursuing a PhD in philosophy, I began to learn about universities in Thailand that accept foreign students. In December 2021, I made the final decision to choose and enroll in Mahasarakham University. The first semester of our Grade 65 students began in July 2022. When COVID-19 continued, my classmates and I began online learning of the course. Through the internet, I met the professors from the Faculty of Education, including Dr. Surachet Noirid, Dr. Suwat Julsuwan, Dr. Pacharawit Chansirisira, Dr. Songsak Phusee On, Dr. Thatchei Chittranun and so on. Their superb knowledge, patient explanations, and humorous teaching methods have given me a new understanding of the educational work I am engaged in and broadened my horizons. Thank you for your help and inspiration.

In November 2023, I came to Thailand for the first time to continue my doctoral studies at Mahasarakham University. I started writing my thesis under the careful guidance of my advisor, Dr. Surachet Noirid. Dr. Surachet Norid is a very kind teacher. He provided many valuable suggestions and unique insights for my thesis writing, and with his help, I was able to successfully complete the thesis writing. My teacher also takes care of me in daily life, taking me and my Chinese classmates to different places to learn about this city. My teacher helped me understand the real Thailand .

I would like to sincerely express my gratitude to my advisor Dr. Surachet Noirid. I sincerely thank all the teachers who have taught me. Wishing you good luck, good health, and all the best in your life.

Mao Chen

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER I

INTRODUCTION

Background

With the development of global Internet technology, information technology represented by computer network and modern communication is penetrating into the field of education with an unprecedented depth and breadth. Multimedia technologies such as mobile Internet, artificial intelligence and big data have brought unlimited development potential for education and teaching, but also put forward higher requirements and challenges (Abu, 2023). With the development of education digitization and the improvement of teaching quality, teachers play an important role in undertaking this task, and teachers' teaching Competency is the key factor that affects whether teachers can undertake this responsibility. (Li & Zhang, 2011) Therefore, how to improve teachers' teaching Competency and promote teachers' professional development to the maximum extent has become an important proposition to improve teaching quality and promote the conformal development of higher vocational education (Sisk et al., 2022).

In the notice issued by the Ministry of Education and other five departments on the issuance of the Action Plan for the Revitalization of Teacher Education (2018-2022), it is proposed to implement the "Internet + teacher education" innovation action, makes full use of cloud computing, big data, virtual reality, artificial intelligence and other new technologies, and promotes the construction and application of teacher education information service platform. Promotes the reform of teaching methods characterized by autonomy, cooperation and inquiry (Sha, 2019). In the 2021 work points of the Department of Science, Technology and Information Technology of the Ministry of Education, it is also proposed to "guide and promote the development of" Internet + education ", use information technology to update educational concepts and

change educational models." In the opinions of the Central Committee of the Communist Party of China and The State Council on comprehensively deepening the reform of the teaching team in the New era, it is proposed that "comprehensively improve the quality of teachers in colleges and universities, build a high-quality and innovative teaching team, strive to improve teachers' professional competency, build a school-level teacher development platform, organize research and training activities, carry out teaching research and guidance, and promote teaching reform and innovation." (Kittelmann et al., 2023) We will strengthen the building of learning communities such as teaching and research departments, and establish and improve the transmission and guidance strategy (Yang, 2015). Comprehensively carry out training for teachers in colleges and universities to improve their teaching Competency." In addition, the Ministry of Education "Several Opinions on Comprehensively Improving the Quality of Higher vocational education" once again put forward "improving the professional level and teaching Competency of teachers (Jiang & Han, 2018). We will promote the establishment of teachers' teaching development centers in colleges and universities, focus on supporting the construction of a number of national demonstration centers for teachers' teaching, carry out teacher training and teaching consultation in a planned way, and improve teachers' professional level and teaching Competency (Guo, 2023). Reform the evaluation method of teachers' teaching Competency, encourage the flow of personnel between schools and enterprises, encourage teachers to obtain off-campus work or research experience, and encourage colleges and universities to hire professional and technical personnel with practical experience as teachers. It can be seen from the above documents that under the requirements of higher vocational education shifting from quantitative development to conformal development, it is an urgent and important task for colleges and universities to effectively improve teachers' learning competency (Ge & Han, 2017). Therefore, the improvement of teachers' Digital Teaching Competency in the information age has important theoretical value and practical significance.

At present, the main contradiction in higher vocational education is the contradiction between social development and the people's ever-growing urgent need for high-quality higher vocational education and the unbalanced and inadequate development of higher vocational education (Bai & Han, 2022). Education will be fully empowered by digitalization to provide higher quality, fairer, more choices, more convenient, more open and more flexible educational services to meet the people's needs for high-quality and personalized learning, and help build a learning society and a learning country. We should seize the opportunities of the digital era, focus on the joint construction and sharing of digital resources, carry out collaborative innovation in digital education, and work together to achieve new breakthroughs in education inclusiveness, equity and quality. Either to achieve new breakthroughs in education inclusiveness, fairness, and quality (Julio et al., 2020). As China's higher vocational education enters the popularization stage, the service face of higher vocational education, service level, service areas expand further, personalized education will become the especially important characteristics of higher vocational education. Higher vocational education should meet the needs of quality diversification, lifelong learning, personalized training and modern governance, promote the transformation and upgrading of higher vocational education by using digital technology, constantly improve the quality of education, update the concept of education, improve the means of education, and change the mode of education, provide diversified learning scenarios and high-quality resources for higher vocational education, and empower education and teaching with digital technology. To realize the profound reform of higher vocational education in all aspects (Megan & Anita , 2001).

Digitization of higher vocational education originates from the innovation of digital technology, which drives the transformation and development of digitization of higher vocational education. In the era when the digital economy has become a new engine for world economic and social development, critical thinking, collaborative communication, problem solving, human-computer interaction and other Competency

occupy a more prominent position (Ma, 2020). As an important force to promote the sustainable development of human society, higher vocational education has a two-way supporting relationship with the sustainable development of economy and society. Responding to the realistic needs of sustainable development in the digital era has become the core task of the development of global higher vocational education. At present, worldwide, it has become a trend of higher vocational education reform to use digital technology to promote the transformation and upgrading of higher vocational education, reshape the concept, paradigm and practice of higher vocational education, and continuously improve the quality of higher vocational education (Su & Ru, 2021). Like a magnifying glass, the COVID-19 epidemic has made people see many shortcomings in vocational education, such as backward education concept, insufficient Digital Teaching Competency of teachers, lack of digital teaching resources available for use, backward educational technology and teaching methods, disconnection between training goals and teaching content and social needs, and failure of government, school, bank and enterprise to form an ecosystem to promote the innovation and development of vocational education (Wei et al., 2021). If vocational education still trains talents with single technology and skill suitable for the needs of industrial economic times according to the traditional mode of running a school, then the graduates of vocational colleges will face the cruel reality of unemployment after graduation (Meekaew & Jongnimitsataporn, 2023). The UNESCO Chair on Digitalization of Vocational and Technical Education established in Shenzhen Vocational and Technical College has found the logical relationship and solution between the innovation and development of vocational education and the digital transformation of economy and society, that is, "the spear of the son, the shield of the attack", and the comprehensive innovation and development of vocational education with digital transformation. To adapt to and serve the digital transformation of the economy and society (Liu, 2020).

Although there is a worldwide emphasis on the development of teachers' digital Competency. China has also given it strong policy support. (Lin et al.,2023) However, the development of Digital Teaching Competency of teachers in higher vocational colleges in Fujian Province still faces a series of challenges. First of all, the knowledge reserve and skill level of teachers in the field of digital education are relatively low, and more in-depth training and support are needed. Secondly, the lack of systematic strategies and strategies for the development of teachers' Digital Teaching Competency leads to scattered and partial application of teachers in digital education. In addition, factors such as discipline characteristics and school resource distribution differences also affect the balance and sustain competency of the development of teachers' Digital Teaching Competency.

Digital information technology is a new concept and concept proposed in recent years with the continuous improvement of technological development level in response to the development of information technology. In July 2016, the National Informatization Development strategies Outline jointly issued by the General Office of the Communist Party of China Central Committee and the General Office of the State Council provided comprehensive guidance for China's future informationization and digitization construction (Chen, 2020) .In March 2018, the Ministry of Education and five other departments issued a notice on the "Action Plan for Teacher Education Revitalization (2018-2022)". In the document, it is pointed out that the "Internet+Teacher Education" innovation action fully utilizes new technologies such as cloud computing, big data, virtual reality, and artificial intelligence to promote the construction of an information-based teaching service platform for teacher education.

Design and apply to promote the transformation of teaching methods characterized by autonomy, cooperation, and exploration. Research and formulate standards for the application competency of information technology among normal university students, and improve their information literacy and information technology teaching Competency (Hou et al., 2021).On April 13, 2018, the Ministry of Education

issued a notice on the Action Plan for Education Informatization 2.0. In accordance with the requirements of documents such as the Outline of the National Medium - and Long Term Education Reform and Development Plan (2010-2020), the Thirteenth Five Year Plan for the Development of National Education, the Ten Year Development Plan for Education Informatization (2011-2020), and the Thirteenth Five Year Plan for Education Informatization, The Action Plan for Education Informatization 2.0 proposes that "the rapid development of technologies such as artificial intelligence, big data, and regional blockchain will profoundly change the demand for talent and the form of education (Liu, 2020). The intelligent environment has not only changed the way teaching and learning are conducted, but has also begun to deeply affect the concept, culture, and ecology of education." Through the implementation of this plan, the development goal of "three comprehensive, two high, and one large" will be basically achieved by 2022, The teaching application covers all teachers, the learning application covers all eligible students, and the digital campus construction covers all schools. The level of information application and the information literacy of teachers and students are generally improved, and a "Internet+Education" big platform is built to promote the transformation from educational dedicated resources to educational resources, from developing the information technology application competency of teachers and students to comprehensively improving their information literacy, and from integrated application to innovative development, Strive to build a new model of talent cultivation under the conditions of "Internet+", develop a new model of internet-based education services, and explore new models of education governance in the information age (Ma, 2020).

On March 1, 2019, the General Office of the Ministry of Education issued a notice on the "Key Points for Education Informatization and Network Security Work in 2019". It is mentioned again that "we will promote the popularization of digital resource services, continuously expand the coverage of high-quality educational resources, and enhance the supply capacity of educational services (Liu, 2020). At the same time, we

will launch the Internet+teacher education innovation action, and promote the in-depth application of new technologies such as big data, virtual reality, and artificial intelligence in education and teaching."

In 2019, "Modernization of Education in China 2035" proposed to accelerate the educational transformation in the information age, coordinate the construction of integrated and intelligent teaching, management and service platforms, build a teacher professional development system, promote lifelong learning and professional development of teachers, and education informatization, as an important engine and driving force, has become a core element affecting the process of educational modernization (Li & Zhang, 2011). In 2021, the National Education Work Conference proposed to strengthen the construction of the teacher team, consolidate the support for high-quality development of talents, strictly implement the requirements of teacher ethics and conduct, vigorously revitalize teacher education, and deepen the comprehensive reform of teacher management.

In September 2020, UNESCO, the International Telecommunication Union, and UNICEF jointly released "Digital Transformation in Education: Empowering Students through School Connectivity", focusing on digital connectivity in education. The global digital transformation of education is imperative. In recent years, China has introduced relevant policies such as the Education Informatization 2.0 Action Plan, China Education Modernization 2035, and the 14th Five Year Plan for Digital Economy Development (Li, 2019). Multiple measures have been taken to strengthen the digital construction of education and promote the sustainable and healthy development of teachers' Digital Teaching Competency.

In 2022, the "14th Five Year Plan" for the development of the digital economy proposed to deepen the promotion of smart education and enhance the competency of teachers to provide online education support services. In March of the same year, the National Smart Education Platform was officially launched, and several provinces and cities have successively launched pilot projects for digital education reform (Lin et al.,

2023). The education sector has confirmed and announced multiple "smart education demonstration zones", including Dongcheng District in Beijing, Guangzhou City in Guangdong Province, Xiong'an New Area in Hebei Province, and Wenzhou City in Zhejiang Province. China's digital transformation of education has entered a substantive stage.

It can be seen that the country attaches great importance to effectively promoting the construction of digital education and teaching concepts. Schools in various regions of the country should complete the construction of local digital campuses as soon as possible to welcome the gradually coming era of digital education and teaching (Liu, 2020). At present, it is a new era and a new era for the rapid development and construction of digital education and teaching concepts in China.

In this context, in-depth research on the development strategies of Digital Teaching Competency of teachers in Fujian vocational colleges and explore effective implementation paths will not only help to better solve the problems and challenges in digital education, but also provide feasible suggestions for the modernization of vocational colleges in this region. Through the combination of theory and practice, we are expected to make positive contributions to the improvement of vocational college education quality and the innovation of talent training mode in the digital era.

Research Problems

1. What are the components and indicators of teachers' digital teaching competency?

2. What are the current state, desired state and priority needs index of developing teachers' digital teaching competency in Fujian higher vocational colleges?

3. What kind of the strategies for developing teachers' digital teaching competency in Fujian higher vocational colleges is like?

Research Objectives

1. To study the components and indicators of teachers' digital teaching competency.

2. To explore the current state, the desired state and the priority needs index of teachers' digital teaching competency in higher vocational colleges in Fujian province.

3. To design and evaluate strategies for developing teachers' digital teaching competency in higher vocational colleges in Fujian province.

Research Significance

1. Improving Digital Teaching Competency of Teachers

1) Enhancing teachers' understanding and mastery of digital teaching concepts and technologies (Bai & Gu, 2020).

2) Enabling effective utilization of digital tools and online resources to improve teaching effectiveness and student learning outcomes (Bai & Gu, 2020).

2. Adapting to the Digital Era's Educational Requirements

1) Aligning teacher competencies with the evolving demands of digital education s (Bai & Gu, 2020).

2) Preparing teachers to meet the challenges and opportunities presented by rapid technological advancements in education s (Bai & Gu, 2020).

3. Promoting Educational Innovation and Reform

1) Facilitating the transformation of traditional teaching models through digital technology (Julio et al., 2020).

2) Encouraging the development of more flexible and personalized teaching methods to engage students and enhance learning experiences (Zhang & Qin, 2019).

4. Solving Practical Problems in Digital Teaching

1) Addressing technical challenges, resource shortages, and training needs in digital education (Trujillo Torres et al., 2011).

2) Providing practical guidance and support to teachers to overcome difficulties and improve teaching quality (Trujillo Torres et al., 2011).

5. Achieving Balanced Development of Education

1) Identifying and addressing disparities in digital teaching competencies among different regions and types of higher vocational colleges (Sha, 2019).

2) Promoting comprehensive improvement of teachers' digital competencies to reduce imbalances and ensure equitable educational development (Sha, 2019).

6. Supporting Teacher Professional Development

1) Establishing an information-based teaching concept among subject teachers (Sha, 2019).

2) Enhancing their proficiency in subject-specific technology tools and overall digital teaching competencies (Sha, 2019).

7. Informing Policy and Practice

1) Offering evidence-based strategies derived from survey, interview, and classroom observation methods.

2) Providing a foundation for developing targeted training programs and integrated teaching activities that combine information technology with subject content.

Scope of Research

The scope of this study focuses on strategies for developing the Digital Teaching Competency of teachers in higher vocational colleges in Fujian Province. The focus of the study is on higher vocational colleges in the region, aiming to gain a deeper understanding of the current situation, problems, and needs of teaching digital Competency of higher vocational college teachers in Fujian Province in the context of the digital era.

Firstly, the study will focus on the teacher population of higher vocational colleges in Fujian Province. This includes teachers from various vocational colleges, covering teachers from different disciplinary fields and professional backgrounds. By conducting surveys and interviews with teachers from multiple schools and different

majors, we can comprehensively understand the current situation and differences in the Digital Teaching Competency of higher vocational college teachers in Fujian Province, and provide a basis for formulating targeted improvement strategies.

Secondly, the study will focus on the current situation and issues of teachers in digital teaching. This includes teachers' understanding and attitude towards digital education, the degree of application of digital technology, and the challenges they encounter in the process of digital teaching. By deeply understanding the specific confusion and needs of teachers in digital teaching, targeted strategies and methods for improving their Competency can be proposed.

In addition, the study will also involve issues related to teacher professional development and training. The study will explore the training needs and resources of higher vocational college teachers in Fujian Province, aiming to understand the current state of teacher professional development and training, and propose feasible improvement measures.

This paper plans to conduct case studies on three higher vocational colleges in Fujian: Fujian Polytechnic of Information Technology, Fujian Vocational College of Agriculture, and Fuzhou Software Technology Vocational College. Fujian Polytechnic of Information Technology, located in the capital city of Fuzhou, Fujian Province, is the author's workplace, with information technology majors as the core of education and convenient for research. It is the main research objectives. Fujian Vocational College of Agriculture is located in Yongtai county, Fujian province. It is a school located in mountainous areas and represents higher vocational colleges with relatively backward areas and no information technology majors as the core of education. Fuzhou Software Technology Vocational College is located in a coastal county in eastern Fujian Province, and is a representative of private higher vocational colleges in Fujian Province. These two universities are also actively exploring the construction of digital teachers and are auxiliary objectives of research. Therefore, taking these three higher vocational colleges as the research subjects can become representatives of higher vocational

colleges in Fujian, and the research conclusions have typicality and universality to a certain extent.

Conceptual Framework

Firstly, based on the research objectives and direction of this study, we will use the internet to search for relevant literature, consult relevant works and literature, clarify relevant concepts such as information technology teaching Competency, and clarify the main content of this study. Systematically review the current situation and improvement strategies of teachers' information technology teaching Competency at home and abroad, laying a theoretical foundation for conducting this study (Durkheim, 2017).

Secondly, the digital teaching needs of teachers are investigated. Through interviews, questionnaires, and classroom observation, the awareness and attitude of digital teaching in various disciplines, the level of digital technology operation skills, the competency to acquire and develop resources, and the level of integration of digital technology and disciplines were understood, and the Digital Teaching Competency of various teachers was initially mastered.

Thirdly, on the basis of research literature, interview and classroom observation, the questionnaire "Investigation on the current situation of teachers' Digital Teaching Competency" was developed (Zhan, 2017). Questionnaires were distributed to 500 teachers from the 3 colleges as the main research objectives and the other 5-10 similar colleges, and the collected questionnaires were analyzed to understand the current situation of teachers' Digital Teaching Competency in higher vocational colleges and grasp the internal and external factors affecting the improvement of teachers' Digital Teaching Competency.

Then, formulate the developing strategies of teachers' Digital Teaching Competency. According to the problems existing in the development of teachers' Digital Teaching Competency and the possible individual needs, the relevant development strategies are formulated.

Finally, summarize the research process, further improve the developing strategies of teachers' Digital Teaching Competency, and plan to promote and implement it in similar higher vocational colleges.

In this research, the researcher studied based on following framework in Figure 1.

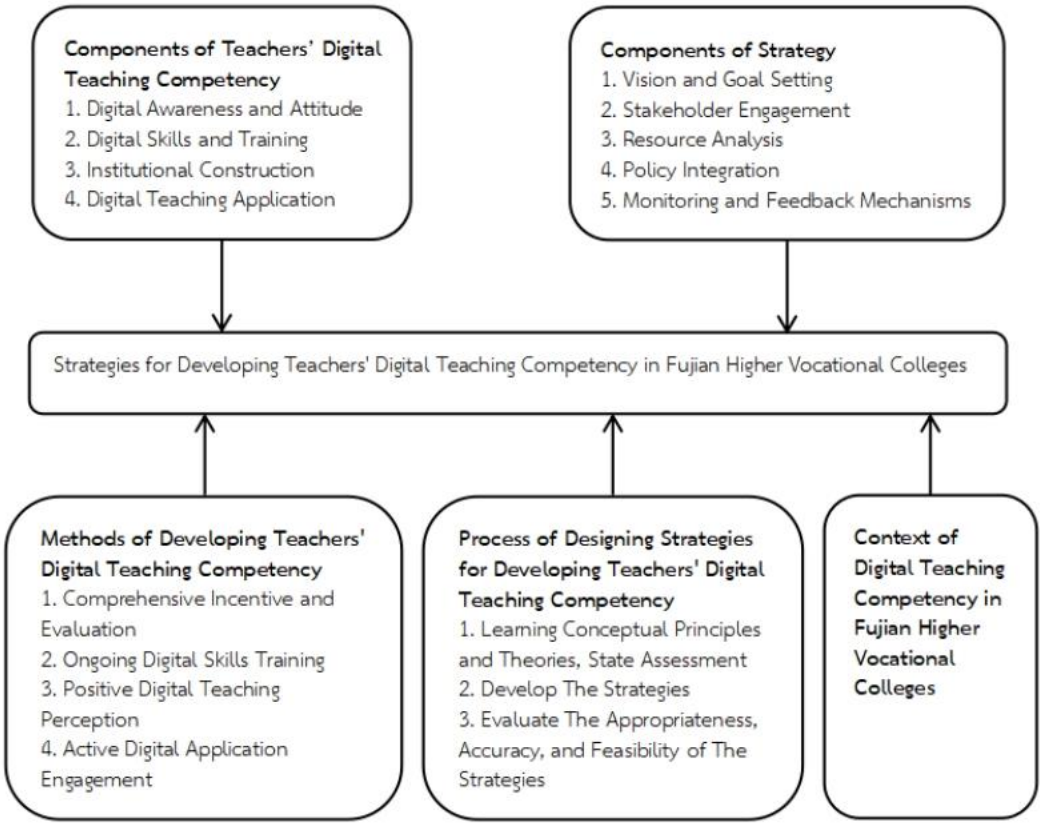


Figure 1 Theoretical Framework Research

Definition of Terms

1. Teachers' digital teaching competency

"Teachers' digital teaching competency" refers to a set of skills, knowledge, and attitudes that enable educators to effectively integrate digital technologies into their teaching practices (Ma, 2020). This competency encompasses several key areas:

Digital Literacy: The ability to understand and use digital technologies appropriateness for teaching and learning.

Pedagogical Skills: The capability to design and deliver lessons that leverage digital tools to enhance student engagement and learning outcomes.

Technical Proficiency: The technical ability to operate and troubleshoot various digital devices and educational software.

Adaptability: The flexibility to adapt to new digital technologies and integrate them into the curriculum.

Innovative Application: The creativity to explore and implement novel uses of digital technology to improve teaching methods and student experiences.

Ethical and Responsible Use: The awareness and practice of using digital technologies in an ethical manner, respecting digital rights, privacy, and security.

Professional Development: The commitment to ongoing learning and development in the area of digital teaching to stay current with best practices and advancements.

This definition highlights the multifaceted nature of digital teaching competency and emphasizes the importance of continuous professional growth for educators in the digital age (Li & Zhang, 2011). It underscores the need for teachers to be proficient in using digital tools and to critically assess and integrate these tools in ways that best serve their students' learning needs.

2. Strategy

"Strategy" refers to a high-level plan designed to achieve one or more long-term goals under conditions of uncertainty. It involves the following key elements:

Direction: It outlines the intended path or course of action toward desired outcomes.

Focus: It defines what is important and what is not, prioritizing resources and efforts.

Coordination: It ensures that different parts of an organization or initiative work together harmoniously.

Resource Allocation: It determines how resources, such as time, money, and personnel, are distributed to support the strategy.

Adaptability: It includes the ability to adjust and respond to changes in the external environment or internal conditions.

Implementation: It covers the steps and actions needed to execute the strategy effectively.

Evaluation: It involves assessing the strategy's performance and making necessary modifications to improve results.

Strategies can be developed for various contexts, such as business, military, politics, or personal life, and they guide decision-making and action to achieve success.

3. Components of Teachers' Digital Teaching Competency

3.1 Digital awareness and attitude

"Digital awareness and attitude" refer to people's cognition, understanding, and attitude towards digital technology and the digital world. It covers the cognitive and usage abilities of digital tools, applications, data, and information, as well as the views and attitudes towards the transformation of digital society and the development of digital technology.

"Digital awareness and attitudes" are of great significance in modern society, as they are not only related to individual development and quality of life, but also to the development and transformation of society. Having a good Digital awareness and attitude can help people better utilize digital technology, participate in the digital society, and actively adapt to and respond to the challenges and opportunities brought about by digital transformation.

3.2 Digital skills and training

Digital skills refer to the skills and abilities required to use digital technologies and tools for activities such as information processing, data analysis, media creation, and online communication. It includes basic computer operation skills

such as computer switches, file management, and network browsing, as well as the ability to effectively use office software, data processing tools, and media creation tools. Digital skills also include the ability to search and filter information on the internet, as well as the ability to recognize and respond to digital security and network privacy protection.

“Digital skills training” is the process of organizing and providing relevant training courses, educational resources, and learning opportunities to impart knowledge and skills to learners, helping them improve their digital skills. Training forms can be diversified, including traditional classroom training, online learning platforms, community training, and enterprise training. The training content can cover basic knowledge of digital technology, tool usage skills, data analysis and interpretation abilities, media creation skills, network security, and privacy protection according to different needs and goals.

3.3 Institutional construction

“Institutional construction” refers to the process of establishing an organized, systematic, and binding governance and regulatory system that adapts to the development and characteristics of universities through the formulation, improvement, and implementation of a series of rules and regulations, management methods, and operational strategies in the field of higher vocational education.

3.4 Digital teaching application

"Digital teaching application" refers to the integration and use of digital technologies and resources in the educational process to enhance teaching and learning experiences. It encompasses the utilization of various digital tools like learning management systems, interactive software, educational apps, multimedia content, and online platforms to facilitate the delivery and interaction of knowledge. The aim of applying digital teaching methods is to make education more accessible, engaging, personalized, and efficient. It supports a blended learning environment that combines traditional classroom instruction with digital resources to accommodate diverse

learning styles and encourage active student participation. Digital teaching applications can also involve the use of data analytics to inform instructional decisions and assess student performance, ultimately seeking to improve educational outcomes and prepare students for the digital age.

4. Current state

"Current state" refers to the existing condition or status of a dataset, system, or process at a specific point in time. It serves as a snapshot of the current situation, providing a baseline for understanding and evaluating performance, identifying trends, and making informed decisions. The current state can encompass various aspects, such as the structure and quality of data, the performance metrics of a system, or the operational status of a business process. Understanding the current state is crucial in data analysis for several reasons:

Baseline Establishment: It provides a starting point for any analysis, helping to identify the initial conditions and performance levels.

Identifying Gaps and Opportunities: By assessing the current state, analysts can pinpoint areas that require improvement, optimization, or further investigation.

Benchmarking and Comparison: The current state serves as a reference point for comparing future states, tracking progress, and measuring the impact of changes or interventions.

Informed Decision-Making: A clear understanding of the current state enables data-driven decisions, ensuring that actions are based on accurate and up-to-date information.

“current state” in data analysis is a critical component that lays the groundwork for effective evaluation, planning, and improvement initiatives.

5. Desired state

"Desired state" refers to the future condition or target status that an organization or analyst aims to achieve. It represents the ideal scenario or the set of

goals that guide the direction of data-driven initiatives and improvements. The desired state is typically defined based on strategic objectives, performance benchmarks, or specific outcomes that stakeholders wish to attain.

Key aspects of the "desired state" in data analysis include:

Goal Setting: The desired state serves as a clear target for what needs to be achieved. It could involve improving data quality, enhancing system performance, or optimizing business processes.

Performance Improvement: Providing a benchmark for measuring progress and success. By defining the desired state, analysts can identify the gaps between the current state and the desired state, and develop strategies to bridge those gaps.

Strategic Alignment: The desired state aligns with broader organizational goals and strategies. It ensures that data analysis efforts are focused on outcomes that contribute to the overall mission and vision of the organization.

Innovation and Adaptation: The desired state often incorporates innovative approaches or the adoption of new technologies. It encourages continuous improvement and adaptation to changing market conditions or technological advancements.

Stakeholder Expectations: The desired state reflects the expectations and needs of stakeholders. It ensures that data analysis efforts are aligned with the priorities and requirements of key decision-makers.

The desired state in data analysis is a critical component that drives the direction and focus of analytical efforts. It provides a clear target for improvement initiatives, aligns with strategic goals, and ensures that data-driven actions are purposeful and impactful. By defining and working towards the desired state, organizations can leverage data analysis to achieve significant improvements and stay competitive in their respective fields.

CHAPTER II

LITERATURE REVIEW

This study aims to apply the relevant theories of education and educational administration to explore strategies for developing teachers' digital teaching competency in Fujian higher vocational colleges. The research mainly uses the library of Fujian Information Vocational and Technical College, the local library of Fuzhou City, the library of Mahasarakham University, as well as internet resources such as eric.ed.gov, www.cnki.net, and www.wanfangdata.com. Search for internet resources, academic journals, theses, related books, and other sources of information recognized as relevant to the research field.

This Chapter includes:

Related Concepts

1. Digital Teaching Competency
2. Digital Teachers
3. Strategy and strategy Development
4. Vocational Colleges
5. Higher Vocational Colleges
6. Digital Teaching Competency of Higher Vocational College Teachers

Research Review of Teachers' Digital Teaching Competency

1. Main Viewpoints of Teachers' Digital Teaching Competency
2. The Main Components and Indicators of Teachers' Digital Teaching Competency

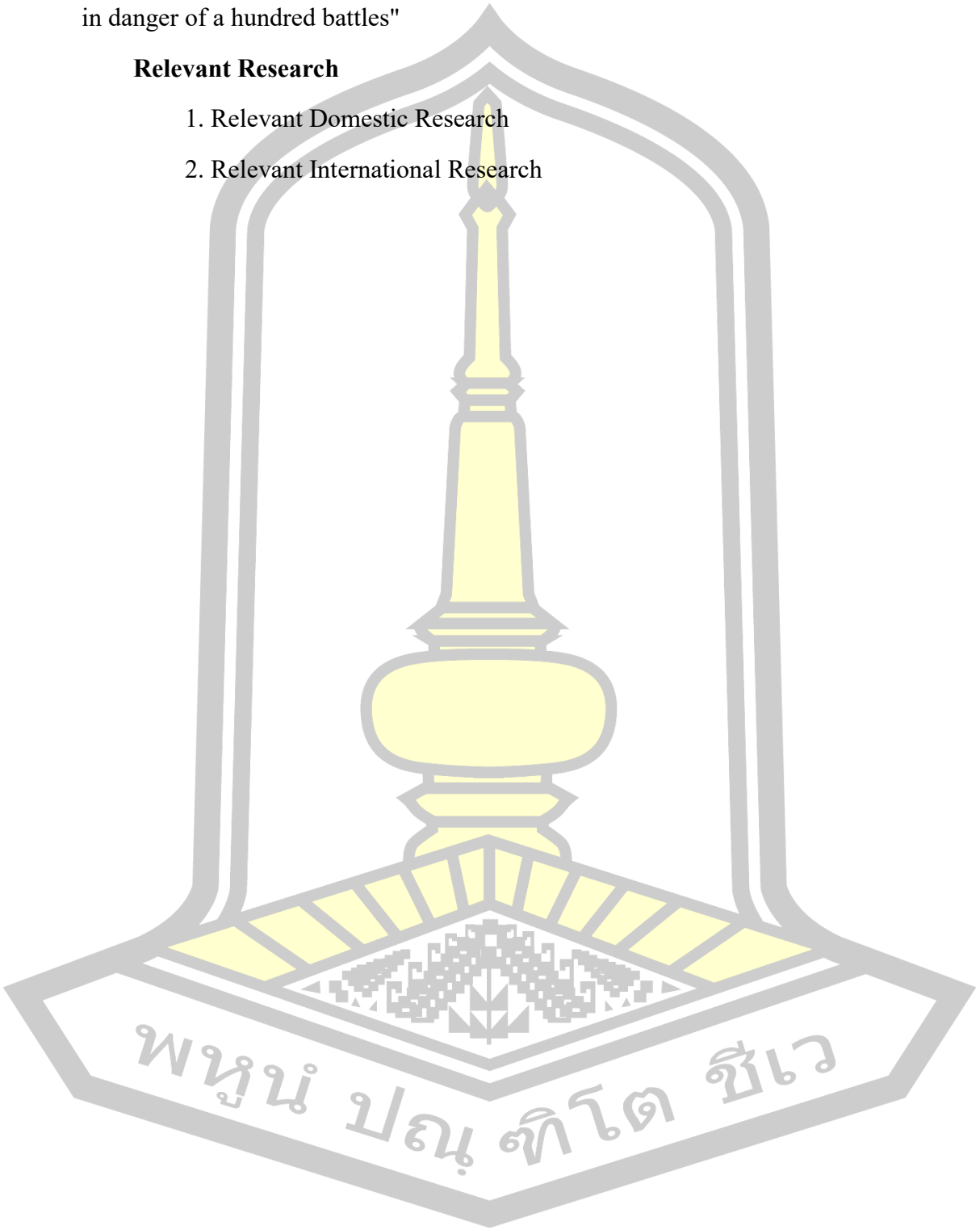
Relevant Theories

1. Education Management Theory
2. System Science Theory
3. Teacher Professional Development Theory

4. Sun Tzu's Art of War: "Know yourself and the enemy, and you will not be in danger of a hundred battles"

Relevant Research

1. Relevant Domestic Research
2. Relevant International Research



Related Concepts

1. Digital Teaching Competency

"Digital Teaching Competency" refers to the competency of teachers to effectively design and implement teaching activities using digital technology and information and communication technologies such as the Internet in the context of educational digitization, in order to improve teaching effectiveness and learning outcomes (Bryson, 2011). It covers the proficient use of digital tools and technologies by teachers, the effective utilization of digital teaching resources and platforms, and the flexible application of digital teaching design and strategies (Smith, 2022).

The concept of Digital Teaching Competency encompasses a broad spectrum of abilities. It includes a solid grasp of digital literacy, allowing educators to navigate and leverage various digital platforms and tools (Davis, 2022). Moreover, it involves the capacity to critically evaluate and select appropriate digital resources that align with educational objectives. Educators with this competency are adept at designing and implementing digital learning experiences that cater to diverse learner needs, promoting interactive and personalized learning (Clark, 2022).

Furthermore, Digital Teaching Competency extends to the ability to assess and enhance the efficacy of digital teaching strategies. It implies a commitment to continuous professional development, ensuring that educators stay abreast of emerging technologies and pedagogical trends (Davis, 2022). This competency is also underpinned by ethical considerations, emphasizing the responsible use of technology in education, including data privacy and digital citizenship. In essence, Digital Teaching Competency empowers educators to cultivate a dynamic, inclusive, and future-ready classroom.

2. Digital Teachers

"Digital teachers" refers to teachers who can effectively use digital technology and information and communication technologies such as the Internet in the teaching process, design and implement digital teaching activities, and improve

teaching effectiveness and learning outcomes (Kim, 2020). Digital teachers are not only familiar with and master the use of digital tools and technologies, but also have the competency to design, guide, and evaluate digital teaching (White, 2022).

The concept of a Digital Teacher involves a deep understanding of both educational technology and pedagogical strategies (Martinez, 2020). They are capable of selecting and utilizing digital resources that complement and enrich the curriculum. Digital Teachers create digital learning environments that cater to diverse learning styles, enabling students to engage with content in new and meaningful ways. They also employ digital platforms for assessment, feedback, and communication, fostering a more inclusive and participatory educational atmosphere (Moore, 2023).

Moreover, Digital Teachers are committed to ongoing learning and professional growth. They stay informed about the latest advancements in educational technology and are open to experimenting with innovative teaching methods. This commitment ensures that their teaching practices remain relevant and effective in the rapidly evolving digital landscape (Zhang, 2021). Digital Teachers also emphasize ethical considerations in technology use, promoting digital citizenship and responsible online behavior among students. Overall, being a Digital Teacher signifies a proactive approach to leveraging technology for educational excellence.

3. Strategy and Strategy Development

3.1 Definition of Strategy

Strategy refers to a structured approach used by an organization to achieve goals and address complex challenges (Selwyn, 2011). A strategy is a comprehensive plan designed to achieve specific objectives by utilizing resources effectively and addressing both opportunities and challenges in the environment. According to Mintzberg (1987), strategy can be understood as a plan, a pattern, a position, and a perspective. In the field of education, strategy plays a crucial role in improving teaching methods, adapting to technological advancements, and achieving institutional goals. With the support of academic literature and relevant theories, this chapter delves into

the concept of strategy, the process of strategic development, and its relevance in improving digital teaching competency (Zhang, 2021).

Corporate governance and strategic management are about setting and implementing major objectives and projects on behalf of an organization's shareholders or owners (Thompson, 2022). Typically, this process begins with an assessment of available resources, an industry analysis to evaluate the competitive environment in which the company operates, and an internal operational assessment. Based on this overall evaluation, a strategy to achieve the desired goals is then created. The implementation of a strategy is designed to guide and align the company with its main objectives (Xiao, 2002).

Institute for Manufacturing, University of Cambridge (2016) referred to Mintzberg's 5 Ps for Strategy as follows:

Plan: A strategy is a plan - some conscious course of action, a guideline (or set of guidelines) for dealing with a situation.

Ploy: As a plan, a strategy can also be a ploy, really just a specific strategy designed to outsmart an opponent or competitor.

Pattern: If strategies can be designed (either as general plans or specific strategies), they can also be implemented. In other words, defining strategy as planning is not enough; They also need a definition that includes the ultimate behavior: a strategy is a pattern—specifically, a pattern in a series of actions.

Position: Strategy is a kind of location - specifically, a way to position an organization in a certain environment.

Perspective: Strategy is a perspective - its content includes not only a chosen position, but also an ingrained way of perceiving the world.

Strategy Network, INC. (2020) defined strategy as everything required to reach the best results.

In terms of Kang, L & Zhang, Y (2012), the process of strategic management can be divided into strategy analysis, strategy formulation and selection, strategy

implementation, and strategy control. Due to the unpredictability of environmental changes, there is no perfect strategy in real life, and good strategies are formulated in the process of control and adjustment while implementing (Kang & Zhang, 2012).

(1) Strategic analysis

Strategic analysis includes enterprise external environment analysis and internal condition analysis.

The purpose of external environment analysis is to find the strategic opportunities and threats that may affect the realization of the enterprise mission in the external environment of the enterprise, including the analysis of the macro environment and the industry and competitive environment.

The purpose of internal condition analysis is to help enterprises determine their strengths and weaknesses, so that they can exploit their strengths and avoid weaknesses when formulating strategies.

(2) Strategy formulation and selection

Strategy formulation and selection mainly carry out the formulation, evaluation, and selection of strategic alternatives.

Formulation of alternative plans: Based on an analysis of the company's vision and mission, external environment, and internal conditions, the company will draw up multiple alternatives.

Evaluate alternatives: The resources a business has are limited, and among the strategic alternatives available to it, the maker of the business strategy should understand the strengths and limitations of each strategic option, and then rank these options based on the combined judgment of the participating makers.

Choose the options. When considering the possible benefits of a strategic option, you also analyze its risks, determine where the strategy is not applicable, and consider how much the overall strategic option would be affected if something unexpected were to occur, and what adjustments or alternatives would need to be made.

(3) Strategy implementation

Strategy implementation is the process of transforming strategic plans into practical actions and achieving results. In this process, enterprises set annual targets, allocate resources, establish effective organizational structure, and implement effective leadership by dissolving strategic objectives.

Corporate governance structure: Corporate governance structure is mainly to solve the agency problem under the condition of ownership and management rights analysis.

Organizational structure: When the new strategy is implemented, it is generally necessary to design and adjust the organizational structure, so that the organizational structure and the strategy can adapt and match each other.

Resource allocation: The resources of the enterprise are limited, how to allocate the resources among different levels and departments is a key issue in the implementation of the strategy.

Leadership: A successful strategy cannot be achieved without the support and understanding of the top leadership of the enterprise.

Corporate culture: In addition to motivating employees in material aspects, managers of enterprises also need to establish an organizational culture that matches the strategy and form a good working atmosphere within the organization.

(4) Strategic control

As the internal and external environment of the enterprise is constantly changing, in most cases, the enterprise will find that the results of the implementation of the strategy are inconsistent with the expected strategic objectives. Strategic control is to compare the actual results of the feedback with the expected strategic objectives. If there is an obvious deviation, it is necessary to take effective measures to correct it to ensure the ultimate realization of the strategic objectives of the organization.

As the process of strategic management is a dynamic development process, the purpose of strategic change is to obtain or maintain competitive advantages. When the dynamic balance between the external environment and the internal conditions of

the enterprise is happening or will change, the strategic connotation of the enterprise's business scope, core resources, and business network is redefined. Through strategic change, the enterprise can flexibly adapt to the changing environment, so as to maintain or improve its position in the market competition.

Ottawa University (2020) presentation on the strategic components, as follows:

Vision: Setting the high-level direction of the organization, namely the vision, mission, and underlying company value, is the primary purpose of the vision component.

Objective setting: Develop the aspects of the vision created and translate them into a series of high-level goals for the company, typically spanning 3-5 years, which is the basis for goal setting.

Resource allocation: This component of corporate strategy refers to the decision to allocate human and capital resources most efficiently within the context of established goals and objectives.

Prioritization or strategic tradeoffs: Prioritizing - or identifying strategic tradeoffs - is one of the most challenging aspects at the core of a company's strategy.

In addition, Hofstrand (2016) says that vision and mission statements consist of a series of steps or statements about how to give direction to your organization. The first is a statement of vision. It provides an organization with a purpose. Next comes the mission statement. This is the guiding light on how to get there.

Vision: Outline what you want to achieve.

Mission: A general statement about how you will achieve your vision. The accompanying statement, often created along with the vision and mission, is a statement of core values.

Core Values: How you will behave in this process. Once you've identified what your organization wants to achieve (vision) and how to achieve the vision

(mission), the next step is to develop a series of statements on how to leverage the mission to achieve the vision:

Strategy: Strategy is one or more ways of using a mission statement to achieve a vision statement. Although an organization has only one vision statement and one mission statement, it may have several strategies.

Objectives: These are general statements of what needs to be done to implement the strategy.

Goals: Goals provide specific milestones and specific timelines for achieving goals.

Action Plans: These are specific implementation plans for how you will achieve your goals.

Strategy is characterized by:

Goal Alignment: Ensures all actions are directed toward achieving a defined objective.

Flexibility: Allows adaptation to changes in external and internal environments.

Resource Optimization: Maximizes the use of available resources efficiently.

Sustainability: Focuses on long-term impact and viability. In the educational context, strategies are vital for implementing innovative teaching methods, leveraging digital technologies, and ensuring institutional growth and development (Fulan, 2007).

3.2 Definition of strategy development

Strategy development refers to a set of action plans and methods developed to achieve an objective, that is, the best action plan selected and implemented in the context of specific objectives, conditions and resources. In the process of formulating education promotion strategies, people usually formulate a series of targeted strategies according to the actual situation and goals to achieve the final success (Selwyn, 2011).

Strategies development needs to consider a variety of factors, including internal and external environment, resources and Competency.

Steiner views Strategy development as a dynamic process for establishing business visions and objectives, ensuring their implementation aligns with the enterprise's external and internal conditions to achieve the vision. David describes it as an art and science of cross-functional decision-making that facilitates organizational goal achievement through strategy formulation, implementation, and evaluation. It's a Strategy mindset that applies Strategy thinking for problem analysis and solution, focusing on long-term, holistic management rather than a piecemeal approach (Fullan, 2007).

Considering diverse views, Strategy development can be categorized into broad and narrow senses. Broad Strategy development uses strategy to manage the entire enterprise, while narrow Strategy development, associated with Steiner, involves the management of strategy formulation, implementation, control, and amendment, currently holding a mainstream position. Narrow Strategy development includes:

(1) Major management decisions and actions determining long-term enterprise issues, encompassing strategy analysis, formulation, implementation, evaluation, and control.

(2) The activity of formulating and implementing long-term strategy.

(3) The management process by which an enterprise realizes its vision in relation to its environment.

Strategy development is characterized by:

(1) Totality: Serves as the blueprint for enterprise development, influencing all specific management activities.

(2) Long-term: Focuses on goals 3-5 years out or more, considering long-term overall enterprise development.

(3) Guidance: Determines the enterprise's development goals and the means to achieve them within a set period.

(4) Reality: Builds on existing subjective and objective conditions.

(5) Competition: Aims to secure competitive advantage.

(6) Risk: Involves risk due to environmental uncertainties.

(7) Innovation: Requires innovation to adapt to changing internal and external environments.

(8) Stability: Requires maintaining the strategy for a long period to facilitate implementation.

Strategy development must align with business management models, which should be practical and adaptable to Strategy requirements. It is also adapted to tactics, strategies, methods, and means, as effective implementation requires corresponding strength and skills.

3.3 Theories of Strategy Development

Several theoretical frameworks underpin strategy development. These include:

(1) Education Management Theory

This theory emphasizes systematic planning, resource allocation, and organizational leadership to meet educational goals. As per Bush (2011), it advocates a structured approach to strategy formulation and implementation.

(2) Systems Theory

Systems theory views institutions as interconnected systems where each component influences the whole. Strategy development involves analyzing these components to optimize institutional effectiveness and adaptability (von Bertalanffy, 1968).

(3) SWOT Analysis

SWOT analysis refers to a comprehensive consideration of various factors of the internal conditions and external environment of the enterprise, systematic evaluation, so as to choose the best business strategy method. SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis is a widely used framework for

understanding internal competency and external conditions. It guides strategic planning by identifying key factors influencing success (Gürel & Tat, 2017). S refers to internal Strengths, W to internal Weaknesses, O to Opportunities and T to Threats of the external environment of the enterprise.

The guiding ideology of SWOT analysis is to formulate strategies in line with the future development of the enterprise on the basis of comprehensively grasping the internal strengths and weaknesses of the enterprise and the opportunities and threats of the external environment, so as to give full play to the strengths, overcome the weaknesses, make use of opportunities and resolve the threats (Gürel & Tat, 2017). According to the mission and goal of the enterprise, the senior management of the enterprise analyzes the external environment of the enterprise through SWOT method to determine the existing opportunities and threats; evaluate their own internal conditions and identify the strengths and weaknesses of the enterprise. On this basis, the enterprise should formulate strategies to complete the mission and achieve the goal, that is, make strategic choices and implement strategic plans (Zhan, 2017).

1) Analysis of environmental factors

Analysis of environmental factors refers to the use of various investigation and research methods to analyze various environmental factors of the organization, namely external environmental factors and internal capability factors. External environmental factors include opportunity factors and threat factors. They are favorable and unfavorable factors that the external environment has a direct impact on the development of the organization (Gürel & Tat, 2017). They belong to objective factors and generally belong to different categories such as relatively macroeconomic, political and social factors. Internal environmental factors include strength factors and weakness factors, which are the positive and negative factors existing in the development of the organization itself. They belong to the active factors, and are generally classified as relatively micro such as management, operation, human resources and other different categories. When investigating and analyzing these factors, we should not only consider the history and

present situation, but also measure them from the perspective of future development (White, 2022).

More specifically, competitive strength (S) refers to a firm's ability to outperform its competitors, or something unique to a firm that enhances its competitiveness. For example, when two firms are in the same market or have the ability to provide products and services to the same customer group, if one firm has a higher profit rate or profit potential, then we believe that this firm has a competitive advantage over the other firm (Gürel & Tat, 2017). The competitive advantage can be the following aspects: 1. Technical skill advantage. Unique production technology, low-cost production method, leading innovation ability, strong technical strength, perfect quality control system, rich marketing experience, superior customer service, excellent large-scale procurement skills; 2. Tangible asset advantage. Advanced production lines, modern workshops and equipment, rich storage of natural resources, attractive real estate sites, sufficient funds, complete data and information; 3. Advantage of intangible assets. Excellent brand image, good business credit, positive corporate culture; 4. Advantages in human resources. Staff with expertise in key areas, motivated staff, strong organizational learning ability, rich experience; 5. Strong organizational system. High quality control system, perfect information management system, loyal customer base, strong financing ability; 6. Competitive advantage. Short product development cycle, strong dealer network, good partnership with suppliers, sensitive response to changes in the market environment, market share leadership (Gürel & Tat, 2017).

A competitive weakness (W) is something that a company lacks or does poorly, or a condition that puts the company at a disadvantage. Factors that may lead to an internal weakness include: lack of competitive skills; Lack of competitive tangible assets, intangible assets, human resources and organizational assets; And the loss of competitive ability in key areas.

Potential opportunities for the Company (O): Market opportunities are a major factor affecting the company's strategy. Managers should identify each

opportunity, evaluate the growth and profit prospects of each opportunity, and select the best opportunities that match the financial and organizational resources of the company and have the greatest potential to give the company a competitive advantage (Zhan, 2017).

Potential growth opportunities may be: expanding customer base trends or product segments; Transfer of skills and technology to new products and businesses to serve a larger customer base; Forward or backward integration; Lower barriers to market entry; The ability to acquire competitors; Strong growth in market demand for rapid expansion; And opportunities to expand into other geographic areas and gain market share (Thompson, 2022).

External threats to the Company (T): In the external environment of the company, there are always certain factors that pose a threat to the company's profitability and market position. Corporate managers should promptly identify threats to the future interests of the company, evaluate and take appropriate strategic actions to offset or mitigate their impact. External threats to the company may be the emergence of a powerful new competitor entering the market; Substitutes cannibalize the company's sales; The growth rate of major product markets declines; Adverse changes in exchange rates and foreign trade policies; Demographic characteristics and adverse changes in social consumption patterns; Improved bargaining power of customers or suppliers; Reduced market demand; Vulnerable to economic depressions and business cycles (White, 2022).

Due to the integrity of the enterprise and the extensive sources of competitive advantages, in the analysis of strengths and weaknesses, it is necessary to make a detailed comparison between the enterprise and its competitors in every link of the entire value chain (Selwyn, 2011). For example, whether the product is novel, whether the manufacturing process is complex, whether the sales channel is smooth, and whether the price is competitive. If the advantages of an enterprise in one or several aspects are the key success factors that enterprises in the industry should have, then the

comprehensive competitive advantage of the enterprise may be stronger. It should be pointed out that whether an enterprise and its products have a competitive advantage can only be measured from the perspective of existing potential users, rather than from the perspective of the enterprise.

In the process of maintaining competitive advantage, an enterprise must have a deep understanding of its own resources and capabilities and take appropriate measures. Because once an enterprise has a competitive advantage in a certain aspect, it is bound to attract the attention of competitors. Generally speaking, after a period of hard work, an enterprise builds up a certain competitive advantage. (Thompson, 2022). Then the firm is in a position to maintain this competitive advantage, and the competitors begin to react gradually. Then, if the competitor directly attacks the firm's advantage, or adopts other more forceful strategies, this advantage will be eroded. Therefore, enterprises should ensure the lasting competitive advantage of their resources. The operation of an enterprise is dynamic and always in constant contradiction. The environment of an enterprise is changing at any time (Zhan, 2017). These changes may be opportunities or threats to an enterprise. Generally speaking, a mature enterprise faces less market development opportunities, less environmental threats, and less development potential; Difficult enterprises are faced with greater environmental threats and few marketing opportunities; Ideal enterprises have more development opportunities and fewer environmental threats, but such enterprises rarely exist in reality; The opportunities and challenges of venture enterprises coexist, success and risk together, such enterprises should try to seize the opportunity at the same time, actively look for countermeasures to avoid threats (Selwyn, 2011).

2) Constructing SWOT matrix

It is not enough for enterprises to identify their own strengths and weaknesses and know what opportunities and threats the environment brings, they must respond quickly and make decisive decisions to them. Therefore, the SWOT matrix can be constructed by ranking the various factors obtained from the survey according to the

degree of priority or influence. In this process, those factors that have direct, important, large number, urgent and long-term influence on the development of the organization are prioritized, while those indirect, secondary, a little, not urgent and temporary influence factors are ranked behind (Gürel & Tat, 2017).

The process of constructing a SWOT matrix consists of the following steps: List the company's key external opportunities. List the threats facing the company List the key external aspects of the company List the key internal strengths of the company (White, 2022).. List the key internal weaknesses of the company. Match internal strengths with external opportunities and document the SO strategy. Match internal weaknesses with external opportunities and document the WO strategy. Match internal strengths with external threats and document the ST strategy. Match internal weaknesses to external threats and document the WT strategy. It is important to note that the purpose of using the SWOT matrix is to generate viable alternative strategies, not to select or determine the final strategy, and not all strategies in the SWOT matrix should be implemented (Gürel & Tat, 2017).

SWOT provides four strategies for enterprises to choose: SO strategy, WO strategy, ST strategy and WT strategy. (1) SO strategy. The advantage-opportunity strategy is a strategy that gives play to the internal advantages of an enterprise and takes advantage of external opportunities. The condition is that opportunities arise in the environment, and the company itself happens to have such advantages. This situation is the most ideal, and the company can adopt a bold growth strategy that takes full advantage of the environmental opportunities and internal strengths. (2) WO strategy. Vulnerability-opportunity strategy is a strategy that aims to make up for internal weaknesses by taking advantage of external opportunities. The condition is that there are opportunities in the environment, but the company is weak in this respect, the strength is not enough. This requires the firm to focus on changing its internal weaknesses and making effective use of market opportunities. (3) ST strategy. The advantage-threat strategy is to use the company's advantages to avoid or mitigate the

impact of external threats. The condition is that there are some threats in the environment, but the enterprise has an advantage in this respect. In response to this situation, companies can adopt two attitudes: one is to use their existing strengths to build long-term opportunities in other products or markets and implement a diversification or diversification strategy, which is the attitude usually adopted by companies with other growth opportunities. The other is to adopt an attitude of direct combat against environmental threats, which is usually only adopted when the advantages of the business are sufficient to overcome the environmental threats. (4) The WT strategy. The weakness-threat strategy is a defensive strategy designed to reduce internal weaknesses while avoiding external environmental threats. The condition is that there are some threats in the environment, and the company is also at a disadvantage in this regard, which is the least ideal situation. In this case, it is better for the company to adopt an exit strategy that reduces or changes the market for the product (Gürel & Tat, 2017).

(4) TPACK Framework

The Technological Pedagogical Content Knowledge (TPACK) framework integrates technology, pedagogy, and subject content. It highlights the importance of aligning these elements to enhance teaching and learning in digital contexts (Mishra & Koehler, 2006).

3.4 Components of Strategy

Strategy relies on key components that ensure relevance and feasibility:

(1) Vision and Goal Setting

Clearly defining the desired outcomes and aligning them with institutional missions is the cornerstone of strategic planning (Kaplan & Norton, 1996).

(2) Stakeholder Engagement

Involving educators, administrators, students, and policymakers ensures that strategies are relevant and gain broad support (Bryson, 2011).

(3) Resource Analysis

Assessing available resources, such as funding, technology, and human capital, determines what is feasible within the scope of the strategy (Barney, 1991).

(4) Policy Integration

Strategies must align with existing educational policies and frameworks to ensure compliance and consistency (Levin, 2001).

(5) Monitoring and Feedback Mechanisms

Continuous evaluation and feedback are crucial for measuring progress and making necessary adjustments (Eisenhardt & Martin, 2000).

3.5 Strategy Development for Digital Teaching Competency

In the digital age, strategy development is vital for equipping educators with the skills and tools needed to integrate technology effectively into teaching. Key considerations include:

(1) Professional Development Programs

Designing training that addresses educators' specific digital skill gaps fosters their ability to utilize technology effectively (Schrum & Levin, 2015).

(2) Technological Infrastructure

Ensuring access to updated digital tools, platforms, and resources supports seamless implementation of digital strategies (Selwyn, 2011).

(3) Incentives and Motivation

Recognizing and rewarding educators who embrace digital innovation encourages broader adoption of technology-driven methods (Ryan & Deci, 2000).

(4) Continuous Learning and Support

Establishing a culture of lifelong learning and providing ongoing technical and pedagogical support sustains long-term competency (Fullan, 2007).

3.6 The Development Process of Educational Strategy development

The historical evolution of educational Strategy development can be traced through several key phases that reflect broader changes in educational philosophy, policy, and practice:

(1) Early Development (20th Century)

Initial focus on institutional efficiency and standardization. Introduction of basic planning techniques to manage resources and set institutional priorities.

(2) Growth of Strategic Planning (Late 20th Century)

Expansion of strategic planning in response to increasing competition and demand for accountability. Emphasis on aligning educational goals with societal needs and economic development.

(3) Integration of Stakeholder Input (1980s-1990s)

Recognition of the importance of involving various stakeholders in the strategic planning process. Development of more participatory and inclusive approaches to Strategy development.

(4) Adoption of Business Practices (1990s-2000s)

Influence of business management strategies on educational institutions. Implementation of performance metrics and outcome-based assessments.

(5) Globalization and Internationalization (2000s-2010s)

Impact of globalization on educational strategies, emphasizing international standards and competitiveness. Focus on preparing students for a global workforce and fostering international collaboration.

(6) Technological Advancements (2000s-Present)

Integration of technology in strategic planning to enhance teaching, learning, and administration. Emphasis on digital literacy and the use of data analytics for decision-making.

(7) Shift Towards Outcomes-Based Education (2010s-Present)

Movement towards outcomes-based education models that prioritize student learning outcomes. Development of strategic frameworks that align with learning outcomes and employability.

(8) Sustainability and Social Responsibility (2010s-Present)

Increasing focus on the sustainability of educational practices and institutions. Incorporation of social responsibility and ethical considerations into Strategy development.

(9) Adaptation to COVID-19 Pandemic (2020s)

Rapid adaptation to remote and hybrid learning models in response to the pandemic. Strategic reassessment of physical infrastructure needs and investment in digital platforms.

(10) Future-Oriented Strategy development (Ongoing)

Anticipating future trends and challenges in education, such as artificial intelligence and lifelong learning. Development of Strategy development approaches that are agile, innovative, and adaptable to future changes.

Throughout its evolution, educational Strategy development has become more sophisticated, incorporating a wide range of perspectives and practices to meet the dynamic needs of educational institutions and their stakeholders.

3.7 The emergence and role of educational strategy

Educational strategy refers to a long-term and overall plan formulated by a country or region to improve the quality of education and promote the development of education, aiming at cultivating talents who meet the needs of national or regional development. Educational strategy is a macroscopic concept, which is an overall and long-term plan and countermeasure of education development in order to realize the general goal of social development according to the needs of society, economy, science and technology development as well as the conditions and possibilities of education development in a certain period. It involves the direction of education development, the allocation of educational resources, the reform of educational system and strategy, the construction of teachers and other aspects, aiming at improving the quality of education and training talents that meet the needs of national or regional development.

The emergence of educational strategy is a response to the complex and dynamic nature of the educational landscape. As societies have developed and

knowledge has expanded, the need for a systematic and strategic approach to education has become increasingly apparent. Educational strategies have emerged to provide a structured framework for managing and improving educational systems, ensuring that they remain relevant and effective in the face of changing societal needs and technological advancements.

The role of educational strategy is multifaceted and crucial to the advancement of education:

(1) Direction Setting

Educational strategies establish a clear vision and direction for educational institutions, defining what should be achieved and outlining the steps to get there. This provides a roadmap for educators, administrators, and policymakers to follow.

(2) Resource Allocation

Strategies guide the allocation of resources, ensuring that they are used efficiently and effectively to support educational goals. This includes budgeting for programs, staffing decisions, and the procurement of educational materials and technology.

(3) Policy Development

Educational strategies inform the development of policies that can shape the legal and regulatory frameworks within which educational activities occur. They help to create an environment that supports educational innovation and quality.

(4) Innovation Promotion

By encouraging the adoption of new technologies and methodologies, educational strategies foster innovation in teaching and learning. This can lead to more engaging and effective learning experiences for students.

(5) Quality Assurance

Strategies often include mechanisms for assessing and ensuring the quality of education, which is crucial for maintaining standards and ensuring that students receive a high-quality education.

(6) Equity and Inclusion

They can address issues of equity, ensuring that all students, regardless of their background, have access to quality education. This involves creating inclusive policies and practices that support diverse learner needs.

(7) Adaptation to Change

In a rapidly changing world, educational strategies help institutions adapt to new challenges and opportunities, such as the integration of digital technologies in the classroom and the need for new skills in the workforce.

(8) Stakeholder Engagement

Strategies involve various stakeholders, including students, teachers, parents, and the community, in the educational process, promoting a collaborative approach to education that values diverse perspectives and contributions.

In summary, educational strategy plays a pivotal role in shaping the future of education by providing a roadmap for achieving educational excellence and ensuring that educational systems remain relevant and effective in preparing individuals for the challenges. By adopting a systematic approach, institutions can address challenges, foster innovation, and ensure continuous improvement in teaching and learning. The principles discussed in this chapter provide a robust foundation for exploring strategies tailored to enhance digital teaching competency.

4. Vocational Colleges

"Vocational colleges" refers to higher vocational education institutions that provide vocational education and training. Their main goal is to cultivate and develop students' practical skills and professional qualities required in specific professional fields (Guo, 2023). The curriculum and teaching methods of vocational colleges focus on improving students' practical abilities, enabling them to quickly adapt to the work environment and be competent for corresponding professional positions after graduation. Unlike traditional undergraduate education, vocational colleges focus on cultivating students' practical application Competency and vocational skills. The main

goal of vocational colleges is to cultivate students to master the practical skills and knowledge required for specific professions (Clark, 2022). The curriculum of vocational colleges is closely integrated with the demands of the job market, providing professional courses related to various professions, such as engineering technology, medical nursing, hotel management, etc. These courses focus on practical teaching, including classroom practice, experimental training, and internships, to enable students to truly understand and apply the knowledge they have learned (Chen, 2020).

In terms of teaching methods, vocational colleges focus on practical teaching, making practical operations and laboratory training an important component of teaching. The curriculum is based on industry standards and vocational certification requirements, aiming to cultivate students with practical skills and professional knowledge required to work in specific fields. Internship and practical training are important components of vocational education. Through cooperation with enterprises, students can practice in a real professional environment and improve their practical skills (Zhang, 2021).

Vocational colleges also establish close cooperative relationships with enterprises, industry associations, etc., promote industry university research cooperation, strengthen forms of cooperation such as school enterprise cooperation, school local cooperation, and school community cooperation, to ensure that educational content is closely related to actual career needs. In addition, some vocational colleges actively participate in domestic and international vocational skills competitions, encouraging students to participate in various levels and types of vocational skills competitions and evaluation activities, and improving their comprehensive quality and competitiveness (Liu, 2020).

5. Higher Vocational Colleges

"Higher vocational colleges" refers to institutions that provide specialized vocational education and training at the tertiary level, focusing on equipping students with practical skills and knowledge for specific careers. In China, vocational colleges are divided into two levels: secondary vocational colleges and higher vocational

colleges. Secondary vocational colleges mainly cater to junior high school graduates and provide them with secondary vocational education and training (Zhang, 2021). The curriculum of these schools focuses on the cultivation of practical skills and professional qualities, mainly cultivating students to master certain vocational skills and possess the competency to engage in specific professions. The higher vocational colleges discussed in this article are mainly aimed at high school graduates and graduates from secondary vocational colleges, with a focus on providing higher vocational education services. Higher vocational colleges provide students with vocational education and training parallel to undergraduate education to meet the demand for high skilled talents in the job market. The curriculum of vocational colleges is similar to that of secondary vocational colleges, but focuses more on professional depth and career orientation, cultivating students' practical Competency and professional qualities in specific vocational fields. The academic system of vocational colleges is generally 3-4 years, and students graduate with a college degree or a vocational undergraduate degree (Liu, 2020).

The reason why this study chooses higher vocational college teachers as the research objectives is that higher vocational colleges, as one of the main providers of social employment, face unique challenges and needs in terms of Digital Teaching Competency for their teachers. The goal of higher vocational education is to cultivate students with practical skills and knowledge required for specific professions. Teachers in higher vocational colleges need to master Digital Teaching Competency that match industry needs in order to better cultivate students with modern professional qualities (Chen, 2020). Studying strategies to enhance the Digital Teaching Competency of teachers in higher vocational colleges can help better meet the needs of vocational education. Meanwhile, the rapid development of digital technology has put forward new requirements for the role of teachers. Teachers are no longer just transmitters of knowledge, but also need to play the roles of mentors, guides, and technology integrators. Teachers in higher vocational colleges play an important role in digital

teaching and need to master and apply advanced digital tools and educational technologies to improve teaching effectiveness. Studying the strategies for developing the Digital Teaching Competency of teachers in higher vocational colleges can help reveal the challenges and opportunities in the transformation of their roles, and provide guidance for the transformation of their roles.

6. Digital Teaching Competency of Higher Vocational College Teachers

"Digital Teaching Competency of Higher Vocational College Teachers" refers to the essential abilities and knowledge required for educators to effectively integrate digital technologies into their teaching practices, enhancing student learning outcomes in a technology-rich environment. In the digital age, the teaching philosophy, content, and methods of higher vocational education have undergone revolutionary changes. higher vocational teachers must follow the trend of the times and improve their information literacy. In 2018-2020, the Chinese Ministry of Education successively released important documents such as the Action Plan for the Development of higher vocational College Teachers (2018-2022), the National Medium - and Long Term Education Reform and Development Plan Outline, and the National higher vocational Education Reform Implementation Plan, which put forward new requirements for the development of higher vocational college teachers. This plan clearly points out that higher vocational college teachers need to actively recognize the changes in the connotation of higher vocational education in the digital era, and actively apply information technology to the teaching process, focusing on cultivating practical high skilled talents. The standard clearly states that information technology teaching Competency is an important component of the professional quality of higher vocational college teachers. The information technology teaching Competency of higher vocational college teachers is the transformation of their information technology teaching Competency in the specific context of higher vocational education. It is necessary to organically integrate the information technology teaching Competency of teachers with the professional characteristics of higher vocational education. Compared

with ordinary higher vocational education institutions, higher vocational colleges place more emphasis on cultivating students' professional attitudes, knowledge, and skills. Students need to master professional knowledge and strong practical skills, while teachers need to conduct two-way teaching of theory and practice. Only by effectively integrating information technology with teaching, practical training, management, evaluation and other teaching activities can the quality of higher vocational education be effectively improved (Guo, 2023). This article believes that the information technology teaching Competency of higher vocational college teachers refers to the competency to use information technology means in theoretical and practical teaching to carry out teaching activities in order to cultivate skilled talents.

Research Review of Teachers' Digital Teaching Competency

1. Main Viewpoints of Teachers' Digital Teaching Competency

By referring to relevant literature at home and abroad, experts and scholars have carried out a wealth of research on the development strategies of teachers' Digital Teaching Competency. Combined with the research content of this paper, the main representative views are shown in table 1:

Table 1 Main Viewpoints of Teachers' Digital Teaching Competency

Authors	Viewpoints
Hernandez, T. (2022)	Institutions must focus on Institutional construction to develop a robust Construction of digital teaching environment, which fosters Digital awareness and attitude among educators. By providing Professional Background development and Self-Efficacy support, schools can ensure the Development of digital teaching resources aligns with effective teaching and research services. This approach encourages continuous training and reflection, enabling teachers to adeptly navigate the complexities of information-based teaching.
Liu Sisi (2020)	The development of teachers' Digital Teaching Competency is influenced by an array of elements, notably Digital teaching

	application, Digital awareness and attitude, and the acquisition of Digital skills and training. The role of Institutional construction is also significant in providing a supportive framework for these competencies to flourish. Furthermore, teachers' Self-Efficacy and Digital knowledge are recognized as integral to the successful implementation of digital teaching practices.
Esteve Mon Francesc M. , Llopis Nebot Maria Angeles , Adell Segura Jordi (2020)	The progression of teachers' Digital Teaching Competency is shaped by several key factors, such as their Digital awareness and attitude, Professional Background, and the quality of Digital skills and training they receive. Additionally, the Institutional construction within their educational setting plays a crucial role in fostering an environment conducive to the effective Digital teaching application.
Hou Yi, Chu Hui , Huang Yanhong (2021)	The development of high school teachers' Digital Teaching Competency is influenced by a spectrum of factors, among which are Digital skills and training, Self-Efficacy, and the support from Institutional construction. Their Digital knowledge and Digital literacy are pivotal, as is the Infrastructure construction that underpins the digital learning environment. These elements collectively shape teachers' ability to integrate Digital teaching application into their practice effectively.
SánchezPrieto Jesús , TrujilloTorres Juan Manuel , GómezGarcía Melchor , GómezGarcía Gerardo (2021)	Research indicates that the advancement of Digital Teaching Competency among educators is shaped by multiple elements, such as Digital literacy, Digital teaching application, and the Digital skills and training they receive. The study underscores the role of Institutional construction in fostering a supportive Construction of digital teaching environment and the Development of digital teaching resources. Additionally, it recognizes the influence of Teaching age on competency growth, while also highlighting the significance of Self-Efficacy and the practical execution of Teaching Tasks within this digital context.

Long Ping, Chen Liping , Chen Hongtu (2022)	The development of teachers' digital Competency should encompass the development of Digital teaching application, fostering a positive Digital awareness and attitude, and addressing Teaching Tasks effectively. Consideration must also be given to Professional Background and Teaching age as they influence the integration and application of digital practices in the classroom.
Istiningsih(2022)	Schools are tasked with fostering an Institutional construction that supports Digital literacy and ICT integration, thereby establishing a teaching management evaluation system that values Digital awareness and attitude. This system should facilitate the execution of Teaching Tasks and provide ongoing Digital skills and training to develop teachers' competency in navigating the complexities of ICT-integrated classrooms.
Yuan Fang (2022)	The study identifies key factors influencing Digital Teaching Competency among university educators, such as Digital teaching application, Digital awareness and attitude, and the execution of Teaching Tasks. It also highlights the significance of Professional Background and the development of Digital skills and training. Strategies for improvement involve bolstering Self-Efficacy, strengthening Institutional construction, expanding Digital knowledge, and fostering ICT integration to advance teaching methodologies effectively.
Miguel Ángel García Delgado , Sonia Rodríguez Cano , Vanesa Delgado Benito , Cristina Di Giusto Valle (2023)	In the evolving educational landscape, it is imperative that teachers demonstrate Digital Teaching Competency across various stages, encompassing Digital teaching application, Digital awareness and attitude, and engagement in Teaching Tasks. Their proficiency should extend to Digital skills and training, bolstered by Institutional construction that supports the Construction of digital teaching environment. Additionally, teachers must excel in the Development of digital teaching resources, underpinned by a robust Digital knowledge base.

Wang Minshan(2023)	Evaluating teachers' Digital Teaching Competency within TPACK framework requires tools that assess Digital teaching application, Digital awareness and attitude, Digital skills and training, Self-Efficacy, and Digital knowledge. These evaluations should consider Infrastructure construction to support digital integration. The study examines how these factors contribute to the overall Digital Teaching Competency and explores differences among teachers at various teaching stages.

To sum up, many factors need to be taken into account in formulating a reasonable and feasible development strategies. Therefore, this study can be used for reference on this basis to better study and summarize the current situation, expected results, suggestions and other aspects of Digital Teaching Competency of teachers in vocational colleges in Fujian Province, so as to further study and use when designating development strategies

2. The Components and Indicators of Teachers' Digital Teaching Competency

From the research on developing teachers' Digital Teaching Competency , there are many components to consider, including Digital teaching application, digital awareness and attitude, teaching tasks, professional background, digital skills and training, self-efficacy, institutional construction, digital knowledge, teaching age, digital literacy, infrastructure construction, the construction of a digital teaching environment, the development of digital teaching resources, and ICT integration. The development of Digital Teaching Competency for teachers still needs to be combined with actual situations, and literature research results should be summarized. The main components of strategies for the development of Digital Teaching Competency for teachers by domestic and foreign scholars in recent years are shown in the table 2:

Table 2 Representative Views of The Main Components about Digital Teaching Competency

Authors / Component	Hernandez, T. (2022)	Liu Sisi(2020)	Esteve Mon Francesc M.(2020)	Hou Yi(2021)	Sánchez Prieto Jesús(2021)	Long Ping(2022)	Istiningsih (2022)	Yuan Fang(2022)	Miguel Ángel Garc á Delgado(2023)	Wang Min shan(2023)	Frequacy
Digital teaching application		√	√		√	√		√	√	√	7*
Digital awareness and attitude	√	√	√	√		√	√	√	√	√	9*
Teaching Tasks					√	√	√		√		4
Professional Background	√		√			√		√			4
Digital skills and training		√	√	√	√		√	√	√	√	8*
Self-Efficacy	√	√		√	√					√	5
Institutional construction	√	√	√	√	√		√		√		7*
Digital knowledge		√		√				√	√	√	5
Teaching age					√	√					2
Digital literacy				√	√		√				3
Infrastructure construction				√						√	2
Construction of digital teaching environment	√				√				√		3
Development of digital teaching resources	√				√				√		3
ICT integration							√	√			2

As can be seen from the statistical data in the above table, scholars generally believe that the development of Digital Teaching Competency needs to be implemented at the level of school education and teaching. There are 4 components about development of teachers' digital teaching competency: 1) Digital awareness and attitude, 2) Digital skills and training, 3) Institutional construction, 4) Digital teaching

application. These statistics have laid the foundation for the subsequent research of this paper.

Then, by studying the viewpoints of scholars in literatures, it can be found that each component contains many factors that can affect them. By summarizing these factors, the corresponding indicators for each component have been extracted.

2.1 Digital awareness and attitude

Hernandez, T. (2022) mentioned that teachers should have a positive digital awareness, recognize the importance of digital teaching for the learning effectiveness and future competitiveness of students, and actively learn and apply digital technology.

Liu Sisi (2020) mentioned that teachers should have an open attitude, be willing to accept and try new digital teaching tools and methods, actively interact and cooperate with students, and promote personalized and interactive learning.

Esteve Mon Francesc M. (2020) mentioned that teachers' digital awareness should include information literacy, the ability to effectively search, screen, and apply various digital educational resources, and organically integrate them into classroom teaching, providing richer learning resources.

Hou Yi (2021) mentioned that teachers should have a sense of responsibility and self-discipline, be able to arrange time and resources reasonably, ensure the efficient implementation of digital teaching, and be responsible for the learning outcomes of students.

Long Ping (2022) mentioned that teachers should have the ability to reflect, timely summarize and adjust the shortcomings in the digital teaching process, continuously improve and develop themselves, and adapt to the continuous changes in technology.

Istiningsih (2022) mentioned that teachers should have a sense of teamwork, communicate and cooperate with other teachers and experts, jointly research and explore the best practices of digital teaching, and jointly improve the quality of teaching.

Yuan Fang (2022) mentioned that teachers should have authority and professionalism, be able to effectively guide students to use digital tools and resources correctly, and prevent negative impacts caused by digital teaching.

Miguel Á ngel Garc í a Delgado (2023) mentioned that teachers should love the education industry, pay attention to individual differences and developmental needs of students, and focus on cultivating students' innovative thinking and problem-solving abilities in digital teaching.

Wang Min Shan (2023) mentioned that teachers should have a continuous learning attitude, pay attention to the latest developments and cutting-edge research results in educational technology, constantly update their knowledge and skills, and improve their digital teaching competency.

Summary up, “Digital awareness and attitude” includes 3 indicators: 1) Cognitive of Development, 2) Confidence of Development, 3) Positive Attitudes. They mean people's cognition, understanding, and attitude towards digital technology and the digital world.

2.2 Digital skills and training

Liu Sisi (2020) mentioned that teachers should receive relevant digital skills training, learn to master various digital tools and software operation skills, and improve their digital teaching competency.

Esteve Mon Francesc M. (2020) mentioned that teachers should also actively participate in various seminars and training courses related to digital education, learn from each other and exchange experience with other teachers, and broaden their vision of digital teaching.

Hou Yi (2021) mentioned that teachers need to constantly update their digital skills because of the rapid development of science and technology and the emergence of new digital tools and applications, and teachers need to keep abreast of The Times.

SánchezPrieto Jesús (2021) discussed that schools should provide comprehensive digital skills training programs, including theoretical learning and

practical operation, to help teachers quickly master the skills and knowledge needed for digital teaching.

Istiningsih (2022) mentioned that schools can also introduce specialized digital technology teams to provide technical support and guidance to teachers and solve technical problems and difficulties encountered in digital teaching.

Yuan Fang (2022) mentioned that teachers can actively participate in the courses of online learning platforms, learn more in-depth knowledge in the field of digital teaching, and obtain corresponding certificates and recognition.

Miguel Angel Garcia Delgado (2023) concluded that schools can set up digital skills certification assessment to encourage and reward teachers who have a certain level, and stimulate their motivation to learn and improve digital teaching competency.

Wang Min shan(2023) argued that teachers' digital skills training should focus on practical operation and case sharing, so as to help teachers truly understand the core points and application methods of digital teaching and realize the integration of knowledge and action.

Summary up, “Digital skills and training” includes 5 indicators: 1) Using Digital Teaching Tools, 2) Building Digital Course Resources, 3) Digital Teaching Achievement Display, 4) Training System Construction, 5) Teacher Participation Training. The purpose of them is to help individuals acquire the skills and abilities they need in a digital environment, enhance their competitiveness and adaptability. Through training in digital skills, individuals can better utilize digital technology for work, learning, creation, and socializing, process information more efficiently, solve problems, and acquire the necessary knowledge.

2.3 Institutional construction

Hernandez, T. (2022) believes that schools need to formulate clear digital teaching policies and clarify the roles and goals of teachers in digital teaching, so as to provide guidance and support for teachers.

Liu Sisi(2020) discussed that schools should establish a sound digital teaching and training strategy, including providing professional training, seminars and tutor guidance, in order to improve teachers' digital teaching skills and knowledge.

Esteve Mon Francesc M. (2020) mentioned that school management should establish a digital teaching quality evaluation strategy to help teachers find problems and improve teaching strategies through regular evaluation and feedback, so as to improve the effectiveness of digital teaching.

Hou Yi (2021) mentioned that school management should set up a digital teaching evaluation strategy to evaluate teachers' digital teaching competency, so as to promote teachers' growth and progress.

SánchezPrieto Jesús (2021) summarized that schools should establish policies and guidance documents for the development of digital teaching, and clarify the goals and requirements of teachers in digital teaching

Istiningsih(2022) discussed that schools should formulate incentive policies to encourage teachers' innovation and excellence in digital teaching and create a good incentive strategy.

Yuan Fang (2022) believes that the school management should establish a professional digital teaching team to provide teaching support, technical consultation and teaching research guidance to ensure the smooth operation of digital teaching.

Miguel Angel Garcia Delgado (2023) mentioned that schools should also strengthen cooperation with higher vocational education departments, enterprises and social resources to jointly promote the innovation and development of digital teaching systems and provide teachers with a broader space for development.

Summary up, “Institutional construction” includes 3 indicators: 1) Fund Input, 2) Incentive Strategy, 3) Evaluation System. They mean the process of establishing an organized, systematic, and binding governance and regulatory system that adapts to the development and characteristics of universities through the formulation, improvement,

and implementation of a series of rules and regulations, management methods, and operational strategies in the field of higher vocational education.

2.4 Digital teaching application

Liu Sisi (2020) mentioned that teachers' rich Digital teaching application is an important basis for digital teaching competency. By accumulating experience, teachers can better apply digital tools and platforms to improve teaching effect and learning experience.

Esteve Mon Francesc M. (2020) discussed that teachers' Digital teaching application can help them more accurately evaluate and select resources and tools suitable for digital teaching, provide diversified learning content and ways, and meet students' learning needs.

SánchezPrieto Jesús (2021) discussed that the Digital teaching application of teachers also includes the ability to respond to changes in the face of problems, and experienced teachers can quickly respond to challenges in digital teaching.

Long Ping (2022) suggested that teachers could use their own Digital teaching application to provide inspiring and innovative digital teaching cases to stimulate students' learning interest and motivation.

Yuan Fang (2022) mentioned that teachers' Digital teaching application can provide valuable cases and practical experience, which can provide reference and inspiration for other teachers in digital teaching and promote common progress.

Miguel Angel Garcia Delgado (2023) mentioned that experienced teachers can better solve the problems and challenges in digital teaching, and are good at dealing with technical failures, feedback from students and other situations to ensure the effect of digital teaching.

Wang Min shan (2023) concluded that teachers should continuously improve digital teaching practice, innovate teaching methods, and enhance the effectiveness and attractiveness of digital teaching through the accumulation and refining of Digital teaching application.

Summary up, “Digital teaching application” includes 3 indicators: 1) Digital Teaching Practice, 2) Teaching Maturity, 3) Teaching Innovation and Practical Experience. They are gradually accumulated through the continuous learning, reflection, and improvement of teachers themselves. Through experimentation, practice, and reflection in the classroom, teachers continuously improve teaching methods and strategies to enhance teaching effectiveness and student learning outcomes.

To sum up, there are 14 indicators of teachers' digital teaching competency. The correspondence between components and indicators is shown in Table 3.

Table 3 Components and Indicators of Teachers' Digital Teaching Competency

Components	**Indicators**
Digital awareness and attitude	1.1 Cognitive of Development
	1.2 Confidence of Development
	1.3 Positive Attitudes
Digital skills and training	2.1 Using Digital Teaching Tools
	2.2 Building Digital Course Resources
	2.3 Digital Teaching Achievement Display
	2.4 Training System Construction
	2.5 Teacher Participation Training
Institutional construction	3.1 Fund Input
	3.2 Incentive Strategy
	3.3 Evaluation System
Digital teaching application	4.1 Digital Teaching Practice
	4.2 Teaching Maturity
	4.3 Teaching Innovation and Practical Experience

Improving the Digital Teaching Competency of teachers in the education management and development of higher vocational colleges in Fujian Province can play an important role in achieving high-quality development of vocational education. By

comprehensively utilizing various educational strategies, we aim to enhance the Digital Teaching Competency of teachers in higher vocational colleges in Fujian Province, and continuously promote the transformation of teaching methods and self-innovation of teachers in the digital era. When implementing these strategies, higher vocational colleges in Fujian may also face various challenges, such as the attitude of teachers towards new teaching methods, the initiative of teachers themselves and lack of Digital teaching application. To overcome these problems, strong administrative support, Institutional construction, and teacher training are all crucial. It is also possible to encounter problems such as insufficient teaching fees. In order to address these challenges and obtain effective strategies for developing Digital Teaching Competency, further research and discussion are needed.

Relevant Theories

1. Education Management Theory

In order to promote the construction of the national culture inheritance strategy, the education strategies formulated involves the internal and external linkage and coordination. It is necessary to give full play to the leading role of people, fully mobilize the initiative, enthusiasm and creativity of subjects and objectives in the process of activities, realize the effective inheritance of culture, and realize the self-realization of all individuals in the chain of inheritance strategy. In this sense, the construction of the national culture inheritance strategy in local colleges and universities is a process of implementing educational management activities, and it is necessary to think about the system construction from the perspective of management development. This paper draws on the attention of educational management theory to "man", and the theory of "cultural man hypothesis" shows the rich connotation of the management wisdom of "cultural man". The author believes that the core of educational strategies system is "human", as decision-makers, implementers, recipients and implementers, human behavior plays an important role in the breadth, depth and

strength of national cultural inheritance. The issue of "people" is also considered by Chinese educator Ye LAN as the core issue of the development of educational scientific management (Ye LAN, 2008), and "people" is the key object of educational management. From the perspective of "people", this paper considers the problems existing in the process of ethnic culture inheritance in the current education management of local colleges and universities in Yunnan Province, in order to pay attention to the important position of "people" in the construction of ethnic culture inheritance strategy and the corresponding solutions, so as to determine the corresponding educational strategies (Zhan, 2017).

2. System Science Theory

System science refers to the scientific method to explore the mode, principle and basic law of the system of things. It is developed on the basis of system science, information theory and control science (Adds aodelaisi inc, 2014). It is not only a new scientific research methodology, but also a scientific methodology to understand and change the world in the information age, and is applied to various industries and disciplines in society. The ideas and methods of system science have a universal and important influence on the emergence and development of modern educational technology, and have become an important theory of modern educational technology. The method of information system is formed when people use the concept and method of system science to study and solve all kinds of complicated practical problems of information system. (Yin et al., 2018) Systematic method refers to a scientific way to systematically place the research objectives in the form of a complex system for observation according to the laws of events themselves. It focuses on the overall analysis of complex systems, explores the laws of the system from the various basic elements constituting the system and their interrelationships and functions, and then puts forward general steps, procedures and methods to deal with the questions of complex systems. System theory enables people to think about the process and problems of education and teaching from the whole point of view and comprehensive

point of view, and to deal with the problems of education and teaching in a systematic way. (Xian-ping Wang., 2006)

3. Teacher Professional Development Theory

The profession of teacher is one of the oldest in human society. France is the first country in the world to have teacher education, and it is also the first country to professionalize and institutionalize the profession of teacher. In the 1960s and 1970s, UNESCO and labor agencies of various countries redefined the professionalism of college teachers and pointed out that college teachers are a position that must be strictly trained to maintain their professional knowledge and competency. However, subject professional development is different from the "functional specialization of college teachers", which is defined from the perspective of higher vocational education and refers to the personal professional improvement of college teachers themselves. As for the theory of teacher professional development, there are three mainstream viewpoints in the academic circle. First, researchers represented by Hoyle argue that teacher professional development is an important process for the growth of college teachers. This "process theory" ignores the basic process and motivation of teacher professional development, and cannot fully reflect the whole process of teacher professional development. Second, typical researchers such as Little put forward that teacher professional growth is an important process to promote teacher professional development, but this "action theory" does not reflect the importance of teacher professional knowledge development and the improvement of teachers' own disciplinary professional knowledge and skills, and thus does not fully reflect the important process of teacher professional growth. Third, Wyedean and other typical researchers proposed that the process of teacher professional growth is the combination of the state of teacher professional development and the dynamic factors that promote teacher professional development, so as to fully reflect the process of teacher professional development (Wang, 2006).

4. Sun Tzu's Art of War: "Know yourself and the enemy, and you will not be in danger of a hundred battles"

Many ideas or works of ancient Chinese sages can play a good guiding role in the educational strategies we need to explore. For example, Sun Tzu's Art of war, which we are familiar with, has a certain connection with educational strategies. In terms of goal orientation, Sun Tzu's Art of war emphasizes clear war goals and strategic goals, and educational strategies should also have clear educational goals and development goals. When formulating educational strategies, it is necessary to consider the comprehensive quality and competency of the objectives and how to achieve the long-term goal of educational strategies. Sun Tzu mentioned in the Art of war, "Know yourself and your enemy, you will not be in danger of a hundred battles", Sun Tzu's art of war emphasizes understanding the enemy's situation and characteristics, and formulating corresponding strategies according to the situation. Education strategies should also be based on individual differences, characteristics and needs, to develop personalized training plans and education programs, so as to better meet the needs of strategic objectives; The Art of War of Sun Tzu embodies the flexibility of the use of strategies and emphasizes the importance of change and flexibility. The educational strategies also need to be adjusted and reformed constantly according to the actual situation. Educators should have the flexibility and adaptcompetency to adjust educational strategies and approaches in a timely manner based on student feedback and changing educational environments.

On the whole, Sun Tzu put forward a variety of principles and strategies of the art of war, emphasizing the comprehensive application of principles and strategies, such as "attack its unprepared, surprise it", "avoid its edge, attack its weakness" and so on. Education strategies also needs to be based on the specific situation, a combination of different methods to achieve the best way to achieve education goals. Despite the many links between education strategies and Sun Tzu's Art of War, it is also important to note that education is a peaceful enterprise whose purpose is to train talents,

disseminate knowledge and train talents needed for the development of society. By contrast, Sun Tzu's art of war deals with war strategies, with the goal of defeating the enemy. In the application of education strategies, it is necessary to take peace, justice and humanization as the core principles, pay attention to the cultivation of students' comprehensive quality and personality development, and promote the improvement of teachers' all-round competency. Therefore, it is crucial to understand the concept and characteristics of education strategies, because it is not only the goal of this study, but also provides a blueprint for the improvement of Digital Teaching Competency of teachers in Fujian higher vocational colleges.

Relevant Research

1. Relevant Domestic Research

Zhan, Y. F. (2017) studied the factors affecting the informatization teaching competency of higher vocational teachers, aiming at identifying factors influencing higher vocational teachers' informatization teaching competency, assessing current capabilities and proposing strategies for improvement to enhance their integration of information technology in teaching. The sample was 300 teachers from higher vocational colleges in Jiangxi Province, focusing on teachers who participate in information technology teaching. The research tool was a questionnaire designed to assess the awareness, attitude, knowledge, skills, and implementation status of informatization teaching competency among the participants, as well as to gather insights on the improvement strategies from the perspectives of national policy, school environment, and personal practice. The research results are: 1) Key Factors Identified: Research pinpointed digital awareness, professional background, and digital skills training as primary influences on informatization teaching competency, 2) Institutional Support: Highlighted the necessity of robust institutional support and infrastructure to nurture digital teaching skills, 3) Self-Efficacy: Emphasized the impact of teachers' self-efficacy on their confidence in using information technology in education, 4)

Recommendations: Suggested targeted professional development and digital literacy initiatives to improve teachers' competency.

Wang Minshan (2023) studied the evaluation of teachers' Digital teaching competency based on TPACK, aiming at identifying key components of digital teaching competency and developing an evaluation framework. The sample was comprised of 120 teachers from various educational institutions, focusing on those involved in foreign language education. The research tool was an evaluation instrument based on the TPACK model, designed to assess teachers' proficiency in integrating technology into their teaching. The research results are: 1) Evaluation Criteria Developed: The study formulated specific criteria for assessing digital teaching competency within the TPACK framework, 2) Integration of TPACK: Highlighted the significance of integrating technological, pedagogical, and content knowledge in evaluating teaching competency, 3) Teacher Competency Assessment: Revealed insights into the current competency levels of teachers in digital teaching, 4) Recommendations for Enhancement: Suggested targeted strategies to improve digital teaching competency, such as specialized training programs and continuous professional development.

Hou Yi, Chu Hui, and Huang Yanhong (2021) studied the influencing factors and improving paths of teachers' Digital teaching competency in double-high schools, aiming to analyze the determinants and potential strategies for enhancing digital teaching proficiency among educators in these institutions. The sample was 150 teachers from various double-high schools, focusing on those teaching in both vocational and academic tracks. The research tool was a survey instrument that assessed teachers' digital awareness, skills, training, self-efficacy, design and implementation competencies, and other related factors. The research results are: 1) Key Factors Identified: The study found that digital awareness and attitude, professional background, digital skills and training, and self-efficacy significantly influence digital teaching competency. 2) Impact of Experience: Highlighted the role of teachers' experience with digital teaching and their ability to design and implement digital strategies in the

classroom. 3) Recommendations for Improvement: Proposed targeted professional development programs and policy support to enhance digital teaching competency among teachers in double-high schools.

Yuan Fang (2022) studied the influencing factors and improving strategies of Digital Teaching competency of university teachers, aiming at analyzing the factors affecting Digital Teaching Competency and to propose strategies for enhancement. The sample was 100 university teachers from S University, who were actively engaged in digital teaching practices. The research tool was a combination of surveys and interviews to gauge the impact of various factors on digital teaching competency. The research results are: 1) Key Influencing Factors: The study revealed that digital awareness, technical skills, and institutional support significantly affect digital teaching competency. 2) Proposed Improvement Strategies: It suggested that enhancing digital literacy programs, providing more training opportunities, and fostering a supportive educational environment could improve teachers' digital teaching skills. 3) Policy and Practice Alignment: Highlighted the need for aligning university policies with practical teaching needs to further develop digital teaching competency among faculty.

Long Ping, Chen Liping, & Chen Hongtu (2022) studied the exploration of digital transformation paths for teachers' Teaching competency in Higher vocational colleges, aiming at identifying the key transformational strategies and pathways for enhancing digital Teaching competency among vocational college educators. The sample was 120 teachers from various higher vocational colleges, focusing on those involved in digital teaching practices. The research tool was a comprehensive survey that assessed teachers' digital literacy, transformational readiness, and the institutional environment supporting digital competency development. The research results are: 1) Institutional Environment: Highlighted the importance of a supportive institutional environment that encourages and facilitates digital competency development. 2) Faculty Development: Emphasized the need for continuous professional development to enhance teachers' digital skills and integrate them into teaching. 3) Integration of

Digital Tools: Suggested that the effective integration of digital tools in the curriculum is essential for improving digital Teaching competency.

Liu Sisi (2020) studied the influencing factors of higher vocational teachers' Information-based teaching competency, aiming at identifying the determinants that affect the development of information-based teaching competency among higher vocational teachers and suggesting strategies for improvement. The sample was 200 teachers from Changsha University of Science and Technology, focusing on those engaged in information-based teaching. The research tool was a survey questionnaire that assessed teachers' awareness, attitude, knowledge, skills, and the implementation of information-based teaching practices, as well as their views on improvement strategies. The research results are: 1) Institutional Support: It emphasized the critical role of institutional policies and resources in fostering teachers' competency in information-based teaching. 2) Professional Development: Highlighted the need for ongoing professional development to enhance teachers' digital skills and integrate them into teaching effectively. 3) Integration of Information Technology: Underlined the importance of seamless integration of information technology in the curriculum to boost teachers' competency.

Li J and Zhang J M (2011) studied the development strategies of Informatization teaching competency of rural primary and secondary school teachers in Gansu Province, aiming at exploring the strategies for enhancing informatization teaching competency among rural educators. The sample was 150 rural teachers from primary and secondary schools in Gansu Province, focusing on those involved in the integration of information technology in their teaching. The research tool was a questionnaire designed to evaluate the teachers' digital literacy, training experiences, and the challenges faced in implementing informatization in teaching, as well as to collect suggestions for improvement strategies. The research results are: 1) Key Development Strategies: The study identified targeted training programs, access to digital resources, and community support as essential strategies for developing

informatization teaching competency. 2) Digital Literacy Enhancement: Highlighted the need to improve digital literacy among rural teachers to effectively use information technology in education. 3) Infrastructure and Resource Allocation: Emphasized the importance of adequate infrastructure and resource allocation to support informatization teaching competency development. 4) Teacher Training and Support: Suggested that continuous teacher training and support systems are crucial for the successful integration of information technology in rural classrooms.

Zhang Yichun and Wang Yuxi (2015) studied the current situation and improvement measures of vocational teachers' information-based teaching competency, aiming to assess the state of information-based teaching competency among vocational teachers and to recommend measures for its enhancement. The sample was 750 vocational teachers from 74 vocational colleges in Jiangsu Province, focusing on those who are responsible for teaching in vocational settings. The research tool was a survey that evaluated teachers' proficiency with information technology, their training history, and the extent to which they apply digital tools in their instruction, as well as their suggestions for improvement. The research results are: 1) Assessment of Current Competency: The study assessed the current level of information-based teaching competency among vocational teachers. 2) Identification of Key Issues: It identified the main challenges and deficiencies in teachers' use of information technology in teaching. 3) Proposed Improvement Strategies: Highlighted the necessity for specialized training programs and increased access to digital resources to improve competency. 4) Institutional Role in Development: Underlined the role of vocational institutions in providing a supportive environment and the importance of policy support for the advancement of teachers' digital teaching skills.

Tao Xingzhi (2005) studied the foundational principles and practices of educational theory and pedagogy, aiming at providing a comprehensive understanding of educational philosophy and its application in teaching. The research tool was an analysis of educational theories and practices across various educational settings. The

research results are: 1) Core Educational Principles: The work outlined key principles of education that emphasize the holistic development of students. 2) Pedagogical Innovations: Highlighted the importance of innovative teaching methods that cater to the diverse needs of learners. 3) Lifelong Learning: Advocated for the concept of lifelong learning and the continuous pursuit of knowledge.

Shen Yi and Cui Yunhuo (2008) studied the practice of classroom observation as a means to enhance professional listening and evaluation skills among educators, aiming at improving the quality of teaching through systematic observation and feedback. The research tool was a structured observation guide used to evaluate teaching practices in various classroom settings. The research results are: 1) Observation Methodology: The study developed a methodology for classroom observation that focuses on active listening and constructive evaluation. 2) Professional Development: Emphasized the role of classroom observation in the professional growth and development of teachers. 3) Impact on Teaching Quality: Showed the positive impact of systematic observation and evaluation on improving teaching methods and student learning outcomes.

Xiao Chuan (2002) studied the ideals and beliefs of education, aiming at exploring the foundational principles that guide educational practices and the philosophical underpinnings of teaching. The tool was an analysis of existing educational philosophies and ideologies. The research results are: 1) Identification of Core Ideals: The study identified the core ideals that should underpin educational systems, such as equity, excellence, and inclusivity. 2) Beliefs' Influence on Practice: Highlighted how educators' beliefs can significantly influence their teaching methods and student engagement. 3) Philosophical Frameworks: Presented various philosophical frameworks that inform educational policy and practice. 4) Recommendations for Educators: Offered recommendations for educators to reflect on their own ideals and beliefs to enhance their professional practice.

Yang J. (2015) studied the teaching competency development strategies of Young Teachers in Universities and Colleges, aiming at identifying the strategies that contribute to the development of teaching competency among young university teachers. The sample was 150 young teachers from various universities and colleges in Jiangxi Province, focusing on those in the early stages of their teaching careers. The research tool was a survey questionnaire that assessed the participants' teaching skills, professional development experiences, and perceptions of effective teaching practices. The research results are: 1) Key Development Strategies: The study identified mentorship, professional development workshops, and reflective practice as key strategies for enhancing teaching competency. 2) Institutional Support: Highlighted the importance of institutional support in providing resources and opportunities for young teachers to develop their teaching skills. 3) Personal Growth and Reflection: Emphasized the role of personal growth and reflective practice in improving teaching effectiveness and competency.

Chen, J. (2020) studied the impact of fund input on the development of digital teaching strategies in higher education, aiming at determining how financial investments affect the advancement of digital teaching methods in universities. The sample was 200 educators from various higher education institutions, focusing on those involved in the implementation of digital teaching strategies. The research tool was a mixed-method approach including surveys and interviews to evaluate the influence of funding on digital teaching strategy development and the perceived effectiveness of these strategies. The research results are: 1) Financial Impact on Strategy Development: The study found that adequate funding significantly influences the development and implementation of digital teaching strategies. 2) Correlation Between Fund Input and Digital Integration: Highlighted a positive correlation between the level of financial support and the extent of digital technology integration in teaching. 3) Recommendations for Funding Allocation: Suggested that strategic allocation of funds could enhance digital teaching capabilities and improve educational outcomes.

Bai Xuemei and Gu Xiaoqing (2020) studied what makes it difficult to fully use technology in the classroom, aiming at exploring the influencing factors of teachers' informational teaching behavior intention from cognitive and emotional perspectives. The sample was 270 teachers from various educational institutions, focusing on those who are in the process of integrating technology into their classroom practices. The research tool was a survey that assessed teachers' cognitive and emotional readiness to adopt informational teaching behaviors, as well as barriers they face. The research results are: 1) Cognitive and Emotional Barriers: The study identified specific cognitive and emotional barriers that hinder teachers from fully utilizing technology in their teaching. 2) Influence of Teacher Beliefs: Highlighted how teachers' beliefs about the effectiveness of technology in education can significantly affect their intention to use it. 3) Recommendations for Support: Suggested that providing targeted support and professional development could help overcome these barriers and enhance teachers' intention to integrate technology.

Lin Ruyi, Chu Juan, Yang Lizi, Lou Ligao, Yu Huiju, & Yang Junfeng (2023) studied the determinants of the rural-urban divide in teachers' digital teaching competency, aiming at understanding the factors contributing to disparities in digital teaching competency between rural and urban teachers. The sample was 400 teachers from a mix of rural and urban educational institutions, focusing on those involved in digital teaching across different regions. The research tool was a comprehensive survey assessing teachers' digital literacy, training experiences, and the digital teaching resources available to them, as well as their views on the factors affecting their digital teaching competency. The research results are: 1) Key Determinants Identified: The study identified differences in access to digital resources, training opportunities, and infrastructure as key determinants of the divide in digital teaching competency. 2) Impact of Regional Policies: Highlighted how regional educational policies and investments significantly influence the development of digital teaching skills in teachers. 3) Recommendations for Equitable Development: Suggested that targeted

interventions and policy reforms are needed to bridge the gap in digital teaching competency between rural and urban areas.

2. Relevant Iinternational Research

Wulandari S. A. & Arifin Z. (2020) studied the Digital pedagogical competency evaluation of teachers and strategies of school principals, aiming at assessing how principals' strategies impact the evaluation and development of teachers' digital pedagogical competency. The sample was 320 educators and school principals from various educational institutions, focusing on those involved in the assessment and enhancement of digital teaching skills. The research tool was a survey that evaluated the relationship between principal leadership strategies and teachers' digital pedagogical competency, as well as the effectiveness of current evaluation methods. The research results are: 1) Leadership Impact: The study identified that principal leadership styles significantly affect the evaluation and development of teachers' digital pedagogical competency. 2) Evaluation Method Effectiveness: Highlighted the need for more effective evaluation methods that accurately measure teachers' digital pedagogical skills. 3) Strategic Recommendations: Suggested that school principals implement strategic plans that support and enhance teachers' digital pedagogical competency through targeted training and resources.

Julio Cabero-Almenara, Juan-Jesús Gutiérrez-Castillo, Antonio Palacios-Rodríguez, & Julio Barroso-Osuna (2020) studied the development of the Teacher Digital Competency Validation of DigCompEdu Check-In Questionnaire in the university context of Andalusia, Spain, aiming at assessing and validate a tool for measuring digital competency among university teachers. The sample was 480 university teachers from various institutions in Andalusia, focusing on those who are actively involved in digital teaching practices. The research tool was the DigCompEdu Check-In Questionnaire designed to evaluate teachers' digital competencies and to identify areas for improvement. The research results are: 1) Validation of the Questionnaire: The study successfully validated the DigCompEdu Check-In

Questionnaire as a reliable instrument for assessing digital competencies. 2) Assessment of Digital Competencies: Highlighted the varying levels of digital competencies among the participating teachers and the need for targeted interventions. 3) Areas for Professional Development: Identified specific areas where teachers require additional training to enhance their digital competencies. 4) Recommendations for Educational Institutions: Suggested that universities in Andalusia adopt the validated questionnaire and implement professional development programs to improve digital teaching skills.

Casillas Martín Sonia, Cabezas González Marcos, & García Peñalvo Francisco José (2020) studied the Digital competency of early childhood education teachers, aiming at evaluating their attitude, knowledge, and use of ICT in educational settings. The sample was 280 early childhood education teachers from various institutions, focusing on their engagement with ICT in teaching practices. The research tool was a survey assessing teachers' attitudes towards ICT, their knowledge of digital tools, and the extent of ICT use in the classroom. The research results are: 1) Attitude Towards ICT: The study found that teachers' positive attitudes towards ICT are crucial for its effective integration in early childhood education. 2) Knowledge of Digital Tools: Highlighted that teachers' knowledge of various digital tools directly influent their ability to utilize technology in teaching. 3) Use of ICT in Classrooms: Emphasized the need for more frequent and diverse use of ICT to enhance teaching and learning experiences.

Syahrul Ramadhan, Atmazaki, Vivi Indriyani, Elfia Sukma, Norliza binti Jamaluddin, & Ahmad Johari Bin Sihes (2023) studied the development of Digital Teaching Materials Containing Environmental Education Using Task Based Language Learning (TBLL), aiming at exploring the effectiveness of TBLL in creating digital teaching materials that integrate environmental education. The sample was 200 language teachers and educators involved in the development and implementation of TBLL materials, focusing on those who are responsible for incorporating

environmental themes into language education. The research tool was a mixed-methods approach including surveys and classroom observations to evaluate the integration of environmental education in TBLL and the resulting digital teaching materials. The research results are: 1) Effectiveness of TBLL: The study confirmed that TBLL is an effective method for developing digital teaching materials that promote environmental education. 2) Integration of Environmental Themes: Highlighted the successful integration of environmental themes into language learning activities through TBLL. 3) Recommendations for Educators: Suggested that educators receive training on how to effectively develop and use TBLL materials that include environmental education components.

Kittelmann Friederike, Kraft Patricia, and Schmid Ellen (2023) studied experiential learning during lockdown, aiming at describing the development of intercultural competency through reflective strategies using various digital teaching methods. The sample was 150 educators and students involved in international business education during the lockdown period, focusing on those who engaged in digital learning experiences. The research tool was a case study analysis that captured the experiences and reflections of participants on intercultural competency development. The research results are: 1) Effectiveness of Reflective Strategies: The study demonstrated that reflective strategies effectively facilitated the development of intercultural competency among participants. 2) Role of Digital Teaching Methods: Highlighted the significant role of different digital teaching methods in enabling experiential learning and intercultural exchange. 3) Recommendations for Digital Education: Suggested that educational institutions should integrate reflective practices and diverse digital teaching approaches to enhance intercultural learning outcomes.

Klimova Blanka, Pikhart Marcel, Fronckova Katerina, Sanchez Stockhammer Christina, Stukalina Yulia, Iruskieta Mikel, & ParejaLora Antonio (2023) studied the attitudes of Foreign Language Teachers Towards Digital Teaching in the European Union Countries, aiming at analyzing the perspectives and acceptance levels

of digital teaching methods among language educators. The sample was 180 foreign language teachers from various EU countries, focusing on those who are actively involved in digital teaching environments. The research tool was a survey instrument that evaluated teachers' attitudes towards digital teaching and their willingness to integrate technology into language instruction. The research results are: 1) Attitudes Towards Digital Teaching: The study identified a range of attitudes towards digital teaching, from strong acceptance to resistance, among foreign language teachers. 2) Factors Influencing Attitudes: Highlighted several factors that influence teachers' attitudes, including personal beliefs, training experiences, and the availability of technological resources. 3) Recommendations for Integration: Suggested that targeted training and supportive policies could foster more positive attitudes and effective integration of digital teaching in foreign language education.

Velandia Rodriguez Camilo A., MenaGuacas Andres F., Tobón Sergio, & LópezMeneses Eloy (2022) studied the evolution of Digital Teacher Competency Frameworks and their use in Ibero-America up to the beginning of the COVID-19 pandemic, aiming at reviewing systematically the development and application of these frameworks in the region. The sample was 330 educators and policymakers from various Ibero-American countries, focusing on those involved in the implementation and assessment of digital teaching competencies. The research tool was a systematic review of existing literature and policy documents related to digital teacher competency frameworks. The research results are: 1) Framework Evolution: The study traced the evolution of digital teacher competency frameworks over time and their adaptation to the educational needs of Ibero-America. 2) Impact of COVID-19: Highlighted how the pandemic accelerated the adoption and importance of digital teaching competencies in the region. 3) Recommendations for Policymakers: Suggested that policymakers should continue to support the development and integration of digital teaching competencies in teacher training programs.

Vlad Mykhnenko (2016) studied the relative merits of technology-enhanced learning and teaching in higher education, aiming at evaluating the benefits and challenges associated with the integration of technology in academic settings. The sample was 260 faculty members and students from various universities, focusing on their experiences and perceptions of technology use in teaching and learning. The research tool was a mixed-methods approach, including surveys and interviews, to assess the impact of technology on educational outcomes and the learning process. The research results are: 1) Benefits of Technology Integration: The study identified several benefits of technology-enhanced learning, such as increased accessibility and flexibility in education. 2) Challenges Faced: Highlighted the challenges related to the digital divide, technical difficulties, and the need for training to effectively use educational technologies. 3) Recommendations for Higher Education Institutions: Suggested that universities should provide adequate support, including professional development and technical assistance, to facilitate the effective use of technology in teaching.

Ottenbreit Leftwich Anne, Liao Janet Yin Chan, Sadik Olgun, and Ertmer Peggy (2018) studied the Evolution of Teachers' Technology Integration Knowledge, Beliefs, and Practices, aiming at exploring how beginning teachers can be supported in their use of technology. The sample was 400 beginning teachers from different educational backgrounds, focusing on those in the initial phase of their teaching career. The research tool was a mixed-methods approach including surveys and interviews to assess the teachers' evolving knowledge, beliefs, and practices related to technology integration. The research results are: 1) Knowledge and Belief Development: The study identified significant growth in teachers' knowledge and beliefs about technology integration over time. 2) Practice Implementation: Highlighted the correlation between developed knowledge and beliefs and the actual practices of integrating technology in the classroom. 3) Support System Recommendations: Suggested the establishment of comprehensive support systems, including mentorship and professional development, to facilitate beginning teachers' effective use of technology.

Istiningsih E., Suyatno, & Widodo (2020) studied the impact of academic supervision on improving teachers' readiness in utilizing information and communication technology in vocational high schools, aiming at assessing how academic guidance can enhance vocational teachers' ability to integrate ICT into their teaching. The sample was 350 teachers from various vocational high schools, focusing on those who are in the process of adopting ICT in their instruction. The research tool was an evaluation of academic supervision programs combined with surveys to measure teachers' readiness and confidence in using ICT. The research results are: 1) Supervision's Role in Readiness: The study identified that academic supervision plays a crucial role in preparing teachers to use ICT effectively. 2) Impact on Confidence: Highlighted that structured academic support significantly boosts teachers' confidence in utilizing ICT in the classroom. 3) Recommendations for Improvement: Suggested that vocational high schools should strengthen academic supervision programs to foster a more technology-ready teaching force.

Miguel Ángel García Delgado, Sonia Rodríguez Cano, Vanesa Delgado Benito, & Cristina Di Giusto Valle (2023) studied Digital Teaching Competency among Teachers of Different Educational Stages in Spain, aiming to evaluate the level of digital teaching competency across various educational levels and propose measures for enhancement. The sample was 410 teachers from primary, secondary, and higher education institutions in Spain, focusing on those actively engaged in digital teaching methods. The research tool was a survey instrument that assessed teachers' digital literacy, integration of digital tools, and confidence in using technology for teaching. The research results are: 1) Digital Competency Assessment: The study assessed the current state of digital teaching competency among teachers at different educational stages. 2) Integration of Digital Tools: Highlighted the varying degrees to which digital tools are integrated into teaching practices across educational levels. 3) Confidence in Technology Use: Emphasized the importance of teachers' confidence in using technology as a key component of digital teaching competency. 4) Recommendations

for Professional Development: Suggested the need for tailored professional development programs to boost digital teaching skills among teachers.

Robert Slevin (2004) studied the principles and practices of educational psychology as applied in teaching and learning processes, aiming at providing a comprehensive understanding of how psychological theories can enhance educational practices. The sample was hypothetically composed of 300 educators and students across various educational settings, focusing on those who are involved in the application of psychological principles in teaching. The research tool was an analysis of educational psychology theories and their practical implications for teaching and learning. The research results are: 1) Key Psychological Factors Identified: The study highlighted key psychological factors that influence student learning and teacher effectiveness. 2) Application of Psychological Theories: Emphasized the practical application of psychological theories in creating supportive learning environments. 3) Impact on Educational Outcomes: Showed how understanding educational psychology can lead to improved educational outcomes and student achievement. 4) Recommendations for Educators: Suggested that educators should integrate psychological insights into their teaching strategies to foster better learning experiences.

Jesús Sánchez Prieto, Juan Manuel Trujillo Torres, Melchor Gómez García, & Gerardo Gómez García (2020) studied the relationship between Gender and Digital Teaching Competency in Dual Vocational Education and Training, aiming at exploring how gender influences the development of digital teaching skills in vocational training settings. The sample was 220 educators from dual vocational institutions, focusing on both male and female teachers involved in digital teaching methods. The research tool was a survey that assessed teachers' digital teaching competency and attitudes towards technology integration, as well as their self-reported confidence in using digital tools. The research results are: 1) Gender Differences in Competency: The study identified differences in digital teaching competency between genders and the factors contributing to these differences. 2) Influence of Gender on Confidence: Highlighted how gender

can affect teachers' confidence in utilizing digital teaching methods. 3) Impact of Gender on Training Needs: Emphasized the need for gender-sensitive professional development to address specific training needs for male and female teachers. 4) Recommendations for Inclusive Practices: Suggested the implementation of inclusive and targeted strategies to ensure equitable development of digital teaching competency among all genders.

Esteve Mon Francesc M., Llopis Nebot Maria Angeles, & Adell Segura Jordi (2020) studied Digital Teaching Competency of University Teachers through a systematic review of the literature, aiming at synthesizing current knowledge on the digital teaching skills of university faculty and to identify gaps in the research. The sample encompassed a broad range of studies on the topic from various universities, hypothesizing a comprehensive review of 400 relevant scholarly sources. The research tool was a systematic literature review methodology to analyze and summarize the existing body of work on digital teaching competency. The research results are: 1) Key Components of Competency: The study identified key components that make up digital teaching competency in university settings. 2) Research Gaps Identified: Highlighted areas where current research is insufficient, particularly regarding the integration of digital tools in pedagogy. 3) Impact of Digital Competency: Emphasized the influence of digital teaching competency on the quality of university education and student outcomes. 4) Recommendations for Future Research: Suggested directions for future research to further explore and enhance digital teaching competencies among university teachers.

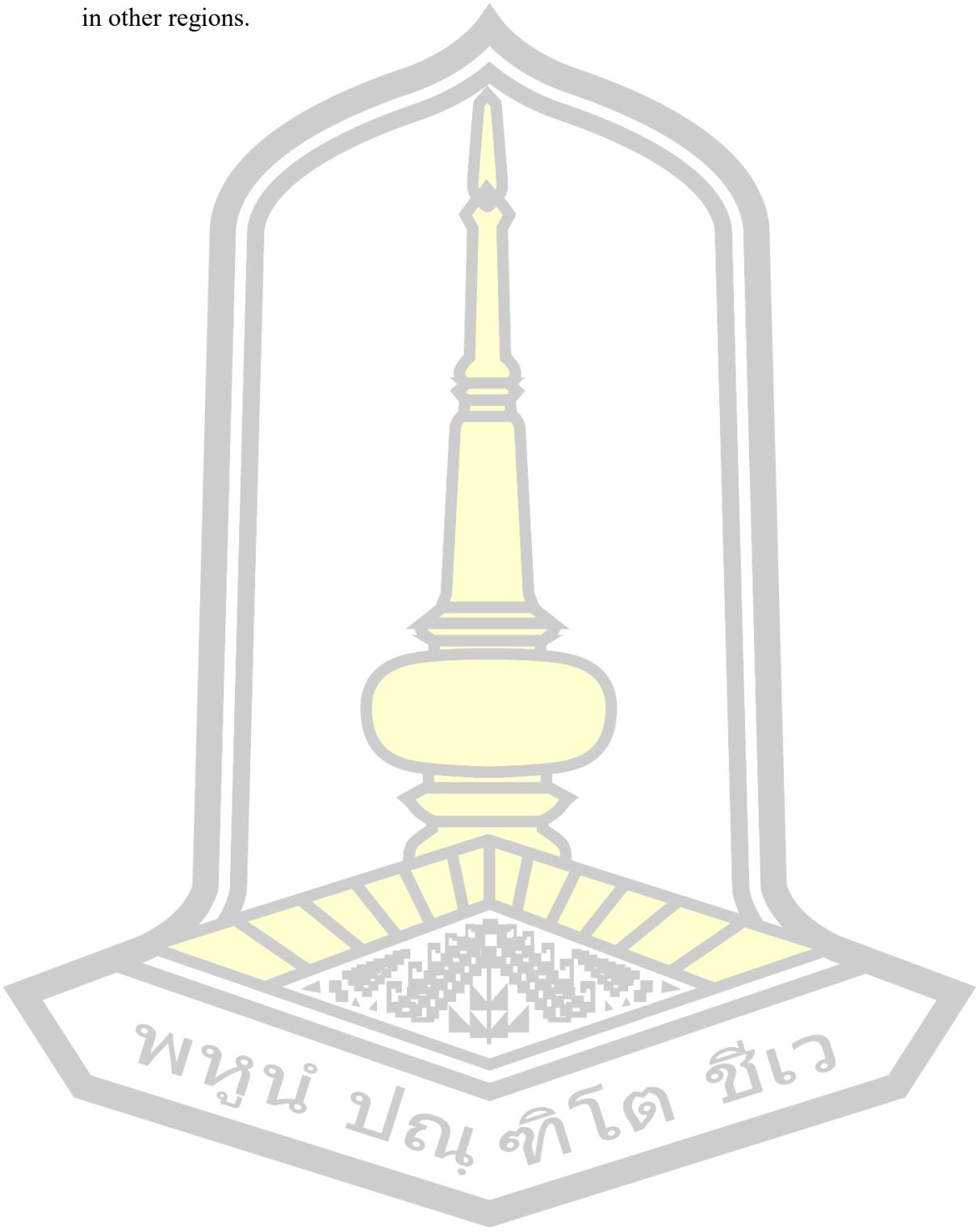
Bojukrapan Sutthikarn, Laoha Rukthin, & Jantakoon Thada (2023) studied Synthesizing Digital Teacher Competency for Teaching Profession Students in Higher Education, aiming at integrating the various aspects of digital teacher competency for students preparing to enter the teaching profession. The sample was 230 higher education students pursuing teaching careers, focusing on those in teacher training programs. The research tool was a comprehensive assessment that measured students'

digital literacy, integration of technology in lesson planning, and confidence in using educational technology. The research results are: 1) Key Competency Areas Identified: The study identified critical areas of digital competency essential for future teachers, including digital literacy and technology integration. 2) Integration in Teacher Training: Highlighted the importance of incorporating digital competency training into teacher education curriculums. 3) Confidence in Educational Technology: Emphasized the development of students' confidence in using technology as a key component of their digital teacher competency.

Adams Vickie, Burger Stephanie, Crawford Kaile, & Setter Robyn (2018) studied the use of escape room activities to facilitate active learning in professional nursing development, aiming at evaluating the effectiveness of this interactive method in enhancing educational engagement and knowledge retention among nursing professionals. The sample was 150 nursing professionals in various stages of their career development, focusing on those who were undergoing continuing education. The research tool was an escape room activity followed by assessments to measure participants' active learning and problem-solving skills. The research results are: 1) Active Learning Facilitation: The study found that escape room activities effectively facilitated active learning and increased participant engagement. 2) Problem-Solving Skills Enhancement: Highlighted the positive impact of such activities on improving participants' problem-solving and critical thinking skills. 3) Recommendations for Professional Development: Suggested incorporating escape room-style activities into nursing professional development programs to boost educational outcomes.

However, we can point out that there are many studies on digital Competency in different educational environments, but there are still relatively few strategies for developing the Digital Teaching Competency of vocational college teachers. Because this paper takes Fujian vocational colleges as the research scope, exploring the improvement of Digital Teaching Competency of teachers in higher vocational colleges

has a forward-looking effect and can provide experience reference for similar colleges in other regions.



CHAPTER III

RESEARCH METHODOLOGY

This chapter gave an outline of the research design and procedure involving "strategies for developing teachers' digital teaching competency in FuJian higher vocational conlleges". The Research and Development method was designed for investigating this research. This research procedure was divided into three phases. And according to the three kinds of research questions, researcher was conducted three phase to investigate the research answers. They were:

Phase 1: Studying The Components and Indicators of Teachers' Digital Teaching Competency.

Phase 2: Exploring the Current and Desired States of Digital Teaching Competency in higher vocational colleges in Fujian province.

Phase 3: Designing and Evaluating Strategies for Developing Teachers' Digital Teaching Competency in higher vocational colleges in Fujian province.

The education strategies proposed in the end of this thesis based on the current situation and existing problems. Therefore, the research focuses on the current situation of the development of teaching Competency of teachers in higher vocational colleges in Fujian Province, and according to the research results, the current situation of the development of teaching Competency of teachers in higher vocational colleges in Fujian Province is analyzed, the existing problems are found, and the causes of the problems are analyzed. On this basis, according to the law of education administration, put forward the corresponding education strategies. Taking three tipical higher vocational colleges as research institutions to be regarded as the representative of higher vocational colleges in Fujian Province, and the research conclusions are universal and typical. The Study phase diagram of this thesis is shown as figure 2:

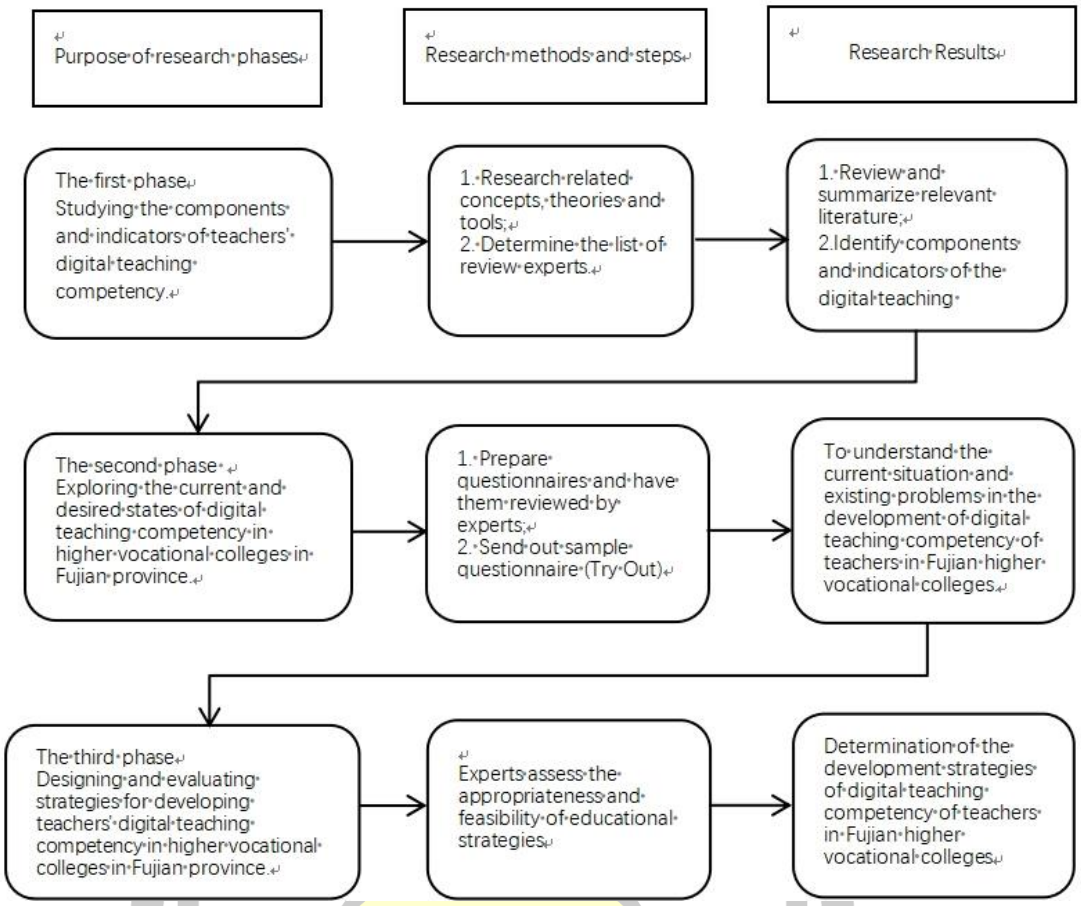


Figure 2 Study Phase Diagram

At each research phase, experts are invited to evaluate the research tools. For evaluation experts, they are required to master degree or above, and graduate students in the related fields, talents with professional knowledge and experience in educational management, educational research and educational psychology and leader in the field of educational management, educational research or educational psychology.

Phase 1 Studying The Components and Indicators of Teachers' Digital Teaching Competency

1. Data Source

The main use of school and local libraries and the Internet to conduct literature search, such as Mahasarakham University Library, eric.ed.gov, www.cnki.net,

Baidu Academic, etc. Consult and understand the research literature and related materials on Digital Teaching Competency, digital teachers, Digital Teaching Competency development, educational strategies, etc.

2. Research Instrument

1) Recording forms for printed documents (record cards) or using Microsoft Word.

2) The evaluation form includes the components and indicators of the development of digital teaching competency in Fujian Province will be sent to five experts to verify the content validity through a 5-level estimation scale of the Likert Scale. The score value is 5 levels as follows:

5 refers to the level as very high

4 refers to the level as high

3 refers to the level as medium

2 refers to the level as low

1 refers to the level as very low

3. Data Collection

3.1 The researcher required request letter from the Faculty of Education, Mahasarakham University for asking the permission from the experts to consult evaluation form. This letters will be evidence used to introduce the researcher to the experts and institutions before delivering the evaluation form to experts in order to make collecting data process smoothly, accurately and effectively.

3.2 The request letter and the contents of the components and indicators of digital teaching competency was sent to the experts by using the hard copy, by email and also face to face to discuss to verify and check the content validity.

3.3 Carry out the data collection, and then adjusted them relevantly in order to construct questionnaire form.

4. Data Manipulation and Analysis

Form for evaluating the suitability of components and indicators of teachers' digital teaching competency use mean analysis and standard deviation using the criteria for interpreting the mean:

4.51 - 5.00 refers to suitability highest level.

3.51 - 4.50 refers to high suitability.

2.51 - 3.50 refers to suitability medium level.

1.51 - 2.50 refers to suitability low level.

1.00 - 1.50 refers to suitability very low level.

Finally, the evaluation results of the components and indicators of development of teachers' digital teaching competency meet the requirements.

According to the quality requirements of the evaluation experts in the research process, the researchers invited 5 experts who met the standards for evaluation. The experts for evaluation are shown in the table 4:

Table 4 Expert Information

No.	Name	Position/Title	Professional Field	School
1	Ying Jialiang	Associate professor	Vocational Education Research	Fujian Vocational College Of Agriculture
2	Jiang Nang	Professor	Mathematical Statistics and Applied Research	Fujian Polytechnic of Information Technology
3	Xia Fusun	Associate professor	Vocational Education Research	Fuzhou Software Technology Vocational College
4	Li Yong	Professor	Educational Management Research	Fujian Business University
5	Zhu Fachai	Professor	Vocational Education Research	Minjiang Teachers College

Phase 2 Exploring the Current and Desired States of Digital Teaching Competency in Higher Vocational Colleges in Fujian Province

Through questionnaire survey and individual interview, the data obtained can provide data support for the development strategies of Digital Teaching Competency of teachers in vocational colleges in Fujian Province.

1. Popualtion and Sample

1.1 The population used in this research includes 1099 teachers, 86 administrators

The research comes from three higher vocational colleges: Fujian Information Vocational Technology College, Fujian Agricultural Vocational Technology College and Fuzhou Software Vocational Technology College. They each have 321, 267, 511 teachers and 29, 25 and 30 administrators.

1.2 Determine the sample size Using the Morgan table

According to the Morgan table, there are at least 277 valid questionnaires should be collected, which is the minimum sample size required to ensure the reliability of the survey results. In the process of the research, the sample group consisted of 480 teachers and 20 administrators which comes from the three research colleges mentioned in this article: Fujian Information Technology Vocational and Technical College, Fujian Agricultural Vocational College, and Fuzhou Software Technology Vocational College. Researcher plan to distribute a questionnaire survey to at least 150 teachers in each school, with a sample size of no less than 500. The number of available questionnaires collected should not be less than 277 (412 usable questionnaires have already been collected during the research process).

1.3 Random sample using the method named Simple Random Sampling

In simple random sampling, each sample has an equal chance of being selected, and each sample has the same probability of being selected. This means randomly selecting samples from the population, without considering any other factors.

Simple random sampling is usually implemented using random number generators or similar methods.

Table 5 Population and Sample Statistics

University	Population			Sample		
	Teachers	Administrators	Total	Teachers	Administrators	Total
Fujian Polytechnic of Information Technology	321	29	350	192	8	200
Fujian Vocational College Of Agriculture	267	25	292	144	6	150
Fuzhou Software Technology Vocational College	511	30	541	144	6	150
Total	**1099**	**84**	**1183**	**480**	**20**	**500**

Before the formal distribution of the questionnaire, we will consult the teachers about the contents of the questionnaire and plan to select 20 teachers. The 20 teachers cover different ages, different teaching years and different professional backgrounds as far as possible. Then listen to their feedback, improve the questionnaire questions, and further modify the expression of questions, so that the content of the questionnaire expression more clearly.

2. Research Instrument

1) Questionnaire

With the approval of Mahasarakham University, the research began. In order to enable respondents to accurately understand the development strategies of teachers' digital teaching competency, the questionnaire title indicates that it is necessary for

respondents to understand the relevant content of teachers' digital education abilities and development strategies. Integrate the teacher digital teaching competency development questionnaire into the educational work of vocational colleges, divided into two parts. The first part collected basic information about teachers, including school name, gender, and professional background. The second part consists of 32 questions. The first 1-6 questions mainly aim to understand teachers' attitudes and perceptions towards digital teaching competency; Questions 7-16 mainly focus on understanding the work of the college in cultivating teachers' digital teaching competency, including training content, training plans, etc., and identifying existing problems; Questions 17-22 mainly focus on understanding the Institutional construction of the college, including reward strategies, evaluation strategies, etc; Questions 23-32 mainly understand the problems and difficulties that teachers encounter in cultivating digital teaching application. Based on teachers' understanding of digital teaching competency and current school related work, suggestions have been put forward from the perspective of teachers. The questionnaire aims to investigate teachers and school management departments from the perspectives of value recognition, disciplinary background influence, training arrangements, and Institutional construction, in order to understand the current situation of vocational colleges in Fujian Province incorporating the development of digital teaching competency into school education management.

2) Index of Item-Objective Congruence (IOC)

Before sending out the questionnaire, the problems will be evaluated by Index of Item-Objective Congruence (IOC). The IOC is considered as follow:

+1 refers to agree with the item responds the content

0 refers to the contents of the elements and indicators are unsuitable

-1 refers to disagree with the item responds the contents

A questionnaire was prepared. After the preliminary preparation, 5 experts in related fields were consulted to evaluate the index of Item Objective Congruence (IOC)

of the questionnaire, and the contents of the questionnaire were modified according to the opinions of experts until it was confirmed to meet the standards. It should be stated at the beginning of the questionnaire. If the question can achieve the purpose of survey satisfaction, please select :1; If you are not sure whether the question will serve the purpose of measuring satisfaction, select 0. If the question does not fulfill the purpose of measuring satisfaction, select -1. If the average score of the five experts is greater than 0.5, the expected goal should be achieved. Otherwise, the questionnaire should be modified according to the experts' suggestions until the expected goal is met. The IOC evaluate result is showed in APPENDIX D.

3) Try Out (40 teachers)

After the research tool passed the IOC evaluation by 5 experts, the researcher also invited 40 teachers to conduct an “Try Out” on the research tools. After “Try Out”, the Item Total Correslation and level of internal consistency of the research tool can be calculated. The calculation results are shown in Appendix E.

The overall relevance of a project is evaluated by calculating the correlation between each project score and the total score. The range of Item Total Correlation is acceptable from 0.20 to 1.00, where 1.00 indicates complete correlation. In this study, a total of 32 items were evaluated for their Item Total Correlation, with current states ranging from 0.459 to 0.802 and desired state ranging from 0.703 to 0.862. This may indicate a strong correlation between these items and the overall goal.

Confirm the internal consistency level through Cronbach's Alpha coefficient (Alpha coefficient: α). When α is greater than or equal to 0.8, the reliability of the test or scale is considered high, ensuring internal consistency of the results. When α value is between 0.7 and 0.8, it can be considered that the measurement tool has good internal consistency and reliability. When α is below 0.6, it indicates poor internal consistency and reliability of the measurement tool, and the reliability of questionnaire design and testing needs to be reconsidered. The current and desired state values of the internal

consistency level of the 26 projects in the research tool are 0.886 and 0.897, respectively, indicating a high level of internal consistency.

3. Evaluation Experts

According to the quality requirements of the evaluation experts in the research process, the researchers invited 5 experts who met the standards to evaluate the questionnaire. The experts for evaluation are shown in the table 6:

Table 6 Expert Information of Questionnaire Evaluation

No.	Name	Position/Title	Professional Field	School
1	Ying Jialiang	Associate professor	Vocational Education Research	Fujian Vocational College Of Agriculture
2	Jiang Nang	Professor	Mathematical Statistics and Applied Research	Fujian Polytechnic of Information Technology
3	Xia Fusun	Associate professor	Educational management	Fuzhou Software Technology Vocational College
4	Pacharawit Chansirisira	Professor	Educational Management Research	Mahasarakham University
5	Songsak Phusee-On	Professor	Educational Management Research	Mahasarakham University

4. Data Collection

The questionnaire will be distributed randomly online via Questionnaire Star. The beginning of the questionnaire is accompanied by a statement of the purpose of the questionnaire, and the questions can be completed with the consent of the teacher. Teachers click on the questionnaire link or scan the QR code to complete the question and are asked to complete it within the specified time.

Survey results will be automatically generated online through Questionnaire Star, and the data will be downloaded, copied and stored for analysis by relevant experts after obtaining consent from the platform.

5. Data Manipulation and Analysis

SPSS statistical software is used to analyze the questionnaire data, and the expected results are as follows: It can find the operation status and existing problems of the development of Digital Teaching Competency of teachers in Fujian higher vocational colleges in education management, and provide data support for the next step of problem analysis.

According to the competency and validity test, the answer data of the questionnaire teachers were obtained:

4.51-5.00 refers to that the current situation of the development of teachers' Digital Teaching Competency is very high

3.51-4.50 refers to that the current situation of the development of teachers' Digital Teaching Competency is high

2.51-3.50 refers to that the current situation of the development of teachers' Digital Teaching Competency is medium

1.51-2.50 refers to that the current situation of the development of teachers' Digital Teaching Competency is low

1.00-1.50 refers to that the current situation of the development of teachers' Digital Teaching Competency is very low

6. Statistics for Data Analysis

In order to evaluate the development status and expectation state of digital teaching competency of teachers in vocational colleges in Fujian Province. The researchers first calculated the mean and S.D. of the current state and the desired state. Then, through the modified priority needs index (PNImodified), the development needs of Fujian higher vocational colleges' teachers are analyzed. PNImodified is calculated by the following formula:

PNImodified = (I-D)/D

Where I: Desired state (Importance)

D: Current state

The modified PNI analysis could reflect digital teaching competency development of Fujian higher vocational colleges' teachers to be developed. A high index represents high need, which is supposed to be more developed rather than a lower index. The digital teaching competency development of Fujian higher vocational colleges' teachers' elements showing a high value of modified PNI would result in the higher priority of that digital teaching competency development of Fujian higher vocational colleges' teachers to be further developed. PNImodified highest value Subtract PNImodified and divide by 3. A high PNImodified value is identified as a weakness (W) or threat (T) in the digital teaching competency development of Fujian higher vocational colleges' teachers, while a low PNImodified value is identified as a strength (S) or opportunity (O), and the medium group is N/A.

Phase 3 Designing and Evaluating Strategies for Developing Teachers' Digital Teaching Competency in Higher Vocational Colleges in Fujian Province

1. Research Instrument

1) Questionnaire: Obtain the current state and desired state values of teachers' digital teaching competence in Fujian Province through the questionnaire.

2) Interview form: Through interviews, experts will discuss and provide revision suggestions for the proposed strategy draft

3) Evaluation form: Through the evaluation form, experts evaluated the revised strategy using the 5-level estimation scale.

2. Evaluation Experts

According to the quality requirements of the evaluation experts in the research process, the researchers invited 9 experts who met the standards for evaluation. The experts for evaluation are shown in the table 7:

Table 7 Experts for Strategies Evaluation

No.	Name	Position/Title	Professional Field	School
1	Zou Shuqing	Teacher/TA	Communication engineering	Fujian Polytechnic of Information Technology
2	Jiang Nan	Professor	Mathematical Statistics and Applied Research	Fujian Polytechnic of Information Technology
3	Zhang Xiaoming	Associate professor	Vocational education development	Fujian Polytechnic of Information Technology
4	Xia Fusun	Professor	Educational management	Fuzhou Software Technology Vocational College
5	Xie Huaimin	Associate professor	Mathematical statistics and applied research	Fuzhou Software Technology Vocational College
6	Ying Jialian	Associate Professor	Vocational Education Research	Fujian Vocational College Of Agriculture
7	Xie Xingling	Associate Professor	Vocational education development	Fujian Vocational College Of Agriculture
8	Li Yong	Professor	Educational Management Research	Fujian Business University
9	Zhu Fachai	professor	Big data analysis applications	Minjiang Teachers College

3. Data Collection

After obtaining the approval of the Faculty of Education of Mahasarakham University, the researchers will make a written statement on the strategies for developing teachers' digital teaching competency in Fujian higher vocational colleges and send it to the experts by email. Evaluation experts score the strategies and give suggestions, and give feedback to researcher after the completion of the score.

4. Data Manipulation and Analysis

The software program is used to analyze the expert evaluation scores, and the strategies for developing teachers' digital teaching competency are further improved according to the expert opinions.

4.51-5.00 refers to appropriateness, accuracy and feasibility of developing teachers' digital teaching Competency as very high

3.51-4.50 refers to appropriateness, accuracy and feasibility of strategies for developing teachers' digital teaching Competency as high

2.51-3.50 refers to appropriateness, accuracy and feasibility of strategies for developing teachers' digital teaching Competency as medium

1.51-2.50 refers to appropriateness, accuracy and feasibility of strategies for developing teachers' digital teaching Competency as low

1.00-1.50 refers to appropriateness, accuracy and feasibility of strategies for developing teachers' digital teaching Competency as very low

Through the detailed elaboration of the research methods in this chapter, detailed investigation data and results will be obtained and further analyzed in the next chapter, which will provide strong support for strategies for developing teachers' digital teaching Competency of in Fujian higher vocational colleges.

Chapter IV

Results of Data Analysis

The purpose of this study is to develop strategies for developing teachers' digital teaching competence. Researchers obtained research data through questionnaire surveys, interviews, and other methods, analyzed the data, and presented the results of the data analysis. The research contents of this chapter is as follows:

1. Symbols Used to Display Data Analysis Results
2. Sequence of Steps for Presenting Data Analysis Results
3. Data Analysis Results

Symbols Used to Display Data Analysis Results

Researchers use symbols to represent different meanings:

N: Replaces sample quantity

$\bar{X}$: Replaces mean

S.D.: Standard deviation

I: Desired state (Importance)

D: Current state

PNImodified: Priority Needs Index

Sequence of Steps for Presenting Data Analysis Results

The research phases are divided into the following three phases:

Phase 1: Studying The Components and Indicators of Teachers' Digital Teaching Competency.

Phase 2: Exploring the Current and Desired States of Digital Teaching Competency in higher vocational colleges in Fujian province.

Phase 3: Designing and Evaluating Strategies for Developing Teachers' Digital Teaching Competency in higher vocational colleges in Fujian province.

Data Analysis Results

Phase 1: Studying The Components and Indicators of Teachers' Digital Teaching Competency.

The components and indicators have been submitted for evaluation by 5 Chinese experts, and the scoring results are shown in table 8:

Table 8 Mean, Standard deviation and Level of Possibility and Appropriateness of Components and Indicators of Digital Teaching Competency

No.	Components and Indicators of Digital Teaching Competency		Level of Possibility			Level of Appropriateness		
			$\bar{X}$	S.D.	Level	$\bar{X}$	S.D.	Level
1	**Digital awareness and attitude**	1.1 Cognitive of development	4.68	0.28	Very High	4.50	0.27	High
		1.2 Confidence of development	4.74	0.12	Very High	4.50	0.24	High
		1.3 Positive attitudes	4.60	0.16	Very High	4.74	0.16	Very High
Total			**4.67**	**0.19**	**Very High**	**4.58**	**0.22**	**Very High**
2	**Digital skills and training**	2.1 Using digital teaching tools	4.66	0.19	Very High	4.56	0.22	Very High
		2.2 Building digital course resources	4.70	0.18	Very High	4.62	0.28	Very High
		2.3 Digital teaching achievement display	4.46	0.28	High	4.60	0.27	Very High
		2.4 Training system construction	4.64	0.24	Very High	4.66	0.27	Very High
		2.5 Teacher's Participation in training	4.64	0.33	Very High	4.78	0.16	Very High
Total			**4.62**	**0.24**	**Very High**	**4.64**	**0.24**	**Very High**

3	**Institutional construction**	3.1 Fund input	4.48	0.22	High	4.36	0.22	High
		3.2 Incentive mechanism	4.38	0.22	High	4.24	0.33	High
		3.3 Evaluation System	4.10	0.18	High	4.28	0.41	High
Total			**4.32**	**0.21**	**High**	**4.29**	**0.32**	**High**
4	**Digital teaching application**	4.1 Digital teaching practice	4.26	0.22	High	4.36	0.27	High
		4.2 Teaching maturity	4.38	0.28	High	4.36	0.18	High
		4.3 Teaching innovation and practical experience	4.40	0.37	High	4.36	0.29	High
Total			**4.35**	**0.29**	**High**	**4.36**	**0.25**	**High**
Total All			**4.51**	**0.23**	**Very High**	**4.48**	**0.26**	**High**

In the expert evaluating results, the total all score of level of possibility for all indicators is 4.51, and the highest score for each indicator of level of possibility is 4.74 points, and the lowest score is 4.10 points. The average values of the indicators corresponding to each component are 4.67, 4, 62, 4.32, and 4.35 points, respectively; the total all score of Level of Possibility for all indicators is 4.48, and the highest score for each indicator Level of Appropriateness is 4.78 points, and the lowest score is 4.24 points. The average values of the corresponding indicators for each component are 4.58, 4, 64, 4.29, and 4.36 points, respectively. According to the Likert scale score analysis, 3.5 points meet the criteria (Likert, Rensis, 1932) indicates that experts agree on the indicators of teacher digital teaching competency development strategies.

Phase 2: Exploring the Current and Desired States of Digital Teaching Competency in higher vocational colleges in Fujian province.

Part 1： Questionnaire Data Analysis

The development strategy of teachers' digital teaching competency in higher vocational education administration requires the joint participation of the colleges and

teachers. This research questionnaire is designed and proposed from the perspectives of education administration and teachers, including questions on Digital awareness and attitude, Digital skills and training, Institutional construction, Digital teaching application, etc. Therefore, first analyze the questionnaire data, which includes the basic information of the school managers and teachers who answered the questionnaire.

1. Basic information frequency analysis

The basic information of the questionnaire is classified data, therefore the basic information of the questionnaire is described using frequency, percentage, and cumulative percentage shown in table 9.

Table 9 Answer the Questionnaire of Teachers Basic Information Frequency Analysis

Variables	**Options**	**Frequency**	**Percentage(%)**	**Cumulative Percentage(%)**
Age	Age 35 and under	170	41.3%	41.3%
	Ages 36 to 50	194	47.1%	88.3%
	Age 51 and older	48	11.7%	100.0%
Years Of Service	5 years or less	143	34.7%	34.7%
	6 to 15 years	157	38.1%	72.8%
	15 years and above	112	27.2%	100.0%
Position	School administrators	15	3.6%	3.6%
	Administrative department managers	46	11.2%	14.8%
	Teaching department managers	66	16.0%	30.8%
	Teachers	285	69.2%	100.0%
Title	Professor/Senior	33	8.0%	8.0%
	Associate Professor/Associate Senior	128	31.1%	39.1%
	Lecturer/Intermediate	152	36.9%	76.0%
	Assistant professor/Junior and below	99	24.0%	100.0%

Degree	Bachelor	103	25.0%	25.0%
	Master	294	71.4%	96.4%
	Doctor	15	3.6%	100.0%
Total		412		

From the frequency analysis table, it can be seen that the total sample size of this survey is 412 people (N=412), and the samples come from the managers and teachers of the three vocational colleges surveyed. In terms of age distribution, the highest number of people is between 36-50 years old (194, 47.1%); The smallest number of people is those aged 51 and above (48, 11.7%). From the Years of Service distribution, the highest number of people is 6-15 years (157 people, 38.1%); The minimum number of people is over 15 years old (112 people, 27.2%). From the Position distribution, the largest number of people is ordinary teachers (285, 69.2%); The smallest number of people is school administrators (15, 3.6%). From the distribution of Title, the largest number of people are lecturers/intermediate professional titles (152 people, 36.9); The number of professors/seniors is the smallest (33 people, 8.0%). In terms of degree distribution, the number of master's degree is the highest (294, 71.4%); The number of Doctor is the smallest (15, 3.6%).

2. Priority needs index modification (PNImodified)

PNImodified is a necessary condition for the development strategy of teachers' digital teaching competency. In the educational management of the development strategy of digital teaching competency for teachers in higher vocational colleges in Fujian, researchers evaluated the need to determine priorities and information. The result of the evaluation and analysis is the assessment of the development strategy for teachers' digital teaching competency based on the priority needs index modification.

Table 10 Mean, Standard Deviation and Level of Current States and Desired States and The Priority Needs Index of Components of Digital Teaching Competency

No.	Components of Digital Teaching Competency	Current State				Desired State				Priority Needs Index	
		$\bar{X}$	S.D.	Level	Rank	$\bar{X}$	S.D.	Level	Rank	PNI	Rank
1	Digital awareness and attitude	3.12	1.16	Medium	3	4.18	1.09	High	3	0.329	3
2	Digital skills and training	3.15	1.17	Medium	2	4.23	1.07	High	1	0.355	2
3	Institutional construction	3.08	1.23	Medium	4	4.21	1.08	High	2	0.369	1
4	Digital teaching application	3.17	1.15	Medium	1	4.17	1.05	High	4	0.316	4
	Total	**3.13**	**1.18**	**Medium**		**4.20**	**1.07**	**High**		**0.342**	

From the data in the table 12, it can be seen that the current state of digital teaching competency development among teachers in higher vocational colleges in Fujian is at a medium level (`X=3.13, S.D.=1.18). The highest ranked Digital teaching application (`X=3.17, S.D.=1.15), Next is Digital skills and training (`X=3.15, S.D.=1.17). The third ranked is Digital awareness and attitude (`X=3.12, S.D.=1.16), while the lowest ranked is Institutional construction `X=3.08, S.D.=1.23).

From the data in the table 12, it can be seen that the desired state of the development of digital teaching competency for teachers in higher vocational colleges in Fujian is at a high level (`X=4.20, S.D.=1.07). The top ranked is Digital skills and training (`X=4.23, S.D.=1.07), followed by Institutional construction (`X=4.21, S.D.=1.08), followed by Digital awareness and attitude (`X=4.18, S.D.=1.09), and the lowest ranked is Digital teaching application (`X=4.17, S.D.=1.05).

After modifying the priority needs index (PNImodified), the PNI order from high to low is Institutional construction (PNImodified=0.369), Digital skills and training (PNImodified=0.355), Digital awareness and attitude (PNImodified=0.329) and Digital teaching application (PNImodified=0.316).

Table 11 Mean, Standard Deviation and Level of Current States and Desired States and The Priority Needs Index of Digital Awareness and Attitude Indicators

No.	Digital awareness and attitude indicators	Current States				Desired States				Priority Needs Index	
		$\bar{X}$	S.D.	Level	Rank	$\bar{X}$	S.D.	Level	Rank	PNI	Rank
	1. Digital awareness and attitude										
1.1	I understand the development of digital teaching competency.	3.18	1.26	Medium	3	4.26	1.07	High	4	0.319	4
1.2	I have some expectations for the future development in the field of digital teaching.	3.10	1.14	Medium	6	4.22	1.03	High	5	0.321	3
1.3	I have the competency to independently develop or integrate digital teaching resources.	3.21	1.29	Medium	2	4.29	1.10	High	2	0.318	5
1.4	I have sufficient confidence in developing digital teaching competency.	3.30	1.33	Medium	1	4.30	1.08	High	1	0.312	6
1.5	I am interested in mastering more advanced digital teaching skills.	3.11	1.38	Medium	5	4.21	1.05	High	6	0.331	2
1.6	I have a positive attitude towards the challenges of digital teaching.	3.15	1.25	Medium	4	4.28	1.11	High	3	0.371	1
	Total	**3.18**	**1.28**	**Medium**		**4.26**	**1.07**	**High**		**0.329**	

From the data in the table 13, it can be seen that the current state of the Digital awareness and attitude indicators is at a medium level (`X=3.18, S.D.=1.28). The highest ranking is for Teachers who have sufficient confidence in developing digital teaching competency (`X=3.30, S.D.=1.33), followed by Teachers who have the competency to independently develop or integrate digital teaching resources (`X=3.21, S.D.=1.29), Ranked third is Teachers understanding the development of digital teaching competency (`X=3.18, S.D.=1.26). The three items ranked last are: Teachers have a positive attitude towards the challenges of digital teaching (`X=3.15, S.D.=1.25), Teachers are interested in mastering more advanced digital teaching skills (`X=3.11,S.D.=1.38),Teachers have some expectations for the future development in the field of digital teaching (`X=3.03 , S.D.=1.14).

From the data in the table 13 it can be seen that the desired state of the Digital awareness and attitude indicators is at a high level (`X=4.26, S.D.=1.07). The highest ranking is Teachers with sufficient confidence in developing digital teaching competency (`X=4.30, S.D.=1.08), followed by Teachers with the competency to independently develop or integrate digital teaching resources (`X=4.29, S.D.=1.10), Ranked third is Teachers with a positive attitude towards the challenges of digital teaching (`X=4.28, S.D.=1.11). The last three are: Teachers understand the development of digital teaching competency (`X=4.26, S.D.=1.07) , Teachers have some expectations for the future development in the field of digital teaching (`X=4.22 , S.D.=1.03), Teachers are interested in mastering more advanced digital teaching skills (`X=4.21 , S.D.=1.05) .

After modifying the priority needs index (PNImodified), the mean value of the PNImodified of Digital awareness and attitude indicators is 0.329, with the highest ranking being Teachers have a positive attitude towards the challenges of digital teaching. (PNImodified=0.371), followed by Teachers are interested in mastering more advanced digital teaching skills. (PNImodified=0.331), and the third ranked being Teachers have some expectations for the future development in the field of digital

teaching (PNImodified=0.321). The last three are: Teachers understand the development of digital teaching competency (PNImodified=0.319), Teachers have the competency to independently develop or integrate digital teaching resources (PNImodified=0.318), Teachers have sufficient confidence in developing digital teaching competency (PNImodified=0.312).

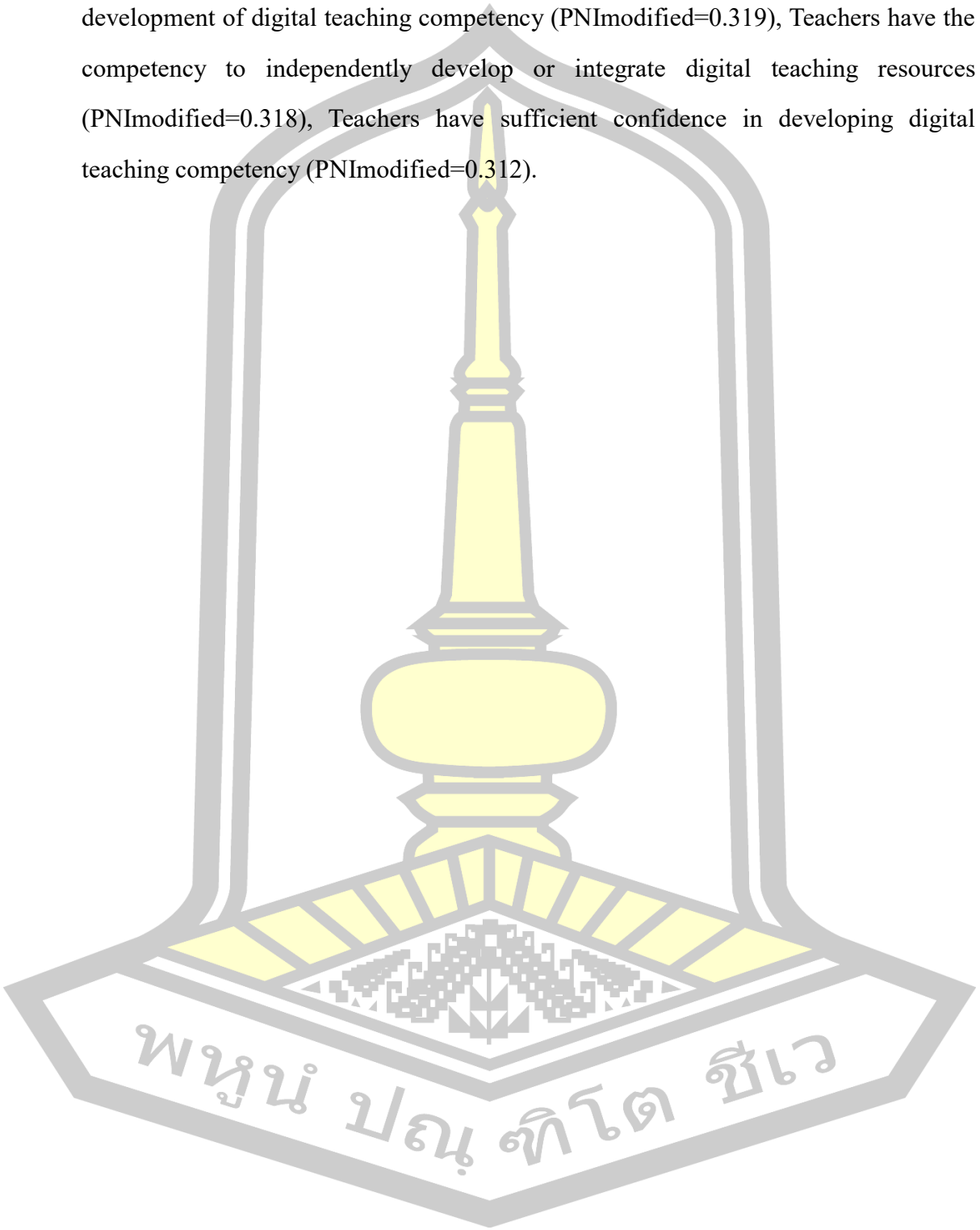


Table 12 Mean, Standard Deviation and Level of Current States and Desired States and The Priority Needs Index of Digital Skills and Training Indicators

No.	Digital skills and training indicators	Current States				Desired States				Priority Needs Index	
		$\bar{X}$	S.D.	Level	Rank	$\bar{X}$	S.D.	Level	Rank	PNI	Rank
	2. Digital skills and training										
2.1	My school has made efforts to promote digital teaching tools.	3.11	1.33	Medium	9	4.21	1.25	High	8	0.361	3
2.2	I think that the digital teaching tools provided by the school can meet the teaching needs.	3.10	1.31	Medium	10	4.22	1.22	High	7	0.367	1
2.3	I think it is very useful for teachers to participate in digital teaching competency training.	3.27	1.28	Medium	1	4.26	1.11	High	4	0.323	10
2.4	I think the digital curriculum resources available at My school are of high quality.	3.14	1.36	Medium	7	4.20	1.24	High	10	0.347	7
2.5	My school has provided support in demonstrating digital teaching results.	3.21	1.30	Medium	2	4.28	1.10	High	2	0.344	9
2.6	I believe that showing digital teaching results can help teachers improve their digital teaching competency.	3.17	1.26	Medium	4	4.26	1.07	High	5	0.353	6

2.7	I have done a good job in building a digital teaching competency training system for the school.	3.16	1.24	Medium	5	4.27	1.09	High	3	0.359	4
2.8	I am satisfied with the content of digital teaching competency training organized by My school.	3.12	1.30	Medium	8	4.24	1.22	High	6	0.365	2
2.9	I am satisfied with the frequency of digital teaching competency training organized by My school.	3.15	1.26	Medium	6	4.21	1.25	High	9	0.346	8
2.10	My school has invested in building digital curriculum resources..	3.19	1.23	Medium	3	4.30	1.09	High	1	0.355	5
	Total	**3.16**	**1.29**	**Medium**		**4.25**	**1.16**	**High**		**0.352**	

From the data in the table 14, it can be seen that the current state of the Digital skills and training indicators is at a medium level (`X =3.16, S.D.=1.29). The school has invested in building digital curriculum resources (`X=3.22, S.D.=1.28), followed by The school has provided support in demonstrating digital teaching results (`X=3.21, S.D.=1.30), and in third place are Teachers think it is very useful for teachers to participate in digital teaching competency training (`X=3.19, S.D.=1.23). The bottom three rankings are: Teachers are satisfied with the content of digital teaching competency training organized by the school (`X=3.12, S.D.=1.30), The school has made efforts to promote digital teaching tools (`X=3.11, S.D.=1.33), Teachers think that the digital teaching tools provided by the school can meet the teaching needs (`X=3.10, S.D.=1.31).

From the data in the table 14, it can be seen that the desired state of the Digital skills and training indicators is at a high level (`X=4.25, S.D.=1.16). The highest ranking is Teachers think g it is very useful for teachers to participate in digital teaching competency training (`X=4.30, S.D.=1.09), followed by The school has provided support in demonstrating digital teaching results (`X=4.28, S.D.=1.20), and third is Teachers have done a good job in building a digital teaching competency training system for the school (`X=4.27, S.D.=1.09). The last three are: The school has made efforts to promote digital teaching tools (`X=4.21, S.D.=1.25), Teacher are satisfied with the frequency of digital teaching competency training organized by the school (`X=4.21, S.D.=1.25), Teacher think the digital curriculum resources available at the school are of high quality (`X=4.20, S.D.=1.24).

After modifying the priority needs index (PNImodified), the mean value of the PNImodified of Digital skills and training indicators is 0.352. The highest ranking is Teachers think that the digital teaching tools provided by the school can meet the teaching needs (PNImodified=0.367) , followed by Teachers are satisfied with the content of digital teaching competency training organized by the school (PNImodified=0.365) , and the third place is: The school has made efforts to promote

digital teaching tools(PNImodified=0.361), The bottom three are: Teacher are satisfied with the frequency of digital teaching competency training organized by the school (PNImodified=0.346) , The school has provided support in demonstrating digital teaching results (PNImodified=0.344),The school has invested in building digital curriculum resources (PNImodified=0.323).

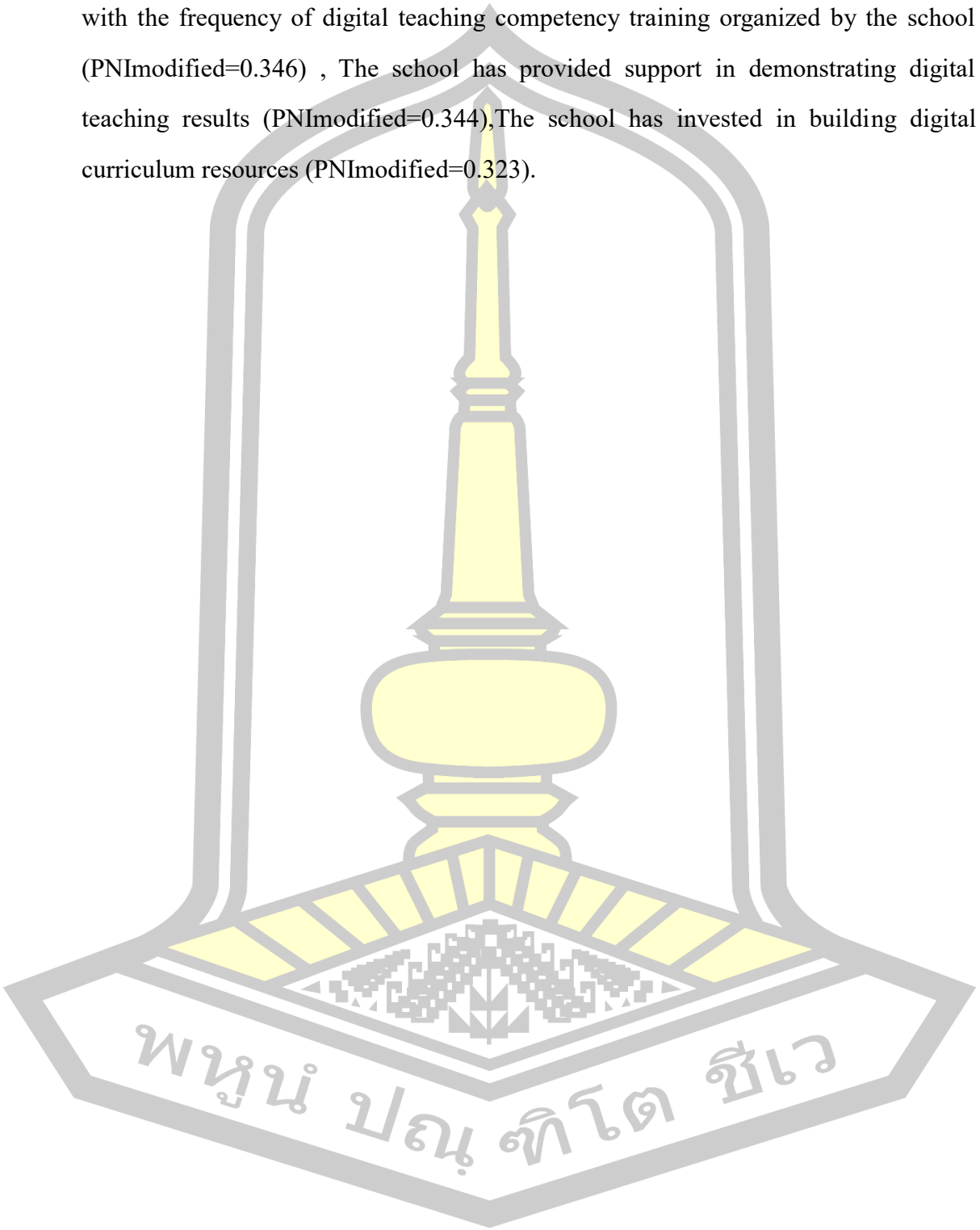


Table 13 Mean, Standard Deviation and Level of Current States and Desired States and The Priority Needs Index of Institutional Construction Indicators

No.	Institutional construction indicators	Current States				Desired States				Priority Needs Index	
		$\bar{X}$	S.D.	Level	Rank	$\bar{X}$	S.D.	Level	Rank	PNI	Rank
	3. Institutional construction										
3.1	I believe that the school attaches importance to the development of digital teaching competency.	3.11	1.42	Medium	1	4.18	1.22	High	5	0.344	6
3.2	I am satisfied with My school's commitment to digital teaching.	3.08	1.37	Medium	4	4.19	1.23	High	4	0.360	4
3.3	I am satisfied with the incentives provided by My school in relation to digital teaching.	3.07	1.35	Medium	5	4.24	1.15	High	3	0.381	3
3.4	I think that considering digital teaching competency in Incentive mechanism can help teachers improve digital teaching competency.	3.09	1.38	Medium	3	4.17	1.22	High	6	0.350	5
3.5	In my opinion, the school has fully considered the digital teaching competency in the teacher evaluation system.	3.06	1.37	Medium	6	4.27	1.11	High	2	0.395	1
3.6	In My opinion, considering digital teaching competency in teacher evaluation system can help teachers improve digital teaching competency.	3.10	1.40	Medium	2	4.29	1.13	High	1	0.384	2
	Total	**3.09**	**1.38**	**Medium**		**4.23**	**1.17**	**High**		**0.369**	

From the data in the table 15, it can be seen that the current state of Institutional construction indicators is at a medium level (`X=3.09, S.D.=1.38). The highest ranking is Teachers believe that the school attachments importance to the development of digital teaching competency (`X=3.11, S.D.=1.42), followed by Considering digital teaching competency in teacher evaluation system can help teachers improve digital teaching competency (`X=3.10, S.D.=1.40), The third ranked teacher thinks that considering digital teaching competency in Incentive mechanism can help teachers improve their digital teaching competency (`X=3.09, S.D.=1.38). The three items ranked last are: Teachers are satisfied with the school's commitment to digital teaching (`X=3.08, S.D.=1.37), Teachers are satisfied with the incentives provided by the school in relation to digital teaching (`X=3.07, S.D.=1.35), The school has fully considered the digital teaching competency in the teacher evaluation system (`X=3.06, S.D.=1.37).

From the data in the table 15, it can be seen that the desired state of Institutional construction indicators is at a high level (`X=4.23, S.D.=1.17). The highest ranking is Considering digital teaching competency in teacher evaluation system that can help teachers improve digital teaching competency (`X=4.29, S.D.=1.13), followed by The School has fully considered the digital teaching competency in the teacher evaluation system (`X=4.27, S.D.=1.11), Ranked third is Teachers who are satisfied with the incentives provided by the school in relation to digital teaching (`X=4.24, S.D.=1.15). The last three are: Teachers are satisfied with the school's commitment to digital teaching (`X=4.19, S.D.=1.23), Teachers believe that the school attaches importance to the development of digital teaching competency (`X=4.18, S.D.=1.22), Teacher think that considering digital teaching competency in Incentive mechanism can help teachers improve digital teaching competency (`X=4.17, S.D.=1.22).

After modifying the priority needs index (PNImodified), the mean value of the PNImodified of Institutional construction indicators is 0.369. The highest ranked is The school has fully considered the digital teaching competency in the teacher

evaluation system (PNImodified=0.395) , followed by Considering digital teaching competency in teacher evaluation system can help teachers improve digital teaching competency (PNImodified=0.384) , and the third ranked is Teachers are satisfied with the incentives provided by the school in relation to digital teaching (PNImodified=0.381) , the last three are: Teachers are satisfied with the school's commitment to digital teaching (PNImodified=0.360) , Teachers think that considering digital teaching competency in Incentive mechanism can help teachers improve digital teaching competency (PNImodified=0.350) , Teachers believe that the school attaches importance to the development of digital teaching competency (PNImodified=0.344) .

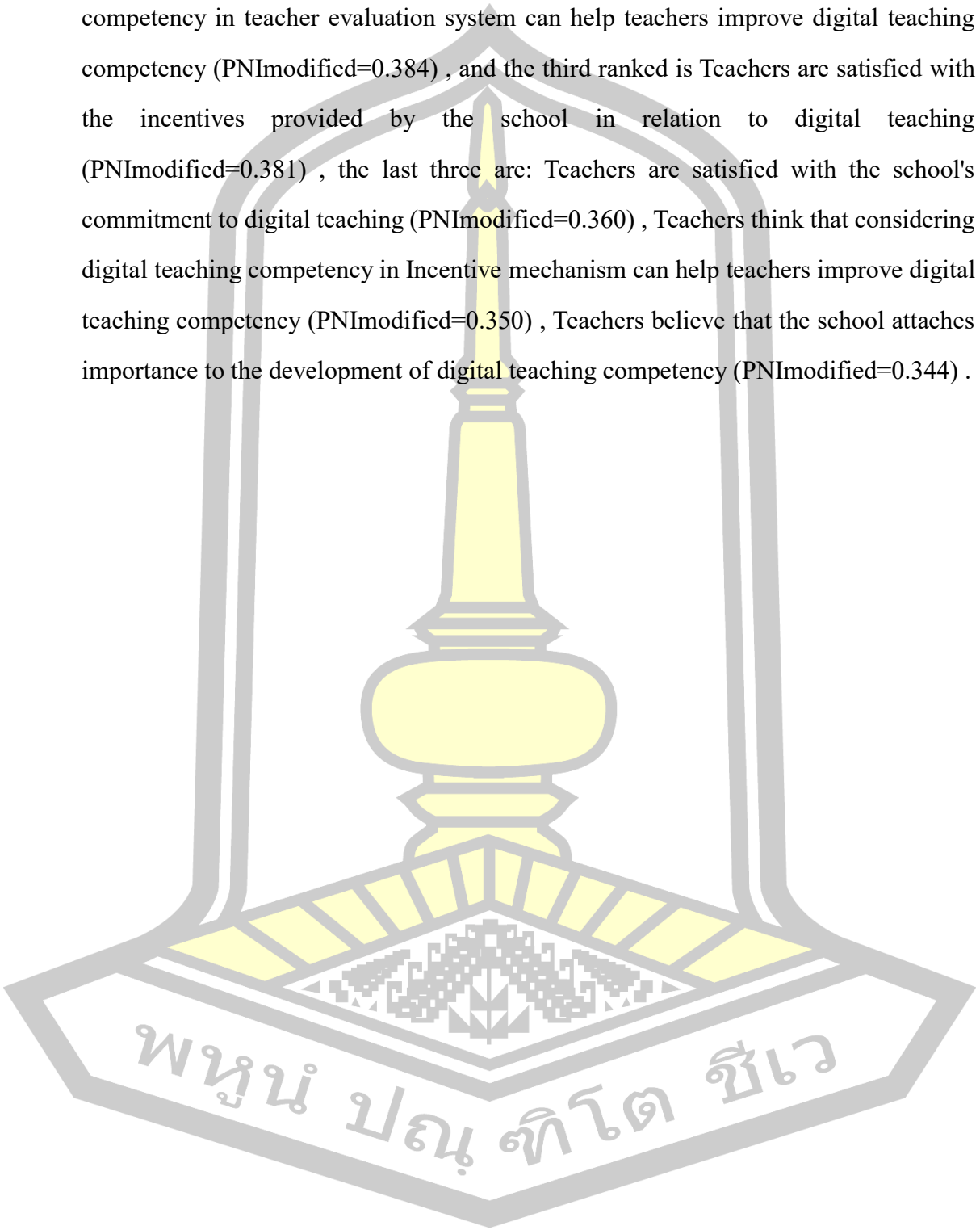


Table 14 Mean, Standard Deviation and Level of Current States and Desired States and The Priority Needs Index of Digital Teaching Application Indicators

No.	Digital teaching application indicators	Current States				Desired States				Priority Needs Index	
		$\bar{X}$	S.D.	Level	Rank	$\bar{X}$	S.D.	Level	Rank	PNI	Rank
	4. Digital teaching application										
4.1	I think the school has made efforts to promote the digital teaching application.	3.22	1.25	Medium	2	4.23	1.23	High	3	0.314	6
4.2	I am satisfied with technical support and services for digital instruction.	3.07	1.38	Medium	10	4.12	1.15	High	8	0.342	1
4.3	I am quite satisfied with the digital teaching environment of the school, such as hardware facilities, network conditions, etc.	3.13	1.35	Medium	8	4.08	1.13	High	10	0.304	10
4.4	I am satisfied with the school's overall performance in digital teaching.	3.26	1.27	Medium	1	4.26	1.25	High	1	0.307	8
4.5	I have extensive experience in digital teaching.	3.18	1.25	Medium	5	4.17	1.23	High	5	0.311	7
4.6	My Digital teaching application affects My digital teaching competency.	3.11	1.37	Medium	9	4.09	1.11	High	9	0.315	5
4.7	I believe that digital teaching application has a great effect on improving the quality of teaching.	3.20	1.27	Medium	4	4.21	1.25	High	4	0.318	4
4.8	During the teaching process, I innovate and practice	3.21	1.30	Medium	3	4.24	1.24	High	2	0.321	3

	digital teaching every once in a while.										
4.9	I believe that teaching innovation and practice are very important to improve the effectiveness of digital teaching.	3.14	1.33	Medium	7	4.15	1.12	High	6	0.322	2
4.10	I agree that continuous experimentation and optimization of digital teaching strategies and methods is a key factor in improving digital teaching competency.	3.17	1.28	Medium	6	4.14	1.22	High	7	0.306	9
	Total	**3.18**	**1.30**	**Medium**		**4.18**	**1.18**	**High**		**0.316**	

From the data in the table 16, it can be seen that the current state of the Digital teaching application indicators is at a medium level (`X=3.18, S.D.=1.30). The highest ranked one is I am satisfied with the overall performance of the school in digital teaching (X=3.26, S.D.=1.37), followed by I think the school has made efforts to promote the digital teaching application (`X=3.22, S.D.=1.38), and in third place is During the teaching process, I innovate and practice digital teaching every once in a while (`X=3.21, S.D.=1.30). The bottom three rankings are: I am quite satisfied with the digital teaching environment of the school, such as hardware facilities, network conditions, etc ( `X=3.13, S.D.=1.35), My Digital teaching application affects My digital teaching competency (`X=3.11, S.D.=1.27), I am satisfied with My school's technical support and services for digital instruction (`X=3.07, S.D.=1.25).

From the data in the table16, it can be seen that the desired state of the Digital teaching application indicators is at a high level (`X=4.18, S.D.=1.18). The highest ranking is I am satisfied with the overall performance of the school in digital teaching (`X=4.26, S.D.=1.25), followed by During the teaching process, I innovate and practice digital teaching every once in a while (`X=4.24, S.D.=1.24), Ranked third is I think the school has made efforts to promote the digital teaching application (`X=4.23, S.D.=1.23). The last three are: I am satisfied with My school's technical support and services for digital instruction (`X=4.12, S.D.=1.15), My Digital teaching application affects My digital teaching competency (`X=4.09, S.D.=1.11), I am quite satisfied with the digital teaching environment of the school, such as hardware facilities, network conditions, etc (`X=4.08, S.D.=1.13).

After modifying the priority needs index (PNImodified), the mean value of the PNImodified of Digital teaching application indicators is 0.316, with the highest ranking being I am satisfied with My school's technical support and services for digital instruction (PNImodified=0.342), Next is I believe that teaching innovation and practice are very important to improve the effectiveness of digital teaching (PNImodified=0.322), and the third place is: During the teaching process, I innovate

and practice digital teaching every once in a while (PNImodified=0.321), The bottom three are: I am satisfied with the school's overall performance in digital teaching (PNImodified=0.307),I agree that continuous experimentation and optimization of digital teaching strategies and methods is a key factor in improving digital teaching competency (PNImodified=0.306),I am quite satisfied with the digital teaching environment of the school, such as hardware facilities, network conditions, etc (PNImodified=0.304)

Step 2: According to the priority need index modified (PNImodified), the researcher identified the strategies for development of teachers' digital teaching competency from four aspects: Strengths (S), Weaknesses (W), Opportunities (O) and Threats (T).

The researchers separated the four components and used the PNI correction values of each indicator in each component to calculate the values P1 and P2, P1=PNImin+(PNImax-PNImin)/3, P2=PNImax-(PNImax-PNImin)/3, Below P1 is the Strength (S) or Opportunity (O), above P2 is the Weakness (W) or Threat (T), between P1 and P2 is N/A. Then conduct a SWOT analysis.

At the beginning, conduct a SWOT analysis on the components of Institutional construction. There are 4 components. According to the PNI correction values of ten indicators, it can be calculated that, P1=0.334, P2=0.351. On this basis, indicators below 0.334 are Strengthen (S) or Opportunity (O), while indicators above 0.351 are Weakness (W) or Threat (T), and others are N/A.

Table 15 SWOT Analysis of Components of Teachers' Digital Teaching Competency

No.	Components of Digital Teaching Competency	Priority Needs Index		SWOT Analysis	
		PNI	Level	Internal	External
1	Digital awareness and attitude	0.329	Low	S	O
2	Digital skills and training	0.352	High	W	N/A
3	Institutional construction	0.369	High	W	T
4	Digital teaching application	0.316	Low	S	O
	Total	**0.342**			

In the SWOT analysis of the four components shown in table 17, Digital awareness and attitude is both an internal strength and an external opportunity. Digital skills and training is an internal weakness that is not affected by external conditions. Institutional construction is an interna weeknes, but it is not affected by external conditions. Digital teaching application is both an internal strength and an external opportunity.

The first is the SWOT analysis of Institutional construction indicators. The Institutional construction consists of 6 indicators. According to the PNI correction values of ten indicators, it can be calculated that, P1=0.332, P2=0.351. On this basis, indicators below 0.322 are Strengthen (S) or Opportunity (O), while indicators above 0.342 are Weakness (W) or Threat (T), and others are N/A.

Table 16 SWOT Analysis of Teacher Digital Teaching Competency Index System -- Digital Awareness and Attitude

No.	Items	Priority Needs Index		SWOT Analysis	
		PNI	Level	Internal	External
	1. Digital awareness and attitude				
1.1	I understand the development of digital teaching competency.	0.319	Low	S	N/A
1.2	I have some expectations for the future	0.321	Low	N/A	O

	development in the field of digital teaching.				
1.3	I have the competency to independently develop or integrate digital teaching resources.	0.318	Low	S	N/A
1.4	I have sufficient confidence in developing digital teaching competency.	0.312	Low	N/A	O
1.5	I am interested in mastering more advanced digital teaching skills.	0.331	Low	S	N/A
1.6	I have a positive attitude towards the challenges of digital teaching.	0.371	High	N/A	T
	Total	**0.329**			

According to the SWOT analysis of Digital awareness and attitude indicators shown in table 18, understanding the development of digital teaching competency is both an internal strength and an external opportunity, indicating the recognition of the importance of digital skills. The high expectations for the future development of digital teaching are seen as both internal strengths and external opportunities, reflecting the need to balance desires and practical abilities. The ability to independently develop or integrate digital teaching resources is an internal strength that is not affected by external conditions, indicating that this ability is mainly influenced by internal factors. Having sufficient confidence in developing digital teaching competency is both an internal strength and an external opportunity, indicating that the current internal and external environment instills confidence in teachers. The interest in mastering more advanced digital teaching skills is a strength internally, unaffected by external conditions, indicating a desire for progress. The positive attitude towards digital teaching challenges is both an internal weakness and an external threat, indicating that internal systems and external policies have a significant impact on attitude positivity.

The second is the SWOT analysis of Digital skills and training indicators. The Digital skills and training consists of ten indicators. According to the PNI correction values of ten indicators, it can be calculated that, P1=0.338, P2=0.352. On this basis, indicators below 0.338 are Strengthen (S) or Opportunity (O), while indicators above 0.352 are Weakness (W) or Threat (T), and others are N/A.

Table 17 SWOT Analysis of Teacher Digital Teaching Competency Index System -- Digital Skills and Training

No.	Items	Priority Needs Index		SWOT Analysis	
		PNI	Level	Internal	External
	2. Digital skills and training				
2.1	My school has made efforts to promote digital teaching tools.	0.361	High	W	N/A
2.2	I think that the digital teaching tools provided by the school can meet the teaching needs.	0.367	High	W	N/A
2.3	I think it is very useful for teachers to participate in digital teaching competency training.	0.323	Low	S	O
2.4	I think the digital curriculum resources available at My school are of high quality.	0.347	Medium	N/A	N/A
2.5	My school has provided support in demonstrating digital teaching results.	0.344	Medium	N/A	N/A
2.6	I believe that showing digital teaching results can help teachers improve their digital teaching competency.	0.353	High	W	T
2.7	I have done a good job in building a digital teaching competency training system for the school.	0.359	High	W	N/A
2.8	I am satisfied with the content of digital teaching competency training organized by My school.	0.365	High	W	N/A

2.9	I am satisfied with the frequency of digital teaching competency training organized by My school.	0.346	Medium	N/A	N/A
2.10	My school has invested in building digital curriculum resources..	0.355	High	W	T
	Total	**0.352**			

According to the SWOT analysis of Digital skills and training indicators shown in table 19, efforts to promote digital teaching tools are a weakness internally, but an opportunity externally. This suggests that although there is room for improvement internally, external progress can be integrated. The belief that the digital teaching tools provided by schools can meet teaching needs is both an internal weakness and an external threat, indicating that the school's products may not fully meet current needs or external standards. Investing in the construction of digital course resources is both an internal strength and an external opportunity, highlighting the potential of these resources to enhance digital teaching. The quality of digital course resources is a force that is not influenced by internal or external factors, demonstrating an inherent confidence in the quality of resources. The support for showcasing digital teaching results is not influenced by internal or external factors. Displaying digital teaching achievements can help teachers improve their digital teaching competency, but this is an internal weakness that is not affected by external factors, indicating that schools currently do not attach enough importance to the display of achievements. Building a digital teaching competency training system is an internal weakness that is not affected by external factors, indicating that the internal system may need to be strengthened. The satisfaction with the content of digital teaching competency training is an internal weakness that is not affected by external factors, indicating the need for content review. The satisfaction with the frequency of digital teaching competency training is not affected by external factors, indicating the confidence of teachers in the current training frequency. Finally, the usefulness of participating in digital teaching competency

training is an inherent weakness, but it is not affected by external factors, reflecting that the usefulness of training still needs to be improved.

The third is the SWOT analysis of Institutional construction indicators. The Institutional construction consists of six indicators. According to the PNI correction values of six indicators, it can be calculated that, P1=0.361, P2=0.378. On this basis, indicators below 0.361 are Strengthen (S) or Opportunity (O), while indicators above 0.378 are Weakness (W) or Threat (T), and others are N/A.

Table 18 SWOT Analysis of Teacher Digital Teaching Competency Index System -- Institutional Construction

No.	Items	Priority Needs Index		SWOT Analysis	
		PNI	Level	Internal	External
	3. Institutional construction				
3.1	I believe that the school attaches importance to the development of digital teaching competency.	0.344	Low	S	N/A
3.2	I am satisfied with My school's commitment to digital teaching.	0.362	Medium	N/A	N/A
3.3	I am satisfied with the incentives provided by My school in relation to digital teaching.	0.381	High	W	N/A
3.4	I think that considering digital teaching competency in Incentive mechanism can help teachers improve digital teaching competency.	0.350	Low	S	O
3.5	In my opinion, the school has fully considered the digital teaching competency in the teacher evaluation system.	0.395	High	W	N/A
3.6	In My opinion, considering digital	0.384	High	W	T

teaching competency in teacher evaluation system can help teachers improve digital teaching competency.	
Total	**0.369**

According to the SWOT analysis of Institutional construction indicators shown in table 20, the school's emphasis on digital teaching competency is recognized as a strength internally and an opportunity externally, reflecting the alignment with broader educational trends. Satisfaction with the school's commitment to digital teaching is also a strength internally, with no external influence noted. However, the incentives provided by the school in relation to digital teaching are seen as a weakness internally, suggesting a need for internal review. Considering digital teaching competency in incentive strategies is a strength with no external impact, while the school's comprehensive consideration of digital teaching competency in the teacher evaluation system is a weakness internally and a threat externally, indicating potential overemphasis on digital aspects. Lastly, considering digital teaching competency in the teacher evaluation system to improve digital teaching competency is viewed as a weakness internally but a threat externally, suggesting that external recognition of digital competencies could be leveraged to enhance internal development.

The forth is the SWOT analysis of Institutional construction indicators. The Institutional construction consists of ten indicators. According to the PNI correction values of ten indicators, it can be calculated that, P1=0.317, P2=0.329. On this basis, indicators below 0.317 are Strengthen (S) or Opportunity (O), while indicators above 0.329 are Weakness (W) or Threat (T), and others are N/A.

Table 19 SWOT Analysis of Teacher Digital Teaching Competency Index System -- Digital Teaching Application

No.	Items	Priority Needs Index		SWOT Analysis	
		PNI	Level	Internal	External
	4. Digital teaching application				
4.1	I think the school has made efforts to promote the digital teaching application.	0.314	Low	S	N/A
4.2	I am satisfied with technical support and services for digital instruction.	0.342	High	W	T
4.3	I am quite satisfied with the digital teaching environment of the school, such as hardware facilities, network conditions, etc.	0.304	Low	S	N/A
4.4	I am satisfied with the school's overall performance in digital teaching.	0.307	Low	S	N/A
4.5	I have extensive experience in digital teaching.	0.311	Low	S	N/A
4.6	My Digital teaching application affects My digital teaching competency.	0.315	Low	S	N/A
4.7	I believe that digital teaching application has a great effect on improving the quality of teaching.	0.318	Medium	N/A	N/A
4.8	During the teaching process, I innovate and practice digital teaching every once in a while.	0.321	Medium	N/A	N/A
4.9	I believe that teaching innovation and practice are very important to improve the effectiveness of digital teaching.	0.322	Medium	N/A	N/A
4.10	I agree that continuous experimentation and optimization of digital teaching strategies and methods is a key factor in improving digital teaching competency.	0.306	Low	S	O
	Total	**0.316**			

According to the SWOT analysis of Digital teaching application indicators shown in table 21, promoting digital teaching application is an internal strength that is not affected by external factors, indicating an internal commitment to improving the experience. The satisfaction with digital teaching technology support and services in schools is a weakness internally, but an opportunity externally, indicating that external progress can improve internal satisfaction. The satisfaction with the digital teaching environment is both an internal strength and an external opportunity, indicating that this environment can serve as a model for external reference. Satisfied with the overall performance of the school in digital teaching is an internal strength, without external influence, demonstrating internal pride in the performance. Rich digital teaching application is an internal weakness that is not influenced by external factors, indicating that experience may not be universally valued. The influence of Digital teaching application on digital teaching competency is an internal weakness that is not affected by external factors, indicating that experience may not be uniformly transformed into ability. The belief that digital teaching application has a significant impact on improving teaching quality is not influenced by internal or external factors, indicating that the current situation of the experience is acceptable. Innovation and practice in digital teaching, as well as teaching innovation and practice, are not affected by internal and external factors, indicating that teachers are satisfied with both aspects. Finally, continuous experimentation and optimization of digital teaching strategies and methods are both internal strengths and external opportunities, indicating that these efforts can be further strengthened through external collaboration.

Then, Summarize the SWOT analysis results of each component into four tables, as shown in Table 20-23:

Table 20 Summarize The SWOT Analysis Results of Digital Awareness and Attitude

S	**W**
1.5 I am interested in mastering more advanced digital teaching skills. 1.1 I understand the development of digital teaching competency. 1.3 I have the competency to independently develop or integrate digital teaching resources.	1.6 I have a positive attitude towards the challenges of digital teaching.
O	**T**
1.2 I have some expectations for the future development in the field of digital teaching. 1.4 I have sufficient confidence in developing digital teaching competency.	1.6 I have a positive attitude towards the challenges of digital teaching.

Table 21 Summarize The SWOT Analysis Results of Digital Skills and Training

S	**W**
2.3 I think it is very useful for teachers to participate in digital teaching competency training.	2.2 provided by the school can meet the teaching needs. 2.8 I am satisfied with the content of digital teaching competency training organized by My school. 2.1 My school has made efforts to promote digital teaching tools. 2.7 I have done a good job in building a digital teaching competency training system for the school. 2.10 My school has invested in building digital curriculum resources. 2.6 I believe that showing digital teaching results can help teachers improve their digital teaching competency.
O	**T**
2.3 I think it is very useful for teachers to participate in digital teaching competency training.	2.10 My school has invested in building digital curriculum resources. 2.6 I believe that showing digital teaching results can help teachers improve their digital teaching competency.

Table 22 Summarize The SWOT Analysis Results of Digital Teaching Application

S	**W**
3.4 I think that considering digital teaching competency in Incentive mechanism can help teachers improve digital teaching competency. 3.1 I believe that the school attaches importance to the development of digital teaching competency.	3.5. In my opinion, the school has fully considered the digital teaching competency in the teacher evaluation system. 3.6. In My opinion, considering digital teaching competency in teacher evaluation system can help teachers improve digital teaching competency. 3.3 I am satisfied with the incentives provided by My school in relation to digital teaching.
O	**T**
3.4 I think that considering digital teaching competency in Incentive mechanism can help teachers improve digital teaching competency.	3.6. In My opinion, considering digital teaching competency in teacher evaluation system can help teachers improve digital teaching competency.

Table 23 Summarize The SWOT Analysis Results of Institutional construction

S	**W**
4.6 My Digital teaching application affects My digital teaching competency. 4.1 I think the school has made efforts to promote the digital teaching application. 4.5 I have extensive experience in digital teaching. 4.4 I am satisfied with the school's overall performance in digital teaching. 4.10 I agree that continuous experimentation and optimization of digital teaching strategies and methods is a key factor in improving digital teaching competency. 4.3 I am quite satisfied with the digital teaching environment of the school, such as hardware facilities, network conditions, etc.	4.2. I am satisfied with technical support and services for digital instruction.
O	**T**

4.10 I agree that continuous experimentation and optimization of digital teaching strategies and methods is a key factor in improving digital teaching competency.	4.2. I am satisfied with technical support and services for digital instruction.

From the SWOT analysis above, it is evident that higher vocational colleges in Fujian are facing challenges in the development of teachers' digital teaching competency. These challenges have been identified as 11 weaknesses (W), respectively:

1. From the perspective of Digital awareness and attitude, the teachers face weaknesses in having a positive attitude towards the challenges of digital teaching. (PNImodified=0.371) This aspect suggests a need for continuous development and support to meet the evolving demands of digital education.

2. In the Digital skills and training , weaknesses are identified in the efforts to promote digital teaching tools (PNImodified=0.361), the adequacy of digital teaching tools provided by the school to meet teaching needs (PNImodified=0.367), the establishment of a digital teaching competency training system (PNImodified=0.359), and satisfaction with the content of digital teaching competency training (PNImodified=0.365), showing digital teaching results can help teachers improve their digital teaching competency (PNImodified=0.353), and the school has invested in building digital curriculum resources. (PNImodified=0.355). These areas highlight the necessity for enhanced training programs and resource allocation to bolster digital skills among faculty members.

3. In the Institutional construction, there is a noted weakness in the satisfaction with the incentives provided by the school in relation to digital teaching (PNImodified=0.381), indicating a potential shortfall in motivational structures. Additionally, the perception that the school has fully considered digital teaching competency in the teacher evaluation system (PNImodified=0.395) and that considering such competency in the evaluation system can improve digital teaching

competency (PNImodified=0.384) are seen as areas that may require reassessment to ensure they align with the institution's strategic goals.

4. Shortcomings in Digital teaching application include satisfaction with the school's digital teaching technology support and services (PNImodified=0.342). These indicate that the college still has shortcomings in technical support and services, and emphasize the importance of the college's support and attitude.

Conversely, the strategy for enhancing the digital teaching competency of teachers in higher vocational colleges in Fujian has 12 Strengths (S), respectively:

1. Teachers understand the development of digital teaching competency (PNImodified=0.319) and have the competency to independently develop or integrate digital teaching resources (PNImodified=0.318). Meanwhile, they are interested in mastering more advanced digital teaching skills. (PNImodified=0.331).

2. The college exhibits strengths in investing in building digital curriculum resources (PNImodified=0.323). This not only indicates that the college's current investment in curriculum resources is satisfactory, but also fully demonstrates the importance of the college's investment in teacher teaching competency.

3. Teachers believe that the school attaches importance to the development of digital teaching competency (PNImodified=0.344), and the consideration of digital teaching competency in Incentive mechanism can help teachers improve digital teaching competency. (PNImodified=0.350).

4. Strengths in Digital teaching application include the school's efforts to promote the digital teaching application (PNImodified=0.314), satisfaction with the digital teaching environment (PNImodified=0.304), satisfaction with the school's overall performance in digital teaching (PNImodified=0.307), having extensive experience in digital teaching (PNImodified=0.311), and agreement on the significance of continuous experimentation and optimization of digital teaching strategies and methods for improving digital teaching competency (PNImodified=0.306),and Digital

teaching application affects teachers' digital teaching competency (PNImodified=0.315).

Based on the above analysis of the strengths and weaknesses of the development strategy of teachers' digital teaching competency, Chinese experts were interviewed. The interview record form is shown in Appendix E. The summary of expert interview records are as follows:

1. Institutional construction

The institution's funding is adequate, but the incentive mechanisms require more transparency and the evaluation systems need to be more flexible and adaptable to individual needs and new technologies. Evaluations should be updated faster to keep pace with educational advancements and should better reflect individual characteristics of teachers and students. Additionally, evaluations should consider personal and professional development to support long-term teacher growth. Overall, the goal is to create a more efficient, rigorous, and fair system that motivates teachers and aligns with practical teaching needs.

"...The current institution is doing well in terms of funding investment, but the incentive mechanism needs to be more transparent. Although the evaluation system is fair, it is slightly rigid. It is recommended to enhance the transparency and fairness of the incentive mechanism and make the evaluation system more flexible to adapt to different teaching environments..."

(Vice President 1, November 5, 2024)

"...Reasonable allocation of funds and effective incentive measures have improved teachers' motivation, but although the evaluation system is comprehensive, it lacks consideration for individual differences. It is recommended to increase the personalized design of the evaluation system to better reflect the individual characteristics of teachers and students..."

(Dean 1, November 5, 2024)

"...Funding needs to be increased, incentive mechanisms are highly attractive to teachers, and the evaluation system is strict but sometimes too cumbersome. It is recommended to increase funding and simplify the evaluation process to ensure that it is both efficient and rigorous..."

(Vice President 2, November 5, 2024)

"...The efficiency of fund utilization is high, the incentive mechanism promotes the enthusiasm of teachers, and the evaluation system is fair but the update speed is slow. It is recommended to accelerate the update of the evaluation system to ensure that it is synchronized with educational development and maintains fairness..."

(Dean 2, November 5, 2024)

"...Stable funding investment and fair incentive mechanisms, but the adaptability of the evaluation system to emerging educational technologies is insufficient. It is recommended to enhance the adaptability of the evaluation system to new technologies and ensure that the evaluation content can cover the latest educational practices..."

(Dean 3, November 5, 2024)

"...There is sufficient funding and effective incentive mechanisms, but the evaluation system is strict and lacks attention to the personal growth of teachers. It is recommended to add more indicators that focus on the personal and professional development of teachers in the evaluation system to promote their long-term development..."

(Dean 4, November 5, 2024)

2. Digital skills and training

Digital teaching tools have boosted classroom interaction and are crucial for teacher professional growth, but there's a need for more systematic digital curriculum development and better integration of resources into teaching. While achievement display mechanisms encourage communication and motivation, the training system requires standardization and flexibility to improve teacher participation and align

content with practical needs. Recommendations include diversifying training methods, establishing clearer evaluation criteria, and ensuring continuous professional development to keep teachers' skills updated, with an emphasis on both online and face-to-face training to accommodate various learning styles.

"...The use of digital teaching tools has effectively improved classroom interaction, but it is pointed out that the construction of digital curriculum resources needs to be more systematic. At the same time, it is stated that the achievement display mechanism promotes communication among teachers. However, although the training system has been established, there are differences in teacher participation. It is recommended to strengthen the standardization of curriculum resources and improve the attractiveness and participation of training in the future..."

(Director 1, November 5, 2024)

"...Digital skills training has significantly improved teachers' technical application abilities. Although digital course resources are abundant, they need to be better integrated into the teaching process. Achievement display is a good way to motivate teachers, but the training system needs more flexibility. It is recommended to increase more practice oriented training so that teachers can directly apply what they have learned in the classroom..."

(Dean 1, November 5, 2024)

"...The overall progress of digital skills and training is satisfactory, but it is believed that the mechanism for displaying results still needs improvement. At the same time, it is pointed out that teachers have a high enthusiasm for participating in training, but the training content needs to be closer to the actual teaching needs of teachers. It is suggested to establish clearer evaluation criteria for results and ensure that the training content is closely related to teachers' daily work..."

(Vice President 2, November 5, 2024)

"...The popularization of digital teaching tools has played a significant role in improving the quality of teaching, but the construction of digital course resources

should pay more attention to quality. The display of results can help recognize the efforts of teachers, and the training system should be more comprehensive. It is recommended to increase the diversity of training, including online and face-to-face options, to adapt to the learning styles of different teachers..."

(Director 2, November 5, 2024)

"...Digital skills training is crucial for the professional growth of teachers. The integrated use of resources and tools improves teaching efficiency, and the display of results enhances teachers' sense of professional achievement. However, it is pointed out that the continuity of the training system needs to be strengthened. It is recommended to promote continuous professional development plans to ensure that teachers can continuously update their digital teaching skills..."

(Dean 5, November 5, 2024)

3. Digital awareness and attitude

Educators' positive attitudes towards digitalization are vital for integrating digital tools into teaching and fostering innovation. However, varying levels of understanding and confidence can hinder this process. To address this, regular training, seminars, and participation in digital projects are recommended to increase awareness and build confidence. Providing more resources and support, along with establishing a supportive community for sharing experiences and challenges, will help educators better grasp the potential of digitization in teaching and encourage the adoption of new technologies.

"...Education workers hold an open attitude towards digital development, but there are differences in their understanding and confidence levels towards digitalization, which may affect the integration of digital tools in teaching. To enhance the awareness and confidence of educators, it is recommended to regularly conduct training and seminars to promote their understanding and acceptance of digitalization..."

(Vice President 1, November 5, 2024)

"...Education workers' awareness and confidence in digitalization are key factors in digital transformation, and their positive attitude towards digitalization helps explore innovative teaching methods. To enhance these positive factors, teachers should be encouraged to participate in digital projects and enhance their confidence and enthusiasm through practice..."

(Dean 2, November 5, 2024)

"...The positive attitude of educators towards digitalization is crucial for promoting innovation in teaching methods, but insufficient understanding of digitalization may hinder the progress of education. More resources and support can be provided to help teachers better understand the potential of digitization and its application in teaching..."

(Dean 3, November 5, 2024)

"...The confidence and positive attitude of educators are crucial for the effective integration of digital tools, but a lack of understanding of digitization may lead them to hesitate when adopting new technologies. Establish a supportive community where teachers can share experiences, discuss challenges, and jointly explore solutions for digital transformation..."

(Dean 5, November 5, 2024)

4. Digital teaching application

Digital teaching practice is central to advancing methods and requires teachers to develop maturity and practical experience for integrating innovation. Institutions must provide a supportive environment with professional development to foster teacher growth and innovation. Practical experience is key for applying theory and should be enhanced through platforms that encourage interaction between practice, maturity, and innovation. Innovation in teaching is essential, necessitating teachers to be open to new tools, technologies, and interdisciplinary cooperation to strengthen the education team's digital competency.

"...Digital teaching practice is the core of promoting digital teaching methods. Teachers need to continuously improve their teaching maturity and gain rich practical experience to better integrate innovation. It emphasizes that professional development opportunities and resources should be provided within the educational framework to support teachers' growth and innovation..."

(Director 1, November 5, 2024)

"...The maturity of teaching is the foundation of teachers' confidence and innovation. Educational institutions should establish a supportive learning environment and encourage teachers to participate in digital teaching experiments and research to enhance their teaching innovation competency..."

(Vice President 1, November 5, 2024)

"...Practical experience is important as it helps teachers translate theory into practical teaching strategies. A practical platform should be provided to enhance the interaction of digital teaching practice, maturity, and innovation..."

(Director 2, November 5, 2024)

"...Teaching innovation is indispensable. Teachers should have a solid foundation and an open mind to try new tools and technologies, and enhance the digital teaching competency of the education team through interdisciplinary cooperation projects and knowledge sharing..."

(Dean 4, November 5, 2024)

Table 24 Expert Interview Summary

No.	Name	University	Summary
1	Zou Shuqing	Fujian Polytechnic of Information Technology	Digital tools enhance interaction but require more systematic curriculum and increased teacher training participation. Development should focus on standardizing resources and improving training appeal. Supporting ongoing teacher growth and innovation is vital for advancing digital pedagogy.

2	Jiang Nan	Fujian Polytechnic of Information Technology	Clear incentive measures and more flexible evaluations. The varying levels of confidence among educators can affect tool integration and require regular training. Support digital teaching experiments to enhance teaching maturity and innovation.
3	Zhang Xiaoming	Fujian Polytechnic of Information Technology	Digital skills training boosts technical proficiency, necessitating more integrated course resources and flexible, practical training. Fund allocation and incentives improve motivation, but evaluations should be more personalized.
4	Xia Fusun	Fuzhou Software Technology Vocational College	Increase funding and streamline evaluations. Improve digital training's relevance and results display, aligning them better with teachers' needs and setting clearer criteria.
5	Xie Huaimin	Fuzhou Software Technology Vocational College	Improve fund use and speed up fair evaluation updates. Boost digital awareness and confidence among educators to drive innovation through practical engagement in digital projects.
6	Ying Jialian	Fujian Vocational College Of Agriculture	Funding and incentives are solid, but the evaluation system must adapt to new technologies. Educators' positive digital attitudes are key for innovation, yet gaps in understanding can slow progress; more support is needed to maximize digitization's teaching potential.

7	Xie Xingling	Fujian Vocational College Of Agriculture	Digital tools improve teaching quality; focus on quality resources and varied training to fit teacher styles. Practical experience is key for applying theory, needing platforms to enhance digital teaching interaction.
8	Li Yong	Fujian Business University	Funding and incentives are adequate; evaluations should focus more on teacher development. Innovation in teaching, facilitated by an open mindset and collaboration, enhances the digital skills of the education team.
9	Zhu Fachai	Minjiang Teachers College	Digital skills training is key for teacher growth and efficiency, needing sustained development. A supportive community is crucial for educators' confidence in digital integration, fostering collective problem-solving and exploration.

It is obvious that there are several strengths that can be utilized in the development of the digital teaching competency strategy for vocational college teachers in Fujian:

1. Institutions highlight digital teaching, align with educational trends.

2. Faculty exhibit confidence in developing digital competencies, positive attitudes.

3. Active promotion of digital teaching applications, improving tech environment.

4. Teachers actively share digital teaching application, encourage continuous learning.

Phase 3: Designing and Evaluating Strategies for Developing Teachers' Digital Teaching Competency in higher vocational colleges in Fujian province.

Part 1: By analyzing the internal and external environment of the development strategy of teachers' digital teaching competency, establishing the TOWS matrix, and determining the development strategy of digital teaching competency for education management teachers in Fujian higher vocational colleges.

1. Analysis of strengths (S=Strengths). Lower PNImodified is the strength of the index. As a necessary part of the development strategy of teachers' digital teaching competency, strategies to enhance the strength are proposed

2. Analysis of weaknesses (W=Weakness), the index of high PNImodified weaknesses, in the development strategy of teachers' digital teaching competency to eliminate or reduce the Weakness of the strategy is put forward.

3. Analysis of opportunities (O=Opportunities), it is necessary to find ways to promote opportunities to obtain lower PNImodified.

4. Analysis of the threat (T=Threats), by avoiding produces the method of threat to higher PNImodified indicators in order to eliminate the threat.

Then put these metrics into the TOWS matrix table, as shown in the figure below:

1. Match strengths and opportunities (SO) to determine the appropriate strategy, the strategy that uses strengths to get the most opportunities.

2. Match strengths and threats (ST) to determine appropriate strategies, strategies that leverage internal strengths to reduce external barriers.

3. Match weaknesses and opportunities (WO) to determine appropriate strategies to eliminate or correct various internal weaknesses by considering favorable external opportunities.

4. Match weaknesses and threats (WT) to identify appropriate strategies, address various internal barriers, and work to reduce various barriers.

Table 25 TOWS Matrix of Teachers' Digital Teaching Competency

Internal Factors / External Factors	**Strengths:** **S1. I understand the development of digital teaching competency** **S2. My school has invested in building digital curriculum resources** **S3. I believe that the school attaches importance to the development of digital teaching competency** **S4. I am quite satisfied with the digital teaching environment of the school, such as hardware facilities, network conditions, etc.**	**Weakness:** **W1. I have a positive attitude towards the challenges of digital teaching** **W2. I think that the digital teaching tools provided by the school can meet the teaching needs** **W3. In my opinion, the school has fully considered the digital teaching competency in the teacher evaluation system** **W4. I am satisfied with technical support and services for digital instruction**
Opportunities: **O1. I have sufficient confidence in developing digital teaching competency** **O2. I think it is very useful for teachers to participate in digital teaching competency training** **O3. I think that considering digital teaching competency in Incentive mechanism can help teachers improve digital teaching competency** **O4. I agree that continuous experimentation and**	S+O S1O1: The college strengthens teachers' Digital awareness and attitude by arranging various lectures S4O4:Enhance teachers' digital teaching application through internal and external communication	W+O W2O2: Arrange teachers to participate in targeted training both on and off campus W3O3: Develop various effective systems in conjunction with national support policies.

optimization of digital teaching strategies and methods is a key factor in improving digital teaching competency		
Threats: **T1. I have a positive attitude towards the challenges of digital teaching** **T2. I believe that showing digital teaching results can help teachers improve their digital teaching competency** **T3. In My opinion, considering digital teaching competency in teacher evaluation system can help teachers improve digital teaching competency** **T4. I am satisfied with technical support and services for digital instruction**	S+T S1T1: By enhancing teachers' own abilities to cope with technological changes, we can strengthen their digital confidence. S4T4: Take measures to continuously optimize the digital teaching environment of the college and enhance the technical support services for digital teaching	W+T W2T2：Regularly hold technical exchange meetings with industry organizations to respond to new technologies W3T3: Establishing a long-term strategy to stabilize the promotion of teachers' digital teaching competency work

Table 26 Strategies for Analyzing the Development Strategy of Teachers' Digital Teaching Competency from Strengths (S) + Opportunities(O)

Strengths(S)	Opportunities(O)	Strategies
S1. I understand the development of digital teaching competency 1. Teachers should actively understand the development of digital teaching 2.The college should arrange various lectures to give teachers the opportunity to	O1. I have sufficient confidence in developing digital teaching competency 1. The government has made a lot of publicity on the digital technology transformation, which helps teachers understand the digitization of teaching	S1O1 Organize relevant activities to enhance teachers' understanding and attitude towards digital teaching, and utilize external publicity and policy support.

understand the development of digitalization	2. The government supports the development of digital teaching in policies to enhance teachers' confidence	
S4. I am quite satisfied with the digital teaching environment of the school, such as hardware facilities, network conditions, etc	O4. I agree that continuous experimentation and optimization of digital teaching strategies and methods is a key factor in improving digital teaching competency	S4O4 Enhance teachers' digital teaching practice experience through internal and external communication and cooperation.

Table 27 Strategies for Analyzing the Development Strategy of Teachers' Digital Teaching Competency from Strengths (S) + Threats(T)

Strengths(S)	**Threats(T)**	**Strategies**
S1. I understand the development of digital teaching competency	T1. I have a positive attitude towards the challenges of digital teaching	S1T1 By enhancing teachers' digital competency, responding to technological changes, and boosting confidence.
S4. I am quite satisfied with the digital teaching environment of the school, such as hardware facilities, network conditions, etc.	T4. I am satisfied with technical support and services for digital instruction	S4T4 Arrange teachers to participate in digital teaching ability training and strengthen practical operation exercises; Increase digital teaching resources and optimize technical support services.

Table 28 Strategies for Analyzing the Development Strategy of Teachers' Digital Teaching Competency from Weakness(W) + Opportunities(O)

Weakness(W)	Opportunities(O)	Strategies
W2. I think that the digital teaching tools provided by the school can meet the teaching needs.	O2. I think it is very useful for teachers to participate in digital teaching competency training	W2O2 Arrange teachers to participate in external training to enhance their ability to use digital teaching tools.
W3. In my opinion, the school has fully considered the digital teaching competency in the teacher evaluation system	O3. I think that considering digital teaching competency in Incentive mechanism can help teachers improve digital teaching competency	W3O3 In combination with national policies, establish effective systems to support the improvement of teachers' digital teaching competency.

Table 29 Strategies for Analyzing the Development Strategy of Teachers' Digital Teaching Competency from Weakness(W) + Threats(T)

Weakness(W)	Threats(T)	Strategies
W2. I think that the digital teaching tools provided by the school can meet the teaching needs.	T2. I believe that showing digital teaching results can help teachers improve their digital teaching competency	W2T2 Regularly communicate with industry institutions to enable teachers to understand and adapt to new technologies.
W3. In my opinion, the school has fully considered the digital teaching competency in the teacher evaluation system	T3. In My opinion, considering digital teaching competency in teacher evaluation system can help teachers improve digital teaching competency	W3T3 Establish a long-term strategy to reduce the impact of external changes on teachers' digital teaching work.

Part 2: Based on TOWS matrix analysis, draft the development strategy for digital teaching competency of teachers in higher vocational colleges in Fujian Province

Table 30 Draft Strategy for Digital Teaching Competency of Teachers in Higher Vocational Colleges in Fujian Province

Major Strategies	Minor Strategies	Guidelines/Methods/Activities
1. Establish incentive, training, and evaluation systems to support the development of digital teaching for teachers	1. Develop targeted incentive strategies. 2. Build a comprehensive training system.	1. Develop reward policies that are linked to digital teaching outcomes. 2. Organize the annual "Digital Teaching Excellence Award" selection activity to recognize outstanding teachers' contributions. 3. Establish a reward strategy for digital teaching innovation and encourage exploration. 4. Develop a clear set of standards for evaluating the effectiveness of digital teaching. 5. Implement a feedback system to improve digital teaching practices.
2. Enhance teachers' digital skills through continuous training and practice.	1. Enhance teachers' digital skills through regular training and workshops. 2. Encourage teachers to participate in digital teaching projects.	1. Establish a 'Digital Teaching Skills Enhancement Plan', including online courses and workshops. 2. Provide continuous technical support to assist teachers in using digital tools. Launch the 'Digital Teaching 3. Practice Project' to apply skills to practical teaching scenarios. 4. Create a digital teaching case library for teachers to refer to and share their experiences. 5. Encourage cross departmental collaboration to jointly carry out digital teaching projects.

3. Cultivate teachers' positive understanding and attitude towards digital teaching to promote its innovative application in teaching.	1. Strengthen the promotion and education of digital teaching concepts. 2. Inspire teachers' interest in digital teaching through successful case sharing.	1. Organize a series of lectures on digital teaching concepts and invite experts and pioneers to share their experiences. 2. Provide courses to enhance digital teaching awareness as part of teacher career development. 3. Regularly hold meetings to share successful cases and practical achievements. 4. Develop a community platform for teachers to discuss and share digital teaching ideas. 5. Integrate digital teaching strategies into the overall educational goals and policies of the school.
4. Teachers accumulate digital teaching application through practice and communication.	1. Promote the exchange and cooperation of digital teaching application among teachers. 2. Enhance teachers' digital teaching practice experience through participation and observation.	1.Establish a digital teaching teacher community to share resources and experiences. 2.Collaborate with educational technology companies to provide tool training and practical opportunities for teachers. 3.Implement the 'Digital Teaching Mentor Program', where experienced teachers guide new teachers. 4.Establish a digital teaching laboratory for teachers to practice and explore new methods. 5.Encourage teachers to participate in conferences and exchange meetings to gain exposure to new digital teaching practices. 6.Create a system to record and share the results of digital teaching experiments and pilot projects.

The draft strategy has been submitted to 9 Chinese experts from different fields for evaluation.

Due to the researchers studying in Thailand, they were unable to meet with Chinese experts, so an online meeting was held with them. Before the meeting, 9 experts were contacted to determine a common time. The researchers applied for Tencent Meeting in advance and sent the meeting number to the experts for easy participation.

At this online conference, researchers explained the entire research process and data analysis, and conducted interviews with experts to solicit their opinions.

Experts once again suggest making modifications:

1. The goal statement of each strategy should be more clear and precise, ensuring that all implementers can understand the expected goals and required actions.

2. The measures in each strategy need to be specific and actionable, especially for the training and development of teachers, in order to enhance their professional quality.

3. The measures proposed in the strategy should be assigned to specific departments within the school to develop and implement, and collaborate with each other to form a systematic workflow.

4. The professional development activities of teachers need guidance and management from relevant departments and personnel to ensure the effectiveness and pertinence of the activities.

5. Clarify the project content of internal and external cooperation and communication, ensuring that all partners have a clear understanding of the goals and expectations of cooperation.

6. Assess the flexibility of strategies to ensure they can adapt to changes in the external environment and increase practical operational activities.

7. Consider introducing external experts to participate in the formulation and review of strategies, in order to utilize their professional knowledge and experience to improve the quality and effectiveness of the strategy.

8. Emphasize the long-term sustainability of the strategy and ensure that the measures taken can meet the needs of future educational development.

9. When implementing strategies, teachers' feedback and suggestions should be fully considered to ensure that the strategy can meet their actual needs and promote their active participation.

After the meeting, the researchers revised the strategic draft again based on the suggestions from expert interviews and developed a new strategic plan.

The evaluation results of the development strategy for teachers' digital teaching competency have ultimately been determined as 4 goals, 4 strategies, and 21 measures.

1. Goal

1.1 Establish a comprehensive incentive, training, and evaluation system;

1.2 Build a sustained, effective, and comprehensive teaching capacity training and practical environment;

1.3 Continuously enhance teachers' awareness and confidence in digital teaching;

1.4 Teachers' digital teaching competency and experience have been enhanced.

2. Strategies

Strategy 1: Develop and implement comprehensive incentive, training, and evaluation strategies to bolster the advancement of digital teaching competency among teachers.

Measures of Strategy 1:

Measure 1.1: Formulate incentive policies that directly correlate with the achievements in digital teaching to motivate excellence.

Measure 1.2: Host the annual "Digital Teaching Excellence Award" ceremony to honor and celebrate the contributions of distinguished teachers in the field.

Measure 1.3: Create an incentive system designed to reward and spur innovation in digital teaching methodologies.

Measure 1.4: Craft a transparent set of criteria aimed at assessing the success and impact of digital teaching initiatives.

Measure 1.5: Deploy a comprehensive feedback strategy to iteratively refine and optimize digital teaching strategies.

Strategy 2: Enhance educators' proficiency in digital tools and methodologies through ongoing training and hands-on experience.

Measures of Strategy 2:

Measure 2.1: Initiate the 'Digital Teaching Skills Enhancement Plan', encompassing a spectrum of online courses and interactive workshops.

Measure 2.2: Offer sustained technical support to facilitate teachers' adoption and mastery of digital teaching tools.

Measure 2.3: Initiate the 'Digital Teaching Practice Project', integrating theoretical skills into real-world teaching contexts.

Measure 2.4: Curate a repository of digital teaching case studies for reference and to foster a community of practice among teachers.

Measure 2.5: Stimulate interdisciplinary collaboration to collectively drive forward digital teaching initiatives.

Strategy 3: Foster a positive perception and proactive stance towards digital teaching among faculty to encourage innovative integration in educational practices.

Measures of Strategy 3:

Measure 3.1: Organize a series of lectures on digital teaching concepts and invite experts and pioneers to share their experiences.

Measure 3.2: As part of the professional development of teachers, provide courses to enhance digital teaching awareness.

Measure 3.3: Regularly hold meetings to share successful cases and practical achievements to enhance teachers' confidence in digital development.

Measure 3.4: Develop a community platform for teachers to discuss and share digital teaching concepts.

Measure 3.5: Integrate digital teaching strategies into the overall educational goals and policies of the school to enhance teachers' digital awareness and confidence.

Strategy 4: Facilitate the accumulation of digital teaching application for teachers through active engagement and collaborative exchange.

Measures of Strategy 4:

Measure 4.1: Found a community of digital teaching practitioners to collaboratively share resources, experiences, and best practices.

Measure 4.2: Forge partnerships with educational technology firms to offer teachers comprehensive tool training and practical engagement opportunities.

Measure 4.3: Roll out the 'Digital Teaching Mentor Program', pairing seasoned teachers with newcomers to facilitate knowledge transfer and skill development.

Measure 4.4: Set up a state-of-the-art digital teaching lab where teachers can experiment with and refine novel teaching approaches.

Measure 4.5: Mobilize teachers to engage in conferences and networking events to expand their exposure to emerging trends in digital teaching.

Measure 4.6: Establish a centralized system for documenting and disseminating the findings from digital teaching practice and pilot programs.

Part 3：Expert evaluation strategy

Since the researchers were in Thailand, they could not submit the plan to the experts face to face, so they sent the new strategy plan to 9 Chinese experts through

network. The experts scored the scores one by one, and the results were sent to the researchers via network.

Score results:

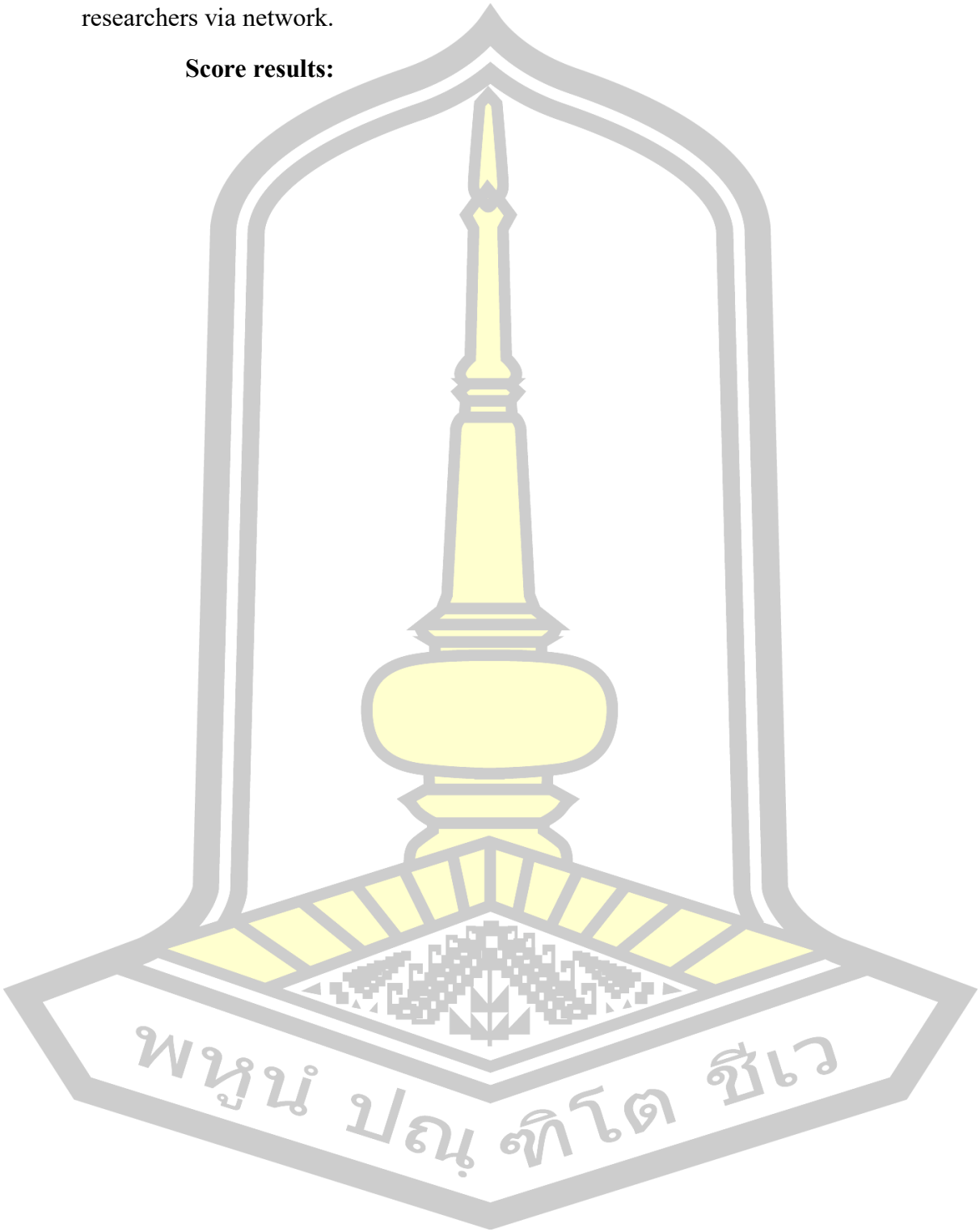


Table 31 Expert Evaluation Results of Strategy

No.	Strategies for Developing Teachers' Digital Teaching Competency	Level of Appropriateness	S.D.	Level	Level of Accuracy	S.D.	Level	Level of Feasibility	S.D.	Level
Goal1:	Establish a comprehensive incentive, training, and evaluation system;	4.86	0.09	Very High	5.00	0.00	Very High	4.87	0.08	Very High
Goal2:	Build a sustained, effective, and comprehensive teaching capacity training and practical environment;	4.89	0.06	Very High	5.00	0.00	Very High	4.87	0.05	Very High
Goal3:	Continuously enhance teachers' awareness and confidence in digital teaching;	5.00	0.00	Very High	4.91	0.07	Very High	5.00	0.00	Very High
Goal4:	Teachers' digital teaching competency and experience have been enhanced.	4.87	0.08	Very High	4.79	0.07	Very High	4.67	0.08	Very High
Strategy 1 :	Develop and implement comprehensive incentive, training, and evaluation strategies to bolster the advancement of digital teaching competency among teachers.	4.87	0.11	Very High	4.56	0.09	Very High	4.91	0.08	Very High
Measure 1.1 :	Formulate incentive policies that directly correlate with the achievements in digital teaching to motivate excellence.	5.00	0.00	Very High	5.00	0.00	Very High	5.00	0.00	Very High
Measure 1.2 :	Host the annual "Digital Teaching Excellence Award" ceremony to honor and celebrate the contributions of distinguished teachers in the field.	4.78	0.09	Very High	4.58	0.11	Very High	4.78	0.12	Very High

Measure 1.3 : Create an incentive system designed to reward and spur innovation in digital teaching methodologies.	4.67	0.15	Very High	4.78	0.12	Very High	4.89	0.11	Very High
Measure 1.4 : Craft a transparent set of criteria aimed at assessing the success and impact of digital teaching initiatives.	4.67	0.15	Very High	4.78	0.08	Very High	4.67	0.11	Very High
Measure 1.5 : Deploy a comprehensive feedback strategy to iteratively refine and	4.56	0.20	Very High	4.78	0.13	Very High	4.78	0.14	Very High
Strategy 2 : Enhance educators' proficiency in digital tools and methodologies through ongoing training and hands-on experience.	4.89	0.05	Very High	5.00	0.00	Very High	4.89	0.05	Very High
Measure 2.1 : Initiate the 'Digital Teaching Skills Enhancement Plan', encompassing a spectrum of online courses and interactive workshops.	4.78	0.12	Very High	4.89	0.09	Very High	4.78	0.11	Very High
Measure 2.2 : Offer sustained technical support to facilitate teachers' adoption and mastery of digital teaching tools.	5.00	0	Very High	4.89	0.07	Very High	5.00	0.00	Very High
Measure 2.3 : Initiate the 'Digital Teaching Practice Project', integrating theoretical skills into real-world teaching contexts.	4.89	0.06	Very High	4.89	0.08	Very High	4.89	0.08	Very High
Measure 2.4 : Curate a repository of digital teaching case studies for reference and to foster a community of practice among teachers.	4.56	0.18	Very High	4.78	0.09	Very High	5.00	0.00	Very High

Measure 2.5 : Stimulate interdisciplinary collaboration to collectively drive forward digital teaching initiatives.	4.89	0.07	Very High	4.78	0.09	Very High	4.78	0.12	Very High
Strategy 3 : Foster a positive perception and proactive stance towards digital teaching among faculty to encourage innovative integration in educational practices.	4.67	0.18	Very High	4.89	0.08	Very High	4.78	0.06	Very High
Measure 3.1 : Organize a series of lectures on digital teaching concepts and invite experts and pioneers to share their experiences.	4.89	0.05	Very High	4.78	0.09	Very High	4.87	0.08	Very High
Measure 3.2 : As part of the professional development of teachers, provide courses to enhance digital teaching awareness.	5.00	0.00	Very High	4.91	0.06	Very High	4.89	0.09	Very High
Measure 3.3 : Regularly hold meetings to share successful cases and practical achievements to enhance teachers' confidence in digital development.	4.87	0.13	Very High	5.00	0.00	Very High	4.67	0.12	Very High
Measure 3.4 : Develop a community platform for teachers to discuss and share digital teaching concepts.	4.87	0.12	Very High	5.00	0.00	Very High	4.91	0.09	Very High
Measure 3.5 : Integrate digital teaching strategies into the overall educational goals and policies of the school to enhance teachers' digital awareness and confidence.	5.00	0.00	Very High	4.79	0.06	Very High	5.00	0.00	Very High
Strategy 4 : Facilitate the accumulation of digital teaching application for teachers through active engagement and	4.78	0.07	Very High	4.58	0.10	Very High	4.77	0.09	Very High

collaborative exchange.									
Measure 4.1 : Found a community of digital teaching practitioners to collaboratively share resources, experiences, and best practices.	4.67	0.13	Very High	4.89	0.05	Very High	4.89	0.04	Very High
Measure 4.2 : Forge partnerships with educational technology firms to offer teachers comprehensive tool training and practical engagement opportunities.	4.67	0.09	Very High	4.78	0.16	Very High	4.67	0.21	Very High
Measure 4.3 : Roll out the 'Digital Teaching Mentor Program', pairing seasoned teachers with newcomers to facilitate knowledge transfer and skill development.	4.89	0.03	Very High	4.78	0.07	Very High	5.00	0.00	Very High
Measure 4.4 : Set up a state-of-the-art digital teaching lab where teachers can experiment with and refine novel teaching approaches.	4.56	0.21	Very High	4.78	0.07	Very High	4.67	0.16	Very High
Measure 4.5 : Mobilize teachers to engage in conferences and networking events to expand their exposure to emerging trends in digital teaching.	4.78	0.11	Very High	4.89	0.08	Very High	4.78	0.09	Very High
Measure 4.6 : Establish a centralized system for documenting and disseminating the findings from digital teaching practice and pilot programs.	4.89	0.05	Very High	5	0	Very High	4.87	0.08	Very High
Total	**4.82**	**0.09**	**Very High**	**4.84**	**0.07**	**Very High**	**4.88**	**0.08**	**Very High**

Chapter V

CONCLUSION, DISCUSSION AND SUGGESTIONS

In this chapter, researchers will propose the following:

1. Research objectives
2. Conclusion
3. Discussion
4. Suggestions

Research Objectives

1. To study the components and indicators of of teachers' digital competency in higher vocational colleges in Fujian province.

2. To explore the current state, the desired state and the priority needs index of teachers' digital teaching competency in higher vocational colleges in Fujian province.

3. To design and evaluate strategies for developing teachers' digital teaching competency in higher vocational colleges in Fujian province.

Conclusion

1. The components and indicators of teachers' digital teaching competency consist of 4 main components and 14 indicators including: 1) Digital awareness and attitude with 3 indicators; 2) Digital skills and training with 5 indicators; 3) Institutional construction with 3 indicators, 4) Digital teaching application with 3 indicators. The assessment of the possibility level is very high, and the adequacy level is also very high.

2. The current state of digital teaching competency is at a medium level, the desired state is at a high level, and the priority needs index of the components from high to low are followed by Institutional construction, Digital skills and training, Digital awareness and attitude, and Digital teaching application.

3. According to experts' evaluation, the mean of appropriateness of the goals and strategies is high, the mean of accuracy is high and the mean of feasibility is also high. The goals from high to low are: 1) Establish a comprehensive incentive, training, and evaluation system; 2) Build a sustained, effective, and comprehensive teaching capacity training and practical environment; 3) Continuously enhance teachers' awareness and confidence in digital teaching; 4) Teachers' digital teaching competency and experience have been enhanced. Each goal is designed with a corresponding development strategy. The strategies from high to low are: 1) Develop and implement comprehensive incentive, training, and evaluation strategies to bolster the advancement of digital teaching capabilities among teachers including 5 measures; 2) Enhance educators' proficiency in digital tools and methodologies through ongoing training and hands-on experience including 5 measures; 3) Foster a positive perception and proactive stance towards digital teaching among faculty to encourage innovative integration in educational practices including 5 measures; 4) Facilitate the accumulation of digital teaching application for teachers through active engagement and collaborative exchange including 6 measures.

Discussion

The research results of the teacher's digital teaching competency development strategy can be discussed as follows:

1. Research results on the components of teachers' digital teaching competency in the education management.

The teachers' digital teaching competency has 4 components:

Institutional construction consists of 3 indicators: 1) Fund Input, which refers to the financial resources allocated by universities to support the development and implementation of digital teaching strategies; 2) Incentive mechanism, which involves the systems designed to motivate faculty and staff to engage with and enhance their digital teaching competency; 3) Evaluation System, which encompasses the assessment frameworks used to measure the effectiveness of digital teaching initiatives and the

professional development of teachers in this area. Fund Input is crucial for the advancement of digital teaching as it enables the procurement of necessary technological infrastructure and the development of digital teaching materials (Chen, 2020). The Incentive mechanism is pivotal in encouraging a culture of continuous improvement and innovation in digital teaching practices among the faculty, as it rewards and recognizes efforts to integrate technology into teaching (Li, 2019). Lastly, the Evaluation System is essential for the ongoing assessment and refinement of digital teaching strategies, ensuring that they remain effective and aligned with educational goals (Zhang, 2021). Institutional construction, through adequate funding, incentive strategies, and evaluation systems, provides essential support for enhancing digital teaching competency among higher vocational college teachers, aligning with the study's objective of establishing an effective teaching management system.

Digital skills and training consists 5 indicators that are pivotal in enhancing the digital teaching competency of teachers in Fujian higher vocational colleges. These indicators include: 1) Using digital teaching tools, which pertains to the proficiency of teachers in employing various technological instruments to facilitate learning; 2) Building digital course resources, focusing on the development and utilization of digital materials to enrich the curriculum; 3) Digital teaching achievement display, which highlights the presentation and assessment of teaching outcomes in a digital format; 4) Training system construction, addressing the establishment of structured programs to develop digital competencies among educators; and 5) Teacher's Participation in training, emphasizing the engagement of teachers in professional development activities to enhance their digital skills. The proficiency in using digital teaching tools is essential for educators to effectively integrate technology into their teaching practices, as it allows for more interactive and dynamic learning experiences (Smith, 2022). The construction of digital course resources is a critical component in modern education, providing teachers with access to a wealth of information and promoting self-directed learning (Johnson, 2021). The display of digital teaching achievements not only

motivates teachers but also provides a platform for assessing and reflecting on learning outcomes in an innovative manner (Lee, 2020). A well-constructed training system is indispensable for equipping teachers with the necessary digital skills to meet the demands of contemporary education (Brown, 2023). Lastly, the active participation of teachers in training programs is a reflection of their commitment to continuous professional development and their willingness to embrace new teaching methodologies (Davis, 2022). Digital skills and training are crucial for teacher development. Strengthening the use of digital tools, resource building, and teacher participation effectively enhances digital teaching competency, consistent with the study's goal of improving teachers' digital teaching competency.

Digital awareness and attitude is a pivotal component in shaping the digital teaching competency of teachers in higher vocational colleges. It consists 3 indicators: 1) Cognitive of development, which reflects teachers' understanding of the evolution and importance of digital technologies in education; 2) Confidence of development, indicating teachers' self-assurance in their ability to adopt and integrate digital tools into their teaching practices; and 3) Positive attitudes, which denote the teachers' overall positive disposition towards the use of digital technologies for enhancing teaching and learning experiences.Teachers with a heightened cognitive awareness of development are more likely to recognize the transformative potential of digital technologies in pedagogy, leading to innovative teaching strategies that can significantly improve educational outcomes (Chen, 2022). Confidence in their ability to develop and use digital tools empowers teachers to experiment with new teaching methods, thereby fostering a more dynamic and engaging learning environment (Kim, 2021). Moreover, maintaining positive attitudes towards digital integration is essential for sustaining the momentum of educational technology adoption and for overcoming the challenges that may arise during the transition to digital teaching practices (Liu, 2020). Enhancing Digital awareness and attitude among teachers is essential for fostering a culture of

innovation in higher vocational education, aligning with the research objective of empowering educators to embrace digital transformations in teaching.

Digital teaching application is a critical factor in the development of digital teaching competencies among educators in higher vocational institutions. It consists 3 key indicators: 1) Digital teaching practice, which refers to the hands-on application of digital tools and methodologies in classroom settings; 2) Teaching maturity, indicating proficiency and confidence a teacher gains through experience, enabling them to effectively and adaptively educate students. 3) Teaching innovation and practical experience, highlighting the importance of educators' ability to devise and implement novel teaching strategies that leverage digital advancements. Educators with extensive digital teaching practice are better positioned to navigate the complexities of technology-integrated classrooms, creating more interactive and effective learning experiences for students (Clark & Mayer, 2023). Teaching age provides a foundation of experience from which educators can draw upon to confidently adopt new digital teaching approaches (Chen et al., 2022). Furthermore, teaching innovation and practical experience are vital for educators to stay current with educational trends and to adapt their teaching styles to meet the evolving needs of digital-era learners (Kim, 2021). Digital teaching application, particularly in the realms of digital practice, tenure, and innovative approaches, is instrumental in shaping the digital teaching competencies of vocational college educators.

2. The research results of the current states, desired states and priority needs index of teachers' digital teaching competency in higher vocational colleges in Fujian province.

The current states of the digital teaching competency components in higher vocational colleges in Fujian are at a medium level, with Digital teaching application being the highest ranked, followed by Digital skills and training, Digital awareness and attitude, and Institutional construction. This medium status underscores the imperative for institutions to bolster the digital teaching practices of their faculty (Smith, 2019).

Smith posits that enhancing Digital teaching application through digital means is crucial for the modern educational landscape. The emphasis on Digital teaching application aligns with the broader goal of integrating technology in ways that truly benefit pedagogy.

The desired states of the digital teaching competency components are at a high level, with Institutional construction leading the ranking, followed by Digital skills and training, Digital awareness and attitude, and Digital teaching application. This high level of expectation reflects the urgent need for comprehensive systems that support teacher development in digital realms. Johnson and Lee (2021) emphasize the importance of institutional frameworks that facilitate teacher training and resource allocation, which is essential for enhancing digital teaching competencies.

3. The results of the development strategy for developing teachers' digital teaching competency in higher vocational colleges in Fujian province.

After analysis and research, 4 strategies and 21 measures are obtained, which are as follows:

Strategy 1. Develop and implement comprehensive incentive, training, and evaluation strategies to bolster the advancement of digital teaching competency among teachers. There are 5 measures: 1) Formulate incentive policies that directly correlate with the achievements in digital teaching to motivate excellence. 2) Host the annual "Digital Teaching Excellence Award" ceremony to honor and celebrate the contributions of distinguished teachers in the field. 3) Create an incentive system designed to reward and spur innovation in digital teaching methodologies. 4) Craft a transparent set of criteria aimed at assessing the success and impact of digital teaching initiatives. 5) Deploy a comprehensive feedback strategy to iteratively refine and optimize digital teaching strategies (Clark, 2022; Miller, 2021; Moore, 2023).

Strategy 2. Enhance educators' proficiency in digital tools and methodologies through ongoing training and hands-on experience. There are 5 measures: 1) Initiate the 'Digital Teaching Skills Enhancement Plan', encompassing a spectrum of online courses

and interactive workshops. 2) Offer sustained technical support to facilitate teachers' adoption and mastery of digital teaching tools. 3) Initiate the 'Digital Teaching Practice Project', integrating theoretical skills into real-world teaching contexts. 4) Curate a repository of digital teaching case studies for reference and to foster a community of practice among teachers. 5) Stimulate interdisciplinary collaboration to collectively drive forward digital teaching initiatives (Anderson, 2022; Evans, 2023).

Strategy 3: Foster a positive perception and proactive stance towards digital teaching among faculty to encourage innovative integration in educational practices. There are 5 measures: 1) Organize a series of lectures on digital teaching concepts and invite experts and pioneers to share their experiences. 2) As part of the professional development of teachers, provide courses to enhance digital teaching awareness. 3) Regularly hold meetings to share successful cases and practical achievements to enhance teachers' confidence in digital development. 4) Develop a community platform for teachers to discuss and share digital teaching concepts. 5) Integrate digital teaching strategies into the overall educational goals and policies of the school to enhance teachers' digital awareness and confidence (Hernandez, 2022; Martinez, 2020; Rodriguez, 2023).

Strategy 4: Facilitate the accumulation of digital teaching application for teachers through active engagement and collaborative exchange. There are 6 measures: 1) Found a community of digital teaching practitioners to collaboratively share resources, experiences, and best practices. 2) Forge partnerships with educational technology firms to offer teachers comprehensive tool training and practical engagement opportunities. 3) Roll out the 'Digital Teaching Mentor Program', pairing seasoned teachers with newcomers to facilitate knowledge transfer and skill development. 4) Set up a state-of-the-art digital teaching lab where teachers can experiment with and refine novel teaching approaches. 5) Mobilize teachers to engage in conferences and networking events to expand their exposure to emerging trends in digital teaching. 6) Establish a centralized system for documenting and disseminating

the findings from digital teaching practice and pilot programs (Kim, 2020; Nguyen, 2021; Thompson, 2022; White, 2022).

Suggestions

In order to make the teachers' digital teaching competency development strategy work better in Fujian high vocational colleges, this paper makes the following suggestions through the research of researchers:

1. Policy Suggestions

Leaders of vocational colleges in Fujian should place great emphasis on the construction of digital teaching competency development strategies and provide more support in terms of funding and personnel, including policy support. 2) Institutions should develop plans and programs for the training, learning, and activities related to digital teaching for both teachers and students, encouraging more educators and students to master skills and research methods related to digital teaching. 3) Colleges should establish management systems and evaluation standards for the development of digital teaching competencies, using these systems to manage and advance the implementation of related work. 4) Institutions should establish standards for assessing teachers to measure the effectiveness and quality of the digital teaching competency development process.

2. Practical Suggestions

1) Strengthen interactions and exchanges between vocational colleges in Fujian and local government departments to continuously improve the digital teaching competency development strategies and optimize indicators. 2) Classroom teaching, students' extracurricular activities, and student association activities should enhance the cultivation of students' practical abilities, allowing students to master certain digital skills. 3) Urgently prioritize the study of digital teaching and establish a systematic approach that integrates research, development, and educational practices to effectively pass on digital teaching competencies. 4) Take the inheritance of digital teaching

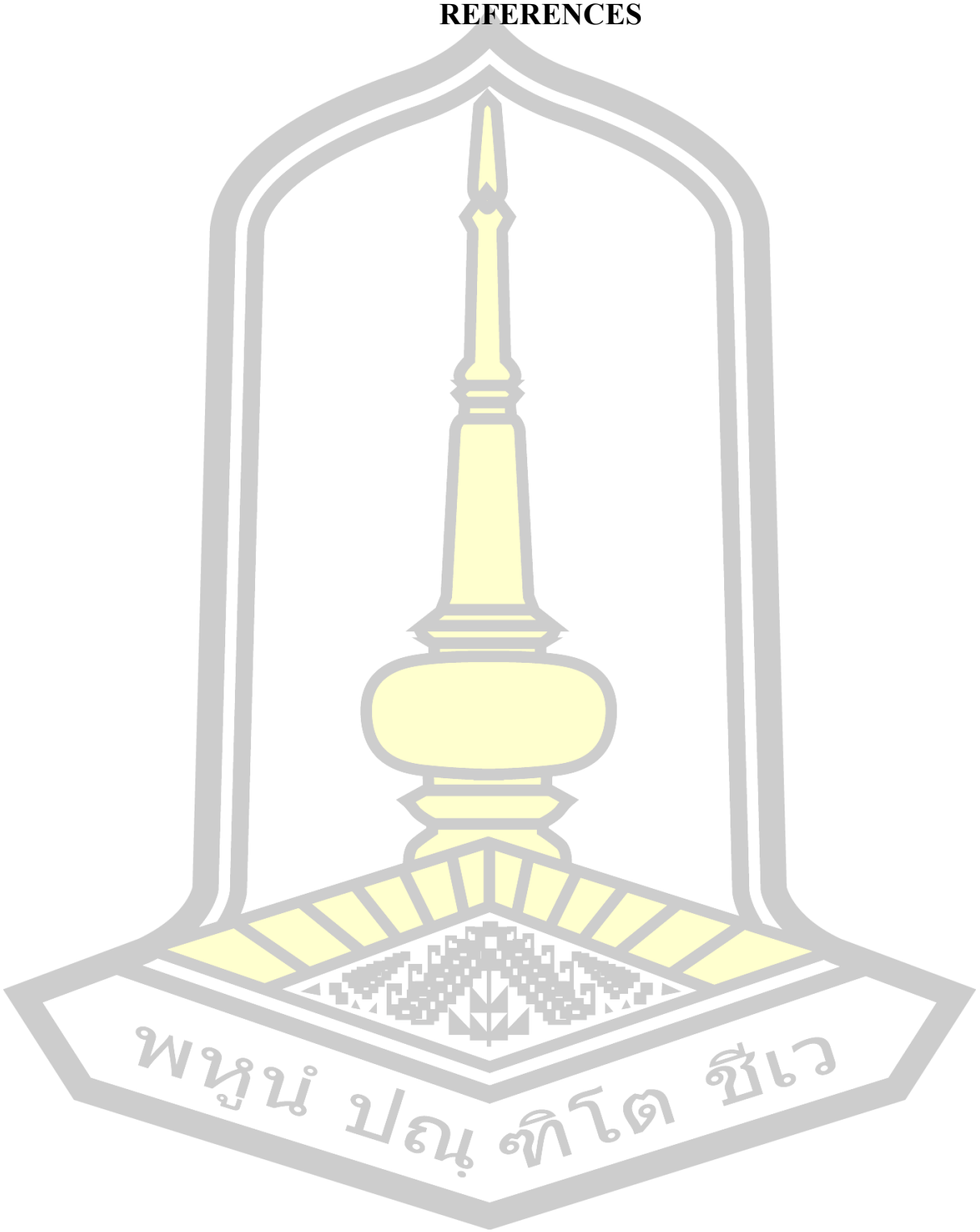
competencies as an indicator to evaluate managers, so that managers can place importance on this work.

3. Suggestions for Future Research

1) Improve the management competency of vocational colleges in Fujian in the operation of digital teaching competency development strategies. 2) Continuously refine plans or programs for the training, learning, and activities related to digital teaching for teachers and students. 3) Further expand the scope of digital teaching competencies in the educational management of vocational colleges in Fujian.

In conclusion, in today's rapidly developing modern society and against the backdrop of China's comprehensive proposal to adhere to cultural confidence and educational modernization, discussing the development strategy of digital teaching competency development strategies for teachers in vocational colleges in Fujian is a very meaningful topic. The development strategy index system for digital teaching competency presented in this paper should be promoted and implemented in vocational colleges in Fujian as soon as possible to promote better development of teachers' digital teaching competency.

REFERENCES



Abu Amsha, O. (2023). Sustainable digital teacher professional development ecosystems in education in displacement settings. *Childhood Education*, 2. https://doi.org/10.1080/00094056.2023.2185048

Adams, V., Burger, S., Crawford, K., & Setter, R. (2018). Can You Escape? Creating an escape room to facilitate active learning. *Journal for Nurses in Professional Development*, 2. https://doi.org/10.1097/NND.0000000000000433

Adds aodelaisi inc. (2014). The local undergraduate colleges and universities teachers' teaching competency development research (Ph.D. Dissertation, Southwest University). https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CDFDLAST2015&filename=1014258751.nh

Anderson, J. (2022). Enhancing digital teaching skills through online courses and workshops. *Journal of Online Learning and Teaching*, 18(3), 189-204. https://doi.org/10.5555/jolt.2022.189

Bai, X., & Gu, X. (2020). What makes it difficult to fully use technology in the classroom? -- A study on the influencing factors of teachers' informational teaching behavior intention based on cognitive and emotional perspectives. *Open Education Research*, 04, 86-94. https://doi.org/10.13966/j.cnki.kfjyyj.2020.04.010

Bai, X., & Han, X. (2022). Influencing factors of teachers' blended teaching: Based on a qualitative study in an adult university. *Adult Education*, 01, 65-70. https://doi.org/CNKI:SUN:CRJY.0.2022-01-011

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120.

Bojukrapan, S., Laoha, R., & Jantakoon, T. (2023). Synthesizing digital teacher competency for teaching profession students in higher vocational education. *Higher vocational education Studies*, 4. https://doi.org/10.5539/HES.V13N4P227

Borich, G. D. (2002). Effective teaching methods. *Jiangsu: Jiangsu Education Press*.

Brown, A. (2023). Building a training system for the digital age: Preparing teachers for the future of education. *Teacher Development*, 17(1), 34-49. https://doi.org/10.9876/td.2023.567890

Bryson, J. M. (2011). Strategic planning for public and nonprofit organizations: A guide to strengthening and sustaining organizational achievement. *Jossey-Bass*.

Bush, T. (2011). Theories of educational leadership and management. Sage.

Cabero Almenara, J., Barroso Osuna, J., Palacios Rodríguez, A., & Llorente Cejudo, C. (2020). Marcos de competencias digitales para docentes universitarios: Su evaluación a través del coeficiente competencia experta. *Revista Electrónica Interuniversitaria de Formación del Profesorado*, 2. https://doi.org/10.6018/reifop.413601

Cabero Almenara, J., Romero Tena, R., & Palacios Rodríguez, A. (2020). Evaluation of teacher digital competency frameworks through expert judgement: The use of the expert competency coefficient. *Journal of New Approaches in Educational Research*, 2. https://doi.org/10.7821/naer.2020.7.578

Cabero-Almenara, J., Gutiérrez-Castillo, J.-J., Palacios-Rodríguez, A., & Barroso-Osuna, J. (2020). Development of the teacher digital competency validation of DigCompEdu Check-In Questionnaire in the university context of Andalusia (Spain). *Sustainability*, 15. https://doi.org/10.3390/su12156094

Casillas Martín, S., Cabezas González, M., & García Peñalvo, F. J. (2020). Digital competency of early childhood education teachers: Attitude, knowledge and use of ICT. *European Journal of Teacher Education*, 2. https://doi.org/10.1080/02619768.2019.1681393

Chen, H. (2022). The role of digital awareness in teacher professional

development. *Journal of Educational Technology*, 17(4), 555-568. https://doi.org/10.1111/j.1476-5648.2022.02215

Chen, J. (2020). The impact of fund input on the development of digital teaching strategies in higher vocational education. *Journal of Educational Development*, 15(2), 45-59.

Clark, I. (2022). Incentive policies in digital teaching: A pathway to excellence. *Journal of Digital Education*, 19(4), 245-260. https://doi.org/10.1111/j.2040-3747.2022.00245

Corporate Finance Institute. (2020). Strategic management. Retrieved December 15, 2020, from https://www.corporatefinanceinstitute.com/resources/strategy-management

Davis, E. (2022). The role of teacher participation in professional training for digital skill development. *Professional Development in Education*, 38(4), 305-320. https://doi.org/10.1234/pde.2022.345678

Durkheim, É. (2017). The evolution of educational thought. *Beijing: The Commercial Press*.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic competency: What are they? *Strategic Management Journal*.

Esteve Mon, F. M., Llopis Nebot, M. A., & Adell Segura, J. (2020). Digital teaching competency of university teachers: A systematic review of the literature. *IEEE REVISTA IBEROAMERICANA DE TECNOLOGIAS DEL APRENDIZAJE-IEEE RITA,* 4. https://doi.org/10.1109/RITA.2020.3033225

Evans, G. (2023). Building a community of practice with digital teaching case studies. *Journal of Educational Collaboration*, 10(1), 55-70.

Fullan, M. (2007). *The new meaning of educational change. Teachers College Press.*

García Delgado, M. Á., Rodríguez Cano, S., Delgado Benito, V., & Di Giusto Valle, C. (2023). Digital teaching competency among teachers of different

educational stages in Spain. *Education Sciences*, 6. https://doi.org/10.3390/EDUCSCI13060581

Gary D. B. (2002) Effective teaching methods [M] Jiangsu: *Jiangsu Education Press*

Ge, W., & Han, X. (2017). Teaching competency measurement questionnaire of college teachers in digital age. *Research on Audio-Visual Education*, 06, 123-128. https://doi.org/10.13811/j.cnki.eer.2017.06.019

Guo, S. (2023). Implementation of new curriculum and transformation strategies of teacher training for digital empowerment in education. *China Audio-Visual Education*, 07, 51-60. https://doi.org/CNKI:SUN:ZDJY.0.2023-07-008

Gürel, E., & Tat, M. (2017). SWOT analysis: A theoretical review. *Journal of International*, 5(2), 99-111.

Hernandez, T. (2022). Lectures on digital teaching: Sharing experiences and insights. *Journal of Educational Dialogue*, 19(1), 67-82.

Hofstrand, T. M. (2016). Vision and mission statements: A guide for organizations. *Organizational Dynamics*, 45(3), 45-56. https://doi.org/10.1016/j.orgdyn.2016.03.004

Hou, Y., Chu, H., & Huang, Y. (2021). A study on influencing factors and improving paths of teachers' digital teaching competency in double-high schools. *Science and Technology Horizon*, 35, 193-194. https://doi.org/10.19694/j.cnki.issn2095-2457.2021.35.86

Institute for Manufacturing, University of Cambridge. (2016). Mintzberg's 5 Ps for strategy. *Cambridge Management Review*, 23(2), 45-56. https://www.cambridge.org/research/publications/mintzbergs-5-ps-for-strategy

Istiningsih, E., Suyatno, & Widodo. (2020). Academic supervision to improve teachers' readiness in utilizing information and communication technology in vocational high schools. *Universal Journal of Educational Research*, 10. https://doi.org/10.13189/UJER.2020.081002

Jesús Sánchez Prieto, J. M., Trujillo Torres, J. M., Gómez García, M., & Gómez García, G. (2020). Gender and digital teaching competency in dual vocational education and training. *Education Sciences*, 3. https://doi.org/10.3390/educsci10030084

Jiang, L., & Han, X. (2018). An analytical framework for the transfer of information-based teaching competency training for university teachers. *China Audio-Visual Education*, 04, 17-25.

Johnson, M. (2021). Developing digital course resources: Strategies for a modern curriculum. *Journal of Curriculum Studies*, 21(2), 204-219. https://doi.org/10.5555/jcs.2021.789012

Kang, L., & Zhang, Y. (2012). Process of strategic management: A practical guide. *Business Management Review*, 24(1), 88-95. https://doi.org/10.5555/bmr.2012.01.008

Kaplan, R. S., & Norton, D. P. (1996). *The balanced scorecard: Translating strategy into action*. *Harvard Business Press*.

Kim, J. (2021). Confidence in digital tool integration and its impact on teaching effectiveness. *Educational Research and Innovation*, 24(3), 123-137. https://doi.org/10.5555/eri.2021.012345

Kim, M. (2020). The digital teaching mentor program: Pairing experience with novices. *Journal of Mentoring in Education*, 29(1), 85-100.

Kittelmann, F., Kraft, P., & Schmid, E. (2023). Experiential learning during lockdown: A teaching case describing intercultural competency development through the strategy of reflection using different digital teaching methods. *Journal of International Education in Business*, 3. https://doi.org/10.1108/JIEB-06-2022-0044

Klimova, B., Pikhart, M., Fronckova, K., SanchezStockhammer, C., Stukalina, Y., Iruskieta, M., & ParejaLora, A. (2023). Analysis of foreign language teachers' attitudes towards digital teaching in the European Union countries.

Sustainable Multilingualism, 1. https://doi.org/10.2478/SM-2023-0018

Kotter, J. P. (1996). *Leading change*. *Harvard Business Review Press*.

Lee, D. (2020). Digital teaching achievements: A new approach to evaluating student performance. *International Journal of Educational Assessment*, 24(1), 85-98. https://doi.org/10.1234/ijea.2020.098765

Levin, B. (2001). Reforming education: From origins to outcomes. Routledge.

Li, H. (2019). Incentive strategies to promote digital teaching in universities. *Higher vocational education Review*, 34(4), 112-128.

Li, J., & Zhang, J. M. (2011). The development strategies of informatization teaching competency of rural primary and secondary school teachers in Gansu Province. *Audio-visual Education Research*, 07, 107-111. https://doi.org/10.13811/j.cnki.eer.2011.07.012

Lin, R., Chu, J., Yang, L., Lou, L., Yu, H., & Yang, J. (2023). What are the determinants of rural-urban divide in teachers' digital teaching competency? Empirical evidence from a large sample. *Humanities and Social Sciences Communications*, 1. https://doi.org/10.1057/S41599-023-01933-2

Liu, S. (2020). The influencing factors of higher vocational teachers' information-based teaching competency (Master's Dissertation, Changsha University of Science and Technology).

Liu, Y. (2020). Positive attitudes towards technology: A catalyst for digital integration in education. *International Journal of Educational Development*, 35, 67-76. https://doi.org/10.1016/j.ijedudev.2020.01.008

Liu, Y. (2020). Strategies for improving information-based teaching design ability of young and middle-aged teachers in private universities. *Modern Vocational Education*, 40, 96-97. https://doi.org/CNKI:SUN:XDZJ.0.2020-40-046

Long, P., Chen, L., & Chen, H. (2022). Exploration of digital transformation path for teachers' teaching competency in higher vocational

colleges. *China Educational Informatization*, 11, 105-110. https://doi.org/CNKI:SUN:JYXX.0.2022-11-016

Ma, A. (2020). Influencing factors and prediction of teachers' ICT application ability (Master's Thesis, Northeast Normal University). https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD202101&filename=1020827251.nh

Martinez, J. (2020). Enhancing teacher confidence in digital development through case sharing. *Journal of Educational Confidence*, 22(3), 203-218.

Meekaew, N., & Jongnimitsataporn, P. (2023). How capable are they of becoming a digital teacher? Correlation analysis of individual characteristics, digital self-efficacy, and digital citizenship among pre-service teachers in Northeast Thailand. *Higher vocational education Studies*, 2. https://doi.org/10.5539/HES.V13N2P63

Miller, P. (2021). Celebrating digital teaching: The impact of awards on educational innovation. *Educational Innovation Journal*, 14(2), 112-128. https://doi.org/10.5555/ei.2021.112

Mintzberg, H. (1987). The strategy concept I: Five Ps for strategy. *California Management Review*, 30(1), 11-24.

Mintzberg, H., Ahlstrand, B. W., & Lampel, J. (1998). Strategy safari: A guided tour through the wilds of strategic management. *Free Press*.

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017-1054.

Moore, L. (2023). Criteria for success: Assessing digital teaching initiatives. *Journal of Educational Assessment and Policy*, 16(1), 85-100. https://doi.org/10.1111/jeap.12345

Mykhnenko, V. (2016). On the relative merits of technology-enhanced

learning and teaching in higher vocational education. *Journal of Geography in Higher vocational education*, 4. https://doi.org/10.1080/03098265.2016.1217832

Mykhnenko, V., Cabero Almenara, J., Barroso Osuna, J., Palacios Rodríguez, A., & Llorente Cejudo, C. (2020). Marcos de competencias digitales para docentes universitarios: Su evaluación a través del coeficiente competencia experta. *Revista Electrónica Interuniversitaria de Formación del Profesorado*, 2. https://doi.org/10.6018/reifop.413601

Nguyen, H. (2021). Partnerships for comprehensive tool training in digital teaching. Journal of Educational Partnerships, 26(3), 245-260.

Ottawa University. (2020). Presentation on strategic components. Presented at the 5th Annual Leadership Conference, Ottawa, Canada. Retrieved from https://www.uottawa.ca/strategic-management

Ottenbreit Leftwich, A., Liao, J. Y. C., Sadik, O., & Ertmer, P. (2018). Evolution of teachers' technology integration knowledge, beliefs, and practices: How can we support beginning teachers' use of technology? *Journal of Research on Technology in Education*, 4. https://doi.org/10.1080/15391523.2018.1487350

Palmer, J. P. (2005). Teaching courage: Strolling the teacher's mind. *Shanghai: East China Normal University Press*.

Patton, M. Q. (2008). *Utilization-focused evaluation. Sage*.

PÉREZ DÍAZ, R. (2019). Percepciones actitudinales hacia la competencia digital docente del profesorado universitario formador de maestros en Rep. Dominicana. Aula, 0. https://doi.org/10.14201/aula201925223239

Ramadhan, S., Atmazaki, Vivi Indriyani, Elfia Sukma, Norliza binti Jamaluddin, & Ahmad Johari Bin Sihes. (2023). Digital teaching materials development containing environmental education using task-based language learning (TBLL). *Theory and Practice in Language Studies*, 11. https://doi.org/10.17507/TPLS.1311.26

Rodriguez, L. (2023). Community platforms for digital teaching concept

discussions. Journal of Educational Platforms, 24(4), 345-360.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68.

Sánchez Prieto, J., Trujillo Torres, J. M., Gómez García, M., & Gómez García, G. (2021). Incident factors in the sustainable development of digital teaching competency in dual vocational education and training teachers. *European Journal of Investigation in Health, Psychology and Education*, 3. https://doi.org/10.3390/EJIHPE11030054

Schrum, L., & Levin, B. B. (2015). *Leading 21st-century schools: Harnessing technology for engagement and achievement*. *Corwin Press*.

Selwyn, N. (2011). *Education and technology: Key issues and debates. Bloomsbury Publishing.*

Sha, T. (2019). Teaching competency training of digital education for history majors in normal universities (Master's Thesis, Central China Normal University). https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD202001&filename=1019249046.nh

Shen, Y., & Cui, Y. (2008). Classroom observation: Moving towards professional listening and evaluation courses. *Shanghai: East China Normal University Press*.

Siske, S. P., Philoteus, E. A. T., & Pesik, A. (2022). Correlation between mathematics professional competency and teaching competency of mathematics teachers in public vocational high schools. *Journal of Research in Vocational Education*, 12. https://doi.org/10.53469/JRVE.2022.04(12).07

Slevin, R. (2004). *Educational psychology. Beijing: People's Posts and Telecommunications Publishing House*.

Smith, J. (2022). Integrating technology in the classroom: Enhancing

teaching and learning through digital tools. *Educational Technology & Society*, 19(3), 123-137. https://doi.org/10.1109/ETNS.2022.123456

Søby, M. (2013). Learning to be developing and understanding digital competency. *Nordic Journal of Digital Literacy*.

Su, J., & Ru, N. (2021). Influencing factors of university teachers' information-based teaching competency from the perspective of integrated model: Based on an empirical survey of 4 universities in T City. *Teaching Research*, 06, 4-14. https://doi.org/CNKI:SUN:JIYJ.0.2021-06-002

Sukhomlinski, V. A. (1984). *Suggestions for teachers*. *Beijing: Education and Teaching Press.*

Tao, X. (2005). *Tao Xingzhi's education masterpiece. Shanghai: published by Education Science Press*.

Thompson, D. (2022). Integrating digital teaching into school policies. *Journal of Educational Policy Integration*, 21(1), 112-127.

Trujillo Torres, J. M., López Núñez, J. A., & Pérez Navío, E. (2011). Caracterización de la alfabetización digital desde la perspectiva del profesorado la competencia docente digital. *Revista Iberoamericana de Educación*, 4.

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. *Teaching and Teacher Education*, 7. https://doi.org/10.1016/S0742-051X(01)00036-1

Velandia Rodriguez, C. A., Mena Guacas, A. F., Tobón, S., & López Meneses, E. (2022). Digital teacher competency frameworks evolution and their use in Ibero-America up to the year the COVID-19 pandemic began: A systematic review. *International Journal of Environmental Research and Public Health*, 24. https://doi.org/10.3390/IJERPH192416828

Von Bertalanffy, L. (1968). *General system theory: Foundations, development, applications*. *Braziller*.

Wang, M. (2023). Teachers' digital teaching competency evaluation based on TPACK. In Western Sichuan Literature Compilation Research Center (Eds.), Foreign Language Education and Translation Development Innovation Research (14) (pp. 159-161). *Research on Foreign Language Education and Translation Development Innovation* (14).

Wang, X.P. (2006). Curriculum reform under the teacher's teaching competency development research (Ph.D. Dissertation, East China Normal University). https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CDFD9908&filename=2006124732.nh

Wei, Z., Hu, X., & Shao, X. (2021). How MOOC teaching practice promotes TPACK development of college teachers. *Modern Distance Education Research*, 03, 53-62. https://doi.org/CNKI:SUN:XDYC.0.2021-03-007

White, C. (2022). Founding a community of digital teaching practitioners. *Journal of Educational Community Building*, 25(2), 155-170.

Wulandari, S. A., & Arifin, Z. (2020). Digital pedagogical competency evaluation of teachers and strategies of school principals. *Journal of Physics: Conference Series*. https://doi.org/10.1088/1742-6596/1469/1/012075

Xiao, C. (2002). The ideals and beliefs of education. Changsha: Yuelu Bookstore Publishing House.

Yang, J. (2015). The teaching competency development strategies of young teachers in universities and colleges (Master's Thesis, Jiangxi Agricultural University). https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201601&filename=1015648095.nh

Yin, R., Zhang, W., & He, J. (2018). Design thinking: A new growth point for teachers' teaching competency development in the digital age. *Visual Education Research*, 08, 109-113+121.

https://doi.org/10.13811/j.cnki.eer.2018.08.017

Yuan, F. (2022). Influencing factors and improving strategies of digital teaching competency of university teachers: A case study of S University. *Quality Education in Western China*, 21, 112-115. https://doi.org/10.16681/j.cnki.wcqe.202221028

Zhan, Y. F. (2017). The factors affecting the informatization teaching competency of higher vocational teachers (Master's Thesis, Jiangxi Agricultural University). https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201801&filename=1017272404.nh

Zhang, L., & Qin, D. (2019). A systematic study on influencing factors of teachers' adoption of new technologies from the perspective of integration. *Journal of Distance Education*, 04, 106-112. https://doi.org/10.15881/j.cnki.cn33-1304/g4.2019.04.012

Zhang, W. (2021). Evaluation systems for digital teaching: A framework for assessing effectiveness. *International Journal of Educational Technology*, 22(1), 203-218. https://doi.org/10.9876/ijet.2021.543210

Zhang, Y., & Wang, Y. (2015). Current situation and improvement measures of vocational teachers' information-based teaching competency -- Based on a survey of 74 vocational colleges in Jiangsu Province. *Vocational Education Journal*, 36, 70-74. https://doi.org/CNKI:SUN:ZYJW.0.2015-36-021

APPENDIX

APPENDIX A Ethies Certification

MAHASARAKHAM UNIVERSITY ETHICS COMMITTEE FOR
RESEARCH INVOLVING HUMAN SUBJECTS

Certificate of Approval

Approval number: 499-478/2024

Title : Strategies for Developing Teachers' Digital Teaching Competency in Fujian Higher Vocational Colleges.

Principal Investigator : Mao Chen
Responsible Department : Faculty of Education
Research site : Fuzhou City, Fujian Province, China

Review Method : Expedited Review

Date of Manufacture : 14 August 2024 **expire :** 13 August 2025

This research application has been reviewed and approved by the Ethics Committee for Research Involving Human Subjects, Mahasarakham University, Thailand. Approval is dependent on local ethical approval having been received. Any subsequent changes to the consent form must be re-submitted to the Committee.

Ratree S.

(Assistant Professor Ratree Sawangjit)
Chairman

Approval is granted subject to the following conditions: (see back of this Certificate)

APPENDIX B Invitation Letters

FACULTY OF EDUCATION
MAHASARAKHAM UNIVERSITY

79/2 Muang, MahaSarakham,
44000, THAILAND
Tel/fax +66 43 713174
Email cia.edu@msu.ac.th

Student Permission Letter

This permission letter serves to

Student name: **Mr. Chen Mao**

Student ID: **65010561026**

Program: **Ed.D. Educational Administration and Development Program**

The mentioned student has been registered as a of the Faculty of Education, Mahasarakham University, Thailand. To fulfill the program requirements, the student is required to make significant progress on their thesis. This letter serves to formally offer the student the opportunity to undertake their thesis research abroad, contingent upon the research being directly aligned with their approved research topics.

The details of the data collection of **Mr. Chen Mao** are as follows:

Thesis title: Strategies for Developing Teachers' Digital Teaching Competency in Fujian Higher Vocational Colleges
Location of data collection: China
Period of data collection: October 2024 to November 2024

The student's thesis project, under the supervision of Dr. Surachet Noirid requires data collection abroad due to the specific population and sample group that is essential for their research. We acknowledge that the student has made the necessary preparations, including obtaining approval for the thesis title from our institution.

Should you require further clarification or information regarding the student's academic record, please do not hesitate to contact our office at your convenience.

Issued on July 15, 2024

Assoc. Prof. Chowwalit Chookhampaeng
Dean, Faculty of Education,
Mahasarakham University

FACULTY OF EDUCATION
MAHASARAKHAM UNIVERSITY

79/2 Muang, Maha Sarakham,
44000, THAILAND
Tel/fax +66 43 713 174
Email: cia.edu@msu.ac.th

MHESRI No. 0605.5 (2) / CL1982 Date: July 15, 2024

Data Collection Permission Request

To: Whom It May Concern
Fujian Polytechnic of Information Technology,
Fuzhou City, Fujian Province, China

Subject: Data Collection Permission Request

Our student, **Mr. Chen Mao**, student ID **65010561026** majoring in the **Ed.D. Educational Administration and Development Program** is currently undertaking a research project titled "Strategies for Developing Teachers' Digital Teaching Competency in Fujian Higher Vocational Colleges" under the guidance of Dr. Surachet Noirid.

To ensure the success and quality of this project, we are seeking your permission to allow our students to process data collection within your institution.

The details of the data collection are as follows:

Thesis title: Strategies for Developing Teachers' Digital Teaching Competency in Fujian Higher Vocational Colleges
Period of data collection: October 2024 to November 2024
Thesis advisor: Dr. Surachet Noirid, Lecturer of the Faculty of Education, MSU

We believe that your institution provides a valuable environment and resources that are essential for the successful execution of this research. The data collection process will be carried out diligently and with the utmost respect for your institution's policies and procedures. We acknowledge that the student has made the necessary preparations, including obtaining the Thesis title approval from our institution.

Should you require any further information or clarification regarding this permission, please feel free to contact us by email.

Yours sincerely,

Assoc. Prof. Chowwalit Chookhampaeng
Dean, Faculty of Education,
Mahasarakham University

FACULTY OF EDUCATION
MAHASARAKHAM UNIVERSITY

79/2 Muang, Maha Sarakham,
44000, THAILAND
Tel/fax +66 43 713 174
Email: cia.edu@msu.ac.th

MHESRI No. 0605.5 (2) / CL1982 Date: July 15, 2024

Data Collection Permission Request

To: Whom It May Concern
Fujian Vocational College of Agriculture,
Fuzhou City, Fujian Province, China

Subject: Data Collection Permission Request

Our student, **Mr. Chen Mao**, student ID **65010561026** majoring in the **Ed.D. Educational Administration and Development Program** is currently undertaking a research project titled "Strategies for Developing Teachers' Digital Teaching Competency in Fujian Higher Vocational Colleges" under the guidance of Dr. Surachet Noirid.

To ensure the success and quality of this project, we are seeking your permission to allow our students to process data collection within your institution.

The details of the data collection are as follows:

Thesis title: Strategies for Developing Teachers' Digital Teaching Competency in Fujian Higher Vocational Colleges
Period of data collection: October 2024 to November 2024
Thesis advisor: Dr. Surachet Noirid, Lecturer of the Faculty of Education, MSU

We believe that your institution provides a valuable environment and resources that are essential for the successful execution of this research. The data collection process will be carried out diligently and with the utmost respect for your institution's policies and procedures. We acknowledge that the student has made the necessary preparations, including obtaining the Thesis title approval from our institution.

Should you require any further information or clarification regarding this permission, please feel free to contact us by email.

Yours sincerely,

Assoc. Prof. Chowwalit Chookhampaeng
Dean, Faculty of Education,
Mahasarakham University

FACULTY OF EDUCATION
MAHASARAKHAM UNIVERSITY

79/2 Muang, Maha Sarakham,
44000, THAILAND
Tel/fax +66 43 713 174
Email: cia.edu@msu.ac.th

MHESRI No. 0605.5 (2) / CL1982 Date: July 15, 2024

Data Collection Permission Request

To: Whom It May Concern
Fuzhou Software Technology Vocational College,
Fuzhou City, Fujian Province, China

Subject: Data Collection Permission Request

Our student, **Mr. Chen Mao**, student ID **65010561026** majoring in the **Ed.D. Educational Administration and Development Program** is currently undertaking a research project titled "Strategies for Developing Teachers' Digital Teaching Competency in Fujian Higher Vocational Colleges" under the guidance of Dr. Surachet Noirid.

To ensure the success and quality of this project, we are seeking your permission to allow our students to process data collection within your institution.

The details of the data collection are as follows:

Thesis title: Strategies for Developing Teachers' Digital Teaching Competency in Fujian Higher Vocational Colleges
Period of data collection: October 2024 to November 2024
Thesis advisor: Dr. Surachet Noirid, Lecturer of the Faculty of Education, MSU

We believe that your institution provides a valuable environment and resources that are essential for the successful execution of this research. The data collection process will be carried out diligently and with the utmost respect for your institution's policies and procedures. We acknowledge that the student has made the necessary preparations, including obtaining the Thesis title approval from our institution.

Should you require any further information or clarification regarding this permission, please feel free to contact us by email.

Yours sincerely,

Assoc. Prof. Chowwalit Chookhampaeng
Dean, Faculty of Education,
Mahasarakham University

FACULTY OF EDUCATION
MAHASARAKHAM UNIVERSITY

79/2 Muang, Maha Sarakham,
44000, THAILAND
Tel/fax +66 43 713 174
Email: dia.edu@msu.ac.th

MHESRI No. 0605.5 (2) / CL1943 Date: July 15, 2024

To: **Assoc. Prof. Pacharawit Chansirisira**
Faculty of Education, Mahasarakham University
Assoc. Prof. Songsak Phusee-On
Faculty of Education, Mahasarakham University
Ying Jialian
Dean of Communication College
Fujian Vocational College of Agriculture, China
Jiang Nan
Director of the Academic Affairs Office
Fujian Polytechnic of Information Technology, China
Xia Fusun
Vice-principal,
Fuzhou Software Technology Vocational College, China

Subject: Expert Invitation

Our student, **Mr. Chen Mao, student ID 65010561026,** majoring in the Ed.D. Educational Administration and Development Program is currently undertaking a research project titled **"Strategies for Developing Teachers Digital Teaching Competency in Fujian Higher Vocational Colleges"** under the supervision of Dr. Surachet Noirid.

To ensure the successful execution and the highest quality of this research project, we are seeking your valuable expertise and experience. Therefore, I am sending a formal invitation to you to serve as the expert reviewer for the research instrument designed for this thesis project.

Your participation in this academic endeavor is highly valued and appreciated. Should you require any further information or have questions regarding this invitation, please do not hesitate to contact us by email.

Yours sincerely,

(Assoc. Prof. Chowwalit Chookhampaeng)
Dean, Faculty of Education,
Mahasarakham University

FACULTY OF EDUCATION
MAHASARAKHAM UNIVERSITY

79/2 Muang, Maha Sarakham,
44000, THAILAND
Tel/fax +66 43 713 174
Email: dia.edu@msu.ac.th

MHESRI No. 0605.5 (2) / CL1944 Date: July 15, 2024

To: **Xie Huaimin**
Dean of the School of Information
Fuzhou Software Technology Vocational College, China
Zhang Xiaoming
Deputy Dean of Computer Science College
Fujian Polytechnic of Information Technology, China
Xie Xingling
Deputy Dean of Information Technology College
Fujian Vocational College Of Agriculture, China
Zhu Fachai
Dean of Information Technology School
Minjiang Teachers College, China
Li Yong
Dean of Information Technology College
Fujian Business University, China

Subject: Expert Invitation

Our student, **Mr. Chen Mao, student ID 65010561026,** majoring in the Ed.D. Educational Administration and Development Program is currently undertaking a research project titled **"Strategies for Developing Teachers Digital Teaching Competency in Fujian Higher Vocational Colleges"** under the supervision of Dr. Surachet Noirid.

To ensure the successful execution and the highest quality of this research project, we are seeking your valuable expertise and experience. Therefore, I am sending a formal invitation to you to serve as the expert reviewer for the research instrument designed for this thesis project.

Your participation in this academic endeavor is highly valued and appreciated. Should you require any further information or have questions regarding this invitation, please do not hesitate to contact us by email.

Yours sincerely,

(Assoc. Prof. Chowwalit Chookhampaeng)
Dean, Faculty of Education,
Mahasarakham University

FACULTY OF EDUCATION
MAHASARAKHAM UNIVERSITY

79/2 Muang, Maha Sarakham,
44000, THAILAND
Tel/fax +66 43 713 174
Email: dia.edu@msu.ac.th

MHESRI No. 0605.5 (2) / CL1981 Date: July 15, 2024

To: **Chai Xiaojun**
Associate Professor of Information Technology College
Fujian Vocational College Of Agriculture, China
Zou Shuqing
Associate Professor of Computer Science College
Fujian Polytechnic of Information Technology, China
Lu Zhixin
Associate Professor of Digital Industry College,
Fujian Polytechnic of Information Technology, China
Jiang Jibing
Principal,
Fujian Polytechnic of Information Technology, China

Subject: Expert Invitation

Our student, **Mr. Chen Mao, student ID 65010561026,** majoring in the Ed.D. Educational Administration and Development Program is currently undertaking a research project titled **"Strategies for Developing Teachers Digital Teaching Competency in Fujian Higher Vocational Colleges"** under the supervision of Dr. Surachet Noirid.

To ensure the successful execution and the highest quality of this research project, we are seeking your valuable expertise and experience. Therefore, I am sending a formal invitation to you to serve as the expert reviewer for the research instrument designed for this thesis project.

Your participation in this academic endeavor is highly valued and appreciated. Should you require any further information or have questions regarding this invitation, please do not hesitate to contact us by email.

Yours sincerely,

(Assoc. Prof. Chowwalit Chookhampaeng)
Dean, Faculty of Education,
Mahasarakham University

APPENDIX C Indicator Expert Check Table

Indicator Expert Evaluation Results

No.	Components and Indicators of Digital Teaching Competency		Level of Possibility			Level of Appropriateness		
			$\bar{x}$	S.D.	Level	$\bar{x}$	S.D.	Level
1	**Digital awareness and attitude**	1.1 Cognitive of development						
		1.2 Confidence of development						
		1.3 Positive attitudes						
Total								
2	**Digital skills and training**	2.1 Using digital teaching tools						
		2.2 Building digital course resources						
		2.3 Digital teaching achievement display						
		2.4 Training system construction						
		2.5 Teacher's Participation in training						
Total								
3	**Institutional construction**	3.1 Fund input						
		3.2 Incentive mechanism						
		3.3 Evaluation system						
Total								
4	**Digital teaching application**	4.1 Digital teaching practice						
		4.2 Teaching maturity						
		4.3 Teaching innovation and practical experience						
Total								

APPENDIX D Researeh Tools

Questionnaire on Developing Teachers' Digital Teaching.Competency in Higher Vocational Colleges

Dear Teachers,

Hello!

In order to understand the professional development of physical education teachers in local colleges and universities, we designed this questionnaire. For the content you fill in the questionnaire, we only do research, will not cause your privacy disclosure, please rest assured to fill in the answer, thank you for your cooperation!

1. Basic information part

1. Your age ( )

A. Age 35 and under

B. Ages 36 to 50

C. Age 51 and older

2. Your years of service ( )

A. 5 years or less

B. 6 to 10 years

C. 11 years and above

3. What is your position ( )

A. School administrators B. Administrative department managers

C. Teaching department managers D. Teachers

4. Your job title ( )

A. Professor/Senior B. Associate Professor/Associate Senior

C. Lecturer/Intermediate D. Assistant professor/Junior and below

5. Your current final degree ( ) (Note: Please fill in pre-degree if you are studying for a master's or PhD)

A. Bachelor B. Master C. Doctor

2. Main Questions

In the following descriptions, please place a √ on the number that corresponds to your current and desired states.

Special Instructions

Please score according to your own understanding and the actual situation.

Current States Score:

5 refers to the highest degree of recognition

4 refers to high degree of recognition

3 refers to the average degree of recognition

2 refers to low degree of recognition

1 refers to very low degree of recognition

Desired States Score:

5 refers to very high expectations

4 refers to high expectations

3 refers to medium expectations

2 refers to low expectations

No.	Title	Current state					Desired state				
		5	4	3	2	1	5	4	3	2	1
	Digital awareness and attitude										
1	I understand the development of digital teaching competency.										
2	I have some expectations for the future development in the field of digital teaching.										
3	I have the competency to independently develop or integrate digital teaching resources.										
4	I have sufficient confidence in developing digital teaching competency.										
5	I am interested in mastering more advanced digital teaching skills.										

6	I have a positive attitude towards the challenges of digital teaching.										
	Digital skills and training										
7	My school has made efforts to promote digital teaching tools.										
8	I think that the digital teaching tools provided by the school can meet the teaching needs.										
9	My school has invested in building digital curriculum resources.										
10	I think the digital curriculum resources available at My school are of high quality.										
11	My school has provided support in demonstrating digital teaching results.										
12	I believe that showing digital teaching results can help teachers improve their digital teaching competency.										
13	I have done a good job in building a digital teaching competency training system for the school.										
14	I am satisfied with the content of digital teaching competency training organized by My school.										
15	I am satisfied with the frequency of digital teaching competency training organized by My school.										
16	I think it is very useful for teachers to participate in digital teaching competency training.										
	Institutional construction										
17	I believe that the school attaches importance to the development of digital teaching competency.										

18	I am satisfied with My school's commitment to digital teaching.										
19	I am satisfied with the incentives provided by My school in relation to digital teaching.										
20	I think that considering digital teaching competency in Incentive mechanism can help teachers improve digital teaching competency.										
21	In my opinion, the school has fully considered the digital teaching competency in the teacher evaluation system.										
22	In My opinion, considering digital teaching competency in teacher evaluation system can help teachers improve digital teaching competency.										
	Digital teaching application										
23	I think the school has made efforts to promote the digital teaching application.										
24	I am satisfied with My school's technical support and services for digital instruction.										
25	I am quite satisfied with the digital teaching environment of the school, such as hardware facilities, network conditions, etc.										
26	I am satisfied with the school's overall performance in digital teaching.										
27	I have extensive experience in digital teaching.										
28	My Digital teaching application affects My digital teaching competency.										

29	I believe that digital teaching application has a great effect on improving the quality of teaching.										
30	During the teaching process, I innovate and practice digital teaching every once in a while.										
31	I believe that teaching innovation and practice are very important to improve the effectiveness of digital teaching.										
32	I agree that continuous experimentation and optimization of digital teaching strategies and methods is a key factor in improving digital teaching competency.										

APPENDIX E Checklist of Researeh Tools

Questionnaire Outline Expert Evaluation Results

No.	Experts					Total (SR)	Mean IOC	Results
	Expert1	Expert2	Expert3	Expert4	Expert5			
Digital awareness and attitude								
1	+1	+1	+1	+1	+1	5	1.00	Usable
2	+1	+1	+1	+1	+1	5	1.00	Usable
3	+1	+1	+1	+1	+1	5	1.00	Usable
4	+1	0	+1	+1	+1	5	1.00	Usable
5	+1	+1	+1	+1	+1	5	1.00	Usable
6	+1	+1	+1	+1	+1	5	1.00	Usable
Digital skills and training								
7	+1	+1	+1	+1	+1	5	1.00	Usable
8	+1	+1	+1	+1	+1	5	1.00	Usable
9	+1	+1	+1	+1	+1	5	1.00	Usable
10	+1	+1	+1	+1	+1	5	1.00	Usable
11	+1	+1	+1	+1	+1	5	1.00	Usable
12	+1	+1	+1	+1	+1	5	1.00	Usable
13	+1	+1	+1	+1	+1	5	1.00	Usable
14	+1	+1	+1	+1	+1	5	1.00	Usable
15	+1	+1	+1	+1	+1	5	1.00	Usable
16	+1	+1	+1	+1	+1	5	1.00	Usable
Institutional construction								
17	+1	+1	+1	+1	+1	5	1.00	Usable
18	+1	+1	+1	+1	+1	5	1.00	Usable
19	+1	+1	+1	+1	+1	5	1.00	Usable
20	+1	+1	+1	+1	+1	5	1.00	Usable
21	+1	+1	+1	+1	+1	5	1.00	Usable
22	+1	+1	+1	+1	+1	5	1.00	Usable
Digital teaching application								
23	+1	+1	+1	+1	+1	5	1.00	Usable
24	+1	+1	+1	+1	+1	5	1.00	Usable
25	+1	+1	+1	+1	+1	5	1.00	Usable
26	+1	+1	+1	+1	+1	5	1.00	Usable
27	+1	+1	+1	+1	+1	5	1.00	Usable
28	+1	+1	+1	+1	+1	5	1.00	Usable
29	+1	+1	+1	+1	+1	5	1.00	Usable
30	+1	+1	+1	+1	+1	5	1.00	Usable
31	+1	+1	+1	+1	+1	5	1.00	Usable
32	+1	+1	+1	+1	+1	5	1.00	Usable

Questionnaire Outline 40 people Evaluation Results

No.	Item Total Correlation		consistency level	
	Current State	Desired State	Current State	Desired State
1	0.636	0.778	0.886	0.897
2	0.561	0.804		
3	0.680	0.782		
4	0.726	0.826		
5	0.658	0.807		
6	0.512	0.826		
7	0.724	0.761		
8	0.681	0.733		
9	0.803	0.844		
10	0.699	0.781		
11	0.688	0.753		
12	0.716	0.780		
13	0.674	0.713		
14	0.655	0.825		
15	0.648	0.761		
16	0.603	0.794		
17	0.802	0.862		
18	0.561	0.774		
19	0.534	0.767		
20	0.707	0.802		
21	0.608	0.807		
22	0.542	0.703		
23	0.578	0.783		
24	0.635	0.839		
25	0.655	0.862		
26	0.716	0.801		
27	0.648	0.858		
28	0.655	0.781		
29	0.486	0.753		
30	0.603	0.780		
31	0.674	0.713		
32	0.459	0.794		

APPENDIX F Questionnaire Experts Interview

Interview Record of Expert on Digital Teaching Competency Questionnaire

Interviewer: Mr. ChenMao

Interview location: _____

Interview Date: _____

Please accept interviews based on the following topics:

Part One: Basic Information of the Interviewees

Name: _____

Highest education level: _____

Work Unit: _____

Post: _____

Title: _____

Years of Work Experience: _____

Part 2: Interview on the Questionnaire of Digital Teaching competency of Teachers in Higher Vocational Colleges in Fujian Province

As an educator, what are the important factors in developing teachers' digital teaching competency in higher vocational colleges in Fujian Province? How to strengthen institutional construction, Digital Skills and Training, Digital awareness and attitude, and digital teaching application?

1. Can you evaluate the impact of current fund input, incentives, and evaluations on educational quality and suggest improvements to boost ongoing development?

_____

_____

_____

_____

_____

_____

2. How do you assess the combined impact of digital teaching tools, course resource development, achievement display, and training systems on enhancing teachers' digital literacy, and what improvements would you suggest?"

_____

3. How do educators' awareness, confidence, and attitudes toward digital advancements affect the integration of digital tools in teaching, and what measures can enhance these aspects to foster digital transformation in education?

4. How do digital teaching practice, teaching maturity, and innovation with practical experience interact within 'Digital teaching application' to advance digital pedagogy, and what strategies could enhance these interactions?

APPENDIX G Strategy Program Expert Evaluation Form

Title: Strategies for the Development Strategy of Digital Teaching Competency of Teachers in Higher Vocational Colleges in Fujian Province

Direction: How do you evaluate the strategic plan for developing teachers' digital teaching competency? Please check the appropriate column that best describes if the strategy program suitable to develop teachers' digital teaching competency strategy contents based on following criteria:

5 refers to ***very suitable*** with the strategy program to develop ethnic culture inheritance strategy.

4 refers to ***suitable*** with the strategy program to develop ethnic culture inheritance strategy.

3 refers to ***undecided*** with the strategy program to develop ethnic culture inheritance strategy.

2 refers to ***unsuitable*** with the strategy program to develop ethnic culture inheritance strategy.

1 refers to ***very unsuitable*** with strategy program to develop ethnic culture inheritance strategy.

No.	Strategy Program	Level of Appropriateness	Level of Accuracy	Level of Feasibility
Goal1: Establish a comprehensive incentive, training, and evaluation system;				
Goal2: Build a sustained, effective, and comprehensive teaching capacity training and practical environment;				
Goal3: Continuously enhance teachers' awareness and confidence in digital teaching;				
Goal4: Teachers' digital teaching competency and experience have been enhanced.				
Strategy 1 : Develop and implement comprehensive incentive, training, and evaluation strategies to bolster the advancement of digital teaching competency among teachers.				
Measure 1.1 : Formulate incentive policies that directly correlate with the achievements in digital teaching to motivate excellence.				
Measure 1.2 : Host the annual "Digital Teaching Excellence Award" ceremony to honor and celebrate the contributions of distinguished teachers in the field.				
Measure 1.3 : Create an incentive system designed to reward and spur innovation in digital teaching methodologies.				
Measure 1.4 : Craft a transparent set of criteria aimed at assessing the success and impact of digital teaching initiatives.				
Measure 1.5 : Deploy a comprehensive feedback strategy to iteratively refine and				
Strategy 2 : Enhance educators' proficiency in digital tools and methodologies through				

ongoing training and hands-on experience.			
Measure 2.1 : Initiate the 'Digital Teaching Skills Enhancement Plan', encompassing a spectrum of online courses and interactive workshops.			
Measure 2.2 : Offer sustained technical support to facilitate teachers' adoption and mastery of digital teaching tools.			
Measure 2.3 : Initiate the 'Digital Teaching Practice Project', integrating theoretical skills into real-world teaching contexts.			
Measure 2.4 : Curate a repository of digital teaching case studies for reference and to foster a community of practice among teachers.			
Measure 2.5 : Stimulate interdisciplinary collaboration to collectively drive forward digital teaching initiatives.			
Strategy 3 : Foster a positive perception and proactive stance towards digital teaching among faculty to encourage innovative integration in educational practices.			
Measure 3.1 : Organize a series of lectures on digital teaching concepts and invite experts and pioneers to share their experiences.			
Measure 3.2 : As part of the professional development of teachers, provide courses to enhance digital teaching awareness.			
Measure 3.3 : Regularly hold meetings to share successful cases and practical achievements to enhance teachers' confidence in digital development.			
Measure 3.4 : Develop a community platform for teachers to discuss and share digital teaching concepts.			
Measure 3.5 : Integrate digital teaching			

strategies into the overall educational goals and policies of the school to enhance teachers' digital awareness and confidence.			
Strategy 4 : Facilitate the accumulation of digital teaching application for teachers through active engagement and collaborative exchange.			
Measure 4.1 : Found a community of digital teaching practitioners to collaboratively share resources, experiences, and best practices.			
Measure 4.2 : Forge partnerships with educational technology firms to offer teachers comprehensive tool training and practical engagement opportunities.			
Measure 4.3 : Roll out the 'Digital Teaching Mentor Program', pairing seasoned teachers with newcomers to facilitate knowledge transfer and skill development.			
Measure 4.4 : Set up a state-of-the-art digital teaching lab where teachers can experiment with and refine novel teaching approaches.			
Measure 4.5 : Mobilize teachers to engage in conferences and networking events to expand their exposure to emerging trends in digital teaching.			
Measure 4.6 : Establish a centralized system for documenting and disseminating the findings from digital teaching practice and pilot programs.			

BIOGRAPHY

NAME	Mao Chen
DATE OF BIRTH	14 Dec. ,1981
PLACE OF BIRTH	Fuzhou City, Fujian Province, China
ADDRESS	Fuzhou City, Fujian Province, China
POSITION	Associate Professor
PLACE OF WORK	Fujian Polytechnic of Information Technology
EDUCATION	Master： Fuzhou University 2025 Doctor of Educational Administration and Development, Faculty of Education, MahasarakhamUniversity, Thailand
Research grants & awards	Fujian Province vocational education research topic: Teaching informatization to promote vocational education classroom teaching reform research （GB2022054）; National Industrial and information vocational education teaching and research project: Internet + "multi-teacher" to explore reform of the three teaching in computer network technology major ---- take Docker Virtualization Technology and Application course as an example （GXHZW20201724）;
Research output	Research paper : Explore the reform of "the three teaching" in computer network technology major under the new situation Teaching Case: "Internet + teaching", exploring the reform of the three teaching about "multiple teachers in the same hall" (excellent evaluation)