



**A DEVELOPMENT OF TRAINING STRATEGY
ON DIGITAL TECHNOLOGY OF
ADMINISTRATIVE EFFECTIVENESS FOR
PRIVATE COLLEGES IN SHAN DONG
PROVINCE**

**Bi Chunhui
6419000019**

**A Dissertation Submitted in Partial Fulfillment of the
Requirements for the Degree of Doctor of Philosophy in
Educational Administration Innovation
Graduate School of Education
Siam University
Academic Year 2025
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Title A Development of Training Strategy on Digital Technology of
Administrative Effectiveness for Private Colleges in Shan Dong
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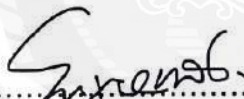
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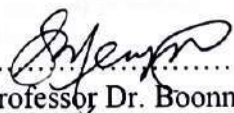
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Abstract


Title A Development of Training Strategy on Digital Technology of Administrative Effectiveness for Private Colleges in Shan Dong Province.

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Degree Doctor of Philosophy

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This study explored the acceptance and impact of digital technology training strategies on the administrative effectiveness of private colleges in Shandong Province. Grounded in the Technology Acceptance Model (TAM), the research integrated theories of Leadership Support (LST) and Knowledge Management (KMT) to provide a comprehensive understanding of the factors influencing administrator's adoption of digital technologies. The independent variables examined include perceived ease of use (PEOU), perceived usefulness (PU), leadership support, and digital technical knowledge, with behavioral intention (BI) acting as an intermediary variable, and administrative effectiveness (AE) as the dependent variable. This research aimed to fill existing gaps in the literature by providing empirical evidence on the interplay between digital technology acceptance and administrative effectiveness, supported by robust theoretical frameworks.

The study employed a mixed-methods approach, combining quantitative surveys to gather data from administrators across eight private colleges in Shandong Province. The quantitative analysis utilized key performance indicator (KPI) including work efficiency, decision quality, communication and collaboration, technology use frequency, and technology application capability to measure administrative effectiveness. The qualitative analysis provided deeper insights into the experiences, perceptions, and attitudes of the administrator towards digital technology training.

Findings from this study reveal the significant roles of perceived ease of use, perceived usefulness, leadership support, and digital technical knowledge in shaping behavioral intention and, subsequently, administrative effectiveness. The results contribute to the development of effective digital technology training strategies, enhancing the administrative effectiveness and overall performance of private colleges in Shandong Province.

Keywords: training strategy, digital technology, administrative effectiveness, private colleges, Shan Dong province

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Bi Chunhui

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study

University administrative management refers to organizing, managing, and coordinating various resources and activities within higher education institutions to achieve educational, research, and social service functions. Its core goal is to ensure the operation and sustainable development of universities, thereby improving the quality of education and school management (Cassar, 2001). University administrative management is a critical link in ensuring the operation and development of universities, and its effectiveness directly impacts the educational quality and social influence.

As a part of China's higher education system, private universities possess greater autonomy and flexibility in administrative management compared to public universities. They can quickly adjust their educational strategies and management models based on market demands and their specific circumstances (Xu & Zhang, 2021). Private universities are more market-oriented in admissions, curriculum design, and educational models, with a stronger emphasis on employment and social needs to enhance their competitiveness and attractiveness (Chen, 2022). However, they generally face significant resource constraints of funding, faculty strength, and infrastructure, which impose higher requirements on their administrative management (Li, 2021).

Located in the eastern coastal region of China, Shandong Province is one of the more economically developed provinces in the country. The province boasts numerous higher education institutions, including many well-known public and private universities. The rapid development of higher education in Shandong is reflected not only in the increase in the number of universities and student enrolment but also in the improvement of educational quality and research capabilities (Li, 2021). Private universities occupy Shandong Province. These institutions, with their flexible management mechanisms and market-oriented educational models, quickly adapt to societal and market demands, training of applied talents for society. The rapid development of private universities has to some extent alleviated the strain on educational resources in public universities, providing more students with the opportunity to receive higher education (Wang, 2022). With the ongoing reforms in China's higher education, private universities in Shandong Province face new opportunities and challenges. By enhancing management levels, optimizing resource allocation, strengthening university-enterprise cooperation, and promoting international exchanges, private universities in Shandong are expected to achieve success in the future and cultivate more high-quality applied talents for society (Li, 2021).

As important organizational units within universities, the administrative management of colleges involves organizing, coordinating, and controlling teaching, research, student management, and administrative affairs within the college. The administrative management of colleges directly relates to the quality of teaching and

research within the college and affects the overall operational efficiency and development level of the university (Wang & Li, 2020). The administrative management functions of colleges in private universities mainly include the following aspects:

Table 1.1 List of Administrative Functions and Assessment Indicators of Colleges in Private Universities

Function	Description	KPI Indicator
Teaching Management	<ol style="list-style-type: none"> 1. Formulate and implement the college's teaching plan 2. Manage curriculum and teaching resources 3. Monitor and evaluate teaching quality 	<ol style="list-style-type: none"> 1. WE - Timeliness of plan implementation 2. DQ - Quality of curriculum and resource management 3. TUF - Frequency of resource utilization and teaching quality evaluations
Research Management	<ol style="list-style-type: none"> 1. Support and promote the college's research activities 2. Manage the application and implementation of research projects 3. Promote the transformation and application of research results 	<ol style="list-style-type: none"> 1. WE - Number of supported research activities 2. DQ - Success rate of research project applications 3. TAC - Level of support for research result applications
Student Management	<ol style="list-style-type: none"> 1. Admissions 2. Academic affairs management 3. Scholarship and financial aid management 4. Psychological counseling and career guidance 	<ol style="list-style-type: none"> 1. WE - Processing time for admissions and academic affairs 2. DQ - Accuracy and fairness in scholarship and financial aid distribution 3. CAC - Effectiveness of counseling and career guidance services
Human Resource Management	<ol style="list-style-type: none"> 1. Recruitment of faculty and staff 2. Training 3. Assessment and incentive mechanisms 4. Enhance work enthusiasm and professional level of faculty and staff 	<ol style="list-style-type: none"> 1. WE - Time and cost efficiency in recruitment and training 2. DQ - Effectiveness of assessment and incentive mechanisms 3. TUF - Frequency and impact of training programs
Financial Management	<ol style="list-style-type: none"> 1. Prepare and execute the college's financial budget 2. Manage the use and allocation of funds 3. Ensure the financial health of the college 	<ol style="list-style-type: none"> 1. WE - Timeliness and accuracy of budget preparation and execution 2. DQ - Effectiveness of fund allocation and management 3. TAC - Level of financial health and resource optimization

With the rapid development of information technology, the application of digital technology has penetrated various industries worldwide. Advanced technologies such as big data, artificial intelligence, cloud computing, and block chain are profoundly changing the operational and management modes of various sectors. In the field of education, the application of digital technology is also continuously deepening, bringing new opportunities and challenges to all aspects of education, from online teaching and educational resource sharing to the informatization of administrative management (Sayman & Atienzar, 2023).

Chinese universities have made significant progress in applying digital technology. The Ministry of Education has launched the "Education Informatization 2.0" action plan, aiming to promote educational modernization through information technology. Major universities have increased their investments in digital campus construction, online education platforms, and intelligent learning environments, striving to enhance educational quality and management efficiency through digital technology (Meyer & Rowan, 2022).

The application of digital technology has greatly improved the efficiency of university administrative management. Information systems enable administrators to quickly process large amounts of data and simplify cumbersome administrative processes. For example, e-government systems can facilitate online approvals and document flow, significantly reducing the use of paper documents and the time required for their circulation (Jang & Eger, 2018). Big data and data analysis technologies provide strong decision support for university management. By analysing student data, financial data, and research data, administrators can comprehensively understand the operation status of the university, identify potential problems, and make more scientific and reasonable management decisions (Wang & Li, 2020).

Digital technology has improved internal communication and collaboration within universities. Utilizing emails, instant messaging tools, and collaborative office platforms, communication among faculty and staff has become more convenient and efficient. Additionally, the use of online meeting systems and document sharing platforms has facilitated cross-departmental and cross-campus collaboration (Zhang, 2023). Through digital technology, universities can provide better services to faculty and students. For instance, intelligent library management systems, online course selection systems, and campus card systems offer great convenience for learning and living, improving service quality and satisfaction (Liu, 2021). The application of information technology helps enhance the transparency and standardization of university management. Online disclosures and data transparency greatly increase the transparency of various administrative tasks within the university, reducing corruption and unethical behavior and enhancing the standardization and credibility of management (Chen, 2022).

In modern university management, digital technology capabilities have become an essential skill for administrator. Effective application of digital technology not only improves management efficiency but also optimizes decision-making processes and enhances the overall competitiveness of the university. The digital technology capabilities of administrator include proficiency in using office automation software, big data analysis skills, and the management and maintenance of information systems (Li, 2021).

Despite the increasing importance of digital technology in university management, the current digital technology capability levels of university administrator remain uneven. Overall, most administrator possess basic office software operation skills, but their capabilities in advanced technology applications and system management still need improvement. They have limited abilities in the in-depth application and maintenance of systems (Chen, 2022), and their understanding and application of network security technologies and measures are insufficient, leading to potential information leakage and system security risks (Wang, 2022).

To enhance the digital technology capabilities of administrator, many universities have initiated relevant training programs. However, the coverage and depth of these training programs still need improvement. The current training content mainly focuses on the basic application of office software and simple data analysis techniques, lacking in-depth training on advanced technologies and system management. The training frequency is insufficient, with many universities conducting only one or a few concentrated training sessions each year, which fails to meet the continuous improvement needs of administrator (Li, 2021). Most universities lack systematic training evaluation mechanisms, making it difficult to accurately assess the actual effectiveness of the training and the technical proficiency of administrator, thereby hindering targeted improvements in training content and methods (Zhang, 2023).

Most university administrator hold a positive attitude towards enhancing their digital technology skills, recognizing the important role of digital technology in improving work efficiency and management quality. Surveys show that approximately 70% of administrators are willing to participate in digital technology training and hope to improve their technical skills through such training (Chen, 2022). In terms of training content and methods, administrators prefer training that can be directly applied to their work, particularly in areas such as data analysis, information system operations, and network security. Due to tight work schedules, administrators desire more flexible training methods, such as online courses, self-study materials, and short-term intensive training, to accommodate their time constraints (Wang, 2022).

According to the Technology Acceptance Model (TAM), users' acceptance of new technology is primarily influenced by two factors: perceived usefulness and perceived ease of use. The acceptance of university administrator in enhancing their digital technology capabilities can also be analysed through these two factors.

Perceived usefulness refers to the degree to which users believe that using a particular technology can enhance their job performance. For university administrator, they generally believe that enhancing their digital technology skills can bring the following benefits: Improved Work Efficiency, mastering more digital technology tools and methods can accelerate information processing and transaction handling, thereby improving the efficiency and quality of daily work (Zhang, 2023); Enhanced Decision-Making Ability, through data analysis and the application of information systems, administrators can better understand the operational status of the university and make more scientific and reasonable decisions (Wang, 2022); Increased Professional Competitiveness, continuously learning and mastering new technologies helps administrators maintain competitiveness in their professional development and adapt to the constantly changing and improving requirements of university management work (Li, 2021).

Perceived ease of use refers to the degree to which users believe that learning and using a particular technology is easy. Factors influencing the acceptance of digital technology training among university administrators include: Practicality of Training Content, administrators prefer training that can be directly applied to their work, particularly in areas such as data analysis, information system operations, and network security (Chen, 2020); Flexibility of Training Methods, due to tight work schedules, administrators desire more flexible training methods, such as online courses, self-study materials, and short-term intensive training, to accommodate their time constraints (Liu, 2021); Continuity of Training, administrators hope to participate in regular training to continuously enhance their digital technology skills and keep up with technological advancements (Zhang, 2023).

In the current educational environment, private universities face multiple pressures and challenges, urgently needing to enhance management efficiency through digital technology. Compared to public universities, private universities typically have more limited resources, especially in terms of financial support and infrastructure, and cannot compete with public institutions on these fronts. This resource shortage directly impacts school operations and management, making it difficult for private universities to improve teaching quality and maintain normal school operations. As competition in the education market intensifies, private universities must attract students, raise teaching standards, and enhance their social reputation. However, traditional management models, such as reliance on paper documents, manual data processing, and complex, layered approval processes, are inefficient and prone to errors. Information asymmetry, poor communication between departments, and slow decision-making responses directly affect the school's overall operations.

Digital technology emerges as a solution. By introducing modern information management systems, online office platforms, automated processes, and data analysis tools, school management can boost work efficiency. For example, information systems can collect and integrate real-time data from various aspects of the school, such as student information, teacher resources, and financial status, helping administrators understand the school's operational status and make more targeted and forward-thinking decisions. Additionally, automated processes can reduce errors in manual operations and enhance approval efficiency, thereby saving time and labour costs. Digital technology improves the school's internal operational efficiency and addresses external pressures. In today's diversified student population and increasingly competitive enrolment environment, private universities that fail to improve administrative effectiveness struggled to stand out in the fierce market competition. Digital transformation enables schools to quickly respond to external changes, flexibly adjust strategies, and enhance competitiveness, ensuring stable growth in long-term development. Through digital technology, private universities can address many pain points in management, improve administrative effectiveness, optimize resource allocation, accelerate decision-making processes, and ultimately enhance the school's overall competitiveness and educational quality. Therefore, research on the application of digital technology in private universities is urgent for the private universities.

Shandong Province, as one of China's major educational hubs, boasts numerous private universities that have gradually emerged in recent years and face an urgent need to improve administrative effectiveness. However, due to differences in systems and

resources, private universities in Shandong often lag behind public universities in the application of digital technology and the enhancement of administrative effectiveness. Therefore, selecting Shandong Province as the research subject can reveal the unique challenges and opportunities. Shandong boasts a relatively high level of economic development, and digital technology is widely applied across various industries, providing favourable conditions for the digital transformation of university management effectiveness. By studying private universities in Shandong, we can analyse and summarize how private universities in relatively economically developed regions leverage digital means to enhance administrative effectiveness, which offers valuable insights for the development of similar institutions. Although there may be differences in the demand for digital technology training among universities in various regions, the situation in Shandong Province, especially with abundant educational resources and a high economic level, provides a representative and scalable case for such research.

In summary, with the rapid development of information technology, the wide application of digital technology in the global scope is profoundly changing the operation mode and management mode of various industries. The field of higher education is no exception. The application of digital technology plays an important role in improving the administrative effectiveness of universities, optimizing the decision-making process and improving the internal communication and cooperation. Especially in China, private colleges and universities, as an important part of higher education, have greater autonomy and flexibility compared with public colleges and universities, and can quickly adjust their school-running strategies and management mode according to the market demand. As an economically developed region in China, Shandong province has a large number of private universities, which have shown outstanding performance in quickly adapting to social and market demand. As an important organizational unit within the university, the administrative management of the college is directly related to the teaching quality and scientific research level. Therefore, it is of great significance to study the digital technology training strategy to improve the administrative effectiveness of the private colleges in Shandong Province. Through systematic digital technology training, the technical ability of administrators can be improved, so as to improve the administrative effectiveness, and promote the overall development and modernization of colleges and universities. This research filled in the current research gap in the administrative effectiveness of private universities, put forward the digital technology training strategy with strong adaptability, and provide feasible guidance for university administrators.

1.2 Significance of the Study

This study addressed the unique challenges and opportunities faced by private colleges in Shandong Province, filling a critical gap in the research on administrative effectiveness in higher education, which is increasingly important in the context of Chinese higher education. The findings were expected to highlight the transformative potential of digital technology training strategies and provide a detailed understanding of how administrators can adjust their approaches to meet the specific needs and developmental stages of administrator.

Additionally, this study employed rigorous a quantitative method combined with a qualitative method to ensure a comprehensive and representative analysis across

different institutional environments. The results of this study informed administrative strategies and contribute to the broader discourse on educational reform in China, emphasizing the importance of appropriate technology training in enhancing administrative effectiveness and ultimately improving institutional performance.

1.3 Questions of the Study

In the digital age, the improvement of administrative effectiveness is not only related to the quality of education, but also to the competitiveness and long-term development of universities. Digital transformation has brought new opportunities and challenges to the administrative management of higher vocational colleges.

At present, private higher vocational colleges in Shandong province generally attach importance to the construction of digital infrastructure, including campus network coverage, digital teaching platform, office automation system, etc., which provides basic conditions for the digital administrative management of universities. Digital transformation promotes the standardization and streamlining of the administrative management process. Some colleges and universities have begun to try process reengineering to reduce the circulation of paper documents, introduce or are developing various information systems, speed up the approval process through electronic means, and improve the speed of decision-making and execution efficiency. Some leading universities have started to explore the use of big data analytics to assist in decision-making. Through the collection and analysis of the data in the administrative management process, it provides data support for resource allocation, teaching quality improvement and student management. Some leading universities have started to explore the use of big data analytics to assist in decision-making.

Through the collection and analysis of the data in the administrative management process, it provides data support for resource allocation, teaching quality improvement and student management. Although digitalization has brought many advantages, different universities have differences in the degree of system integration, utilization rate and user satisfaction. They are also faced with problems such as insufficient capital investment, system compatibility problems, information security risks, administrator resistance to new technologies, and lack of unified planning and standards.

Although information construction needs the support of hardware facilities, it is not a pile of simple advanced equipment, but a systematic project composed of three elements of talent information resources and modern information technology, among which talent is the new force of educational information construction. The information construction of private colleges and universities requires the information atmosphere that principals understand, precise backbone and teachers can use. Through gradual training, learning and application training, the ability of self-study talents is strengthened, so as to improve the overall level of information technology of the school.

Lack of advanced training, respondents want to receive more training on advanced data analysis, information system operation, and network security, but the current training content fails to meet these needs. The content is not practical enough, and the training content cannot effectively solve the specific problems encountered by teachers and managers. The training methods are not flexible enough, and the current training methods fail to adapt to the habits and needs. Respondents choose flexible training methods, such as online courses and short-term workshops. Lack of practical

opportunities, the lack of hands-on practice links in the training, and the lack of practical opportunities for managers to learn new technologies affect the training effect. The training was low, and the respondents thought training frequency was low to keep up with technological development. They recommend quarterly training to update technical knowledge. The lack of a system, and training, cannot measure the effect of training and the technical mastery of the trainees. There is no continuous improvement mechanism, and the training content and methods cannot be continuously improved according to the actual needs due to the lack of assessment and feedback. With the increasing popularity of information technology in higher education management, understanding and improving the ability of administrators to accept and apply digital technology has become a key path to improve the administrative effectiveness. Therefore, this study raised the following research questions:

(1) What are the differences in perceived ease of use (PEOU) and perceived usefulness (PU) among administrators of different ages?

(2) What is the role of leadership support (LS) and digital technical knowledge (DTK) on behavioral intention (BI) for using digital technology?

(3) What is the mediating role of behavioral intention (BI) in the relationship between digital technical knowledge (DTK) and administrative effectiveness (AE)?

(4) How does digital technical knowledge (DTK) of administrators of different ages affect administrative effectiveness (AE)?

(5) How can digital technology training strategies be formulated to effectively improve the administrative effectiveness of private colleges in Shandong Province?

These problems aimed to comprehensively explore the factors affecting the acceptance of digital technology, and provide scientific basis and practical guidance for improving the administrative effectiveness of the colleges of private universities in Shandong Province.

1.4 Objectives of the Study

This study aimed to conduct an in-depth analysis of digital technology acceptance among different groups of administrative personnel in private colleges in Shandong Province. On this basis, targeted training strategies were developed to enhance administrative effectiveness. Specifically, this study employed questionnaire surveys and structural equation modeling to systematically examine the relationships among key variables, including digital technology adoption, behavioral intention, leadership support, and administrative effectiveness, thereby providing a scientific foundation and practical guidance for institutional management practices. Based on the empirical findings, this study further proposed and constructed targeted digital technology training strategies to improve administrative effectiveness in private colleges in Shandong Province. On the basis of the above research framework, the specific objectives of this study are as follows:

1. To determine the differences in perceived ease of use (PEOU) and perceived usefulness (PU) among administrators at different age groups.

2. To examine the impact of leadership support and digital technical knowledge on the behavioural intention (BI) of administrators.

3. To examine the mediating role of behavioral intention (BI) in the relationship between digital technical knowledge (DTK) and administrative effectiveness (AE).

4. To determine the impact of digital technical knowledge (DTK) of administrative personnel (AP) of different ages on administrative effectiveness (AE).

5. To formulate effective digital technology training strategies (DTTS) to improve the administrative effectiveness (AE) of private colleges in Shandong Province.

1.5 Scope of the Study

This study focused on the administrators of private vocational colleges in Shandong Province, and adopted mixed research methods to comprehensively investigate and improve the administrative effectiveness. The specific scope of the study is as follows:

1.5.1 Research institutions

This study selected private colleges in Shandong Province as the research subject. These colleges included but were not limited to schools in different disciplines such as business schools, engineering schools and schools of Humanities. The colleges were chosen based on the following:

- Geographic scope: Private higher vocational colleges in Shandong Province.
- Type of college: private vocational colleges which mainly provide junior college and undergraduate education.
- Research focus: Colleges involved in the application of digital technology in their administration.

1.5.2 Research Population

The study population of this study was the administrators of private colleges in Shandong Province, including all personnel involved in administrative work, such as dean, vice dean, teaching section chief, chief of student management section, chief of practical training section, director, etc. The study population was selected based on the following criteria:

- Age Groups

30-39: These people may have received higher education after 2000, and computers have become more popular.

40-49: These people may have received higher education in the 1990s, and computers became widespread but not yet widely used.

50 and over: These people received higher education in the 1980s or earlier, before computers were widespread.

- Job Roles

Staff responsible for the daily management and administrative affairs of the university, with specific positions including teaching management, scientific research management, student management, financial management, human resources management, etc.

By combining administrators of different ages, different responsibility ranges and different technical bases, this study could comprehensively analyze the application

of digital technology in administrative management, and formulate effective training strategies to improve the administrative effectiveness of colleges of private vocational colleges in Shandong Province.

1.6 Benefits of the Study

This study aimed to formulate digital technology training strategy on the improvement of administrative effectiveness, put forward improvement suggestions and feasible programs, provide scientific basis and practical guidance for the information construction and education management of higher vocational colleges, and make important contributions in theory, practice, and policy.

The research results provide empirical basis and specific suggestions for private vocational colleges in Shandong province to formulate and implement digital technology training strategies, and help them improve the technical application ability and overall administrative effectiveness of administrators. Through the comparison of intelligent campus and unintelligent campus, the research results reveal the training effect based on different technologies, and provide valuable reference for other regions and types of higher vocational colleges. According to the feedback of administrators on the training content and methods, improvement suggestions are put forward to ensure that the training is more practical and easy to use, and improve the training effect and the satisfaction of managers. This study emphasizes the importance of digital technology in improving administrative effectiveness, supports the construction of education informatization, promotes the development of higher vocational colleges to the direction of intelligent campus, and provides support for the realization of education modernization.

The research results provide scientific basis and reference for education authorities and policy makers to promote the informatization construction of higher vocational colleges and formulate relevant policies, and promote the optimization and implementation of education management policies. By improving the administrative effectiveness of private higher vocational colleges, they can promote the fair distribution and use of educational resources, improve the quality of education, and promote the fair development of education.

1.7 Definition of Key Terms

Term	Definition
Administrative Personnel (AP)	Administrative personnel refer to the staff in charge of daily management and administrative affairs in colleges and universities. Their primary responsibilities include coordinating academic and administrative affairs, managing personnel and finance, maintaining campus order, and ensuring the effective implementation of various policies and procedures. In this study, administrative personnel refer to the managers in the colleges of private universities in Shandong Province. Their work efficiency

Term	Definition
Administrative Effectiveness (AE)	<p>and management ability directly affect the overall operation and development of the college.</p> <p>Administrative effectiveness refers to the efficiency and effect of administrative personnel when performing their duties. In this study, administrative effectiveness is quantified by key performance indicators (KPIs) to evaluate the effect of digital technology training strategies.</p>
Key Performance Indicators (KPIs)	<p>Key performance indicators are specific indicators used to measure the performance of an organization or individual in terms of specific goals. In this study, key performance measures are used to quantify administrative effectiveness, including:</p> <p>Work Efficiency (WE): Task completion time and number of transactions processed.</p> <p>Decision quality (DQ): Accuracy and timeliness of decisions.</p> <p>Communication collaboration (CAC): frequency and quality of communication.</p> <p>Frequency of technology use (TUF): the frequency of managers using digital technology in their daily work.</p> <p>Technology application capability (TAC): Managers' ability to master and apply digital technology.</p>
Leadership Support (LS)	<p>Leadership support refers to the actions and commitments of institutional leaders in facilitating the adoption and effective use of digital technology within administrative operations. It includes providing policy direction, allocating necessary resources, offering technical and financial support, and creating an environment that encourages innovation and continuous learning.</p>
Digital Technology Training Strategy (DTTS)	<p>Digital technology training strategy refers to the program to improve the digital technical ability and application level of the administrative personnel through the systematic training plan. Specific strategies include: training content, training frequency, training methods, etc. In this study, the design and implementation of digital technology training strategy aims to improve the technical application ability of administrative personnel in private colleges in Shandong Province, so as to improve the overall administrative effectiveness.</p>

Term	Definition
Digital Technical Knowledge (DTK)	Digital technical knowledge refers to the ability of administrative staff to understand, operate, and apply digital technologies effectively in their work. It encompasses basic knowledge of digital tools and systems, proficiency in common software applications, awareness of emerging technologies, and the capability to troubleshoot, install, and adapt digital solutions to support administrative tasks.
Technology Acceptance Model (TAM)	Technology Acceptance Model is a theoretical model used to explain and predict users' acceptance of new technology. The TAM model mainly includes the following two core concepts, perceived usefulness (PU), and perceived ease of use (PEOU). According to the TAM model, perceived usefulness and perceived ease of use can affect the user's behavioral intention (BI), and thus determine the actual use (AU) situation.
Perceived Usefulness (PU)	Perceived usefulness is the degree to which a user believes that using a technology can improve their work performance. In this study, perceived usefulness refers to the degree to which administrators believe that digital technology training improves their work efficiency, decision-making quality, and overall administrative effectiveness.
Perceived Ease of Use (PEOU)	Perceived ease of use refers to how easy the user considers it is to learn and use a technology. In this study, perceived ease of use refers to the extent to which administrators found the digital technology training content easy to learn and use.
Training Strategy	Training strategy refers to a systematic and targeted training program designed to improve the knowledge, skills, and problem-solving abilities of administrative staff in digital technology. It includes the scientific design of training content such as basic knowledge of digital technology, the use of common tools and software, troubleshooting, and equipment installation, the reasonable arrangement of training frequency through regular or on-demand sessions, and the selection of diverse training methods such as online courses, offline workshops, and hands-on practice.

CHAPTER 2

LITERATURE REVIEW

This section is devoted to a literature review of each variable, which is described below:

2.1 Introduction

2.2 Theoretical Foundation

2.2.1 Theory of Rational Behaviour (TRA)

2.2.2 Technology Acceptance Model (TAM)

2.2.3 Leadership Support Theory (LST)

2.2.4 Knowledge Management (KM)

2.2.5 Key Performance Indicators (KPI) and Performance Improvement Theory (PIT)

2.2.6. Perceived Usefulness (PU)

2.2.7 Perceived Ease of Use (PEOU)

2.2.8 Leadership Support (LS)

2.2.9 Digital Technical Knowledge (DTK)

2.2.10 Behavioral intention (BI)

2.2.11 Administrative Effectiveness (AE)

2.2.12 Gaps and Emerging Trends

2.3 Theoretical Framework

2.4 Conceptual Framework

2.5 Conclusion

2.1 Introduction

The increasing integration of digital technologies in educational administration has drawn growing scholarly attention to the relationships among digital technology acceptance, administrative effectiveness, and training strategies. Digital technology adoption is widely regarded as a critical driver of administrative effectiveness in higher education, which is commonly evaluated through key performance indicators (KPIs) such as work efficiency, decision quality, communication and collaboration, frequency of technology use, and technology application capability (Kim et al., 2018). Within this context, the Technology Acceptance Model (TAM) explains how perceived usefulness (PU) and perceived ease of use (PEOU) shape behavioral intention (BI) toward technology use, while the Theory of Reasoned Action (TRA) further posits that behavioral intention serves as the most immediate determinant of actual behavior and performance outcomes. Accordingly, behavioral intention may function not only as a

mediating mechanism linking technology acceptance factors to administrative effectiveness, but also as a direct predictor of effectiveness when technology use becomes embedded in routine administrative practices. Based on this theoretical foundation, the present study adopts a partial mediation framework that allows for the simultaneous examination of both direct and indirect effects of digital technology acceptance on administrative effectiveness. Despite the extensive application of TAM and TRA in technology acceptance research, empirical studies focusing on administrative management in private colleges in Shandong Province remain limited. Therefore, this literature review systematically synthesizes relevant theoretical and empirical studies to identify research gaps and establish a solid theoretical foundation for the present study.

2.2 Theoretical Foundation

2.2.1 Theory of Rational Behavior (TRA)

The Theory of Rational Behavior (TRA) provides a foundational framework for predicting and explaining human behavior by emphasizing the role of behavioral intention as the most immediate antecedent of actual behavior. It posits that behavioral intention is jointly shaped by individuals' attitudes toward the behavior and subjective norms. Attitude refers to an individual's positive or negative evaluation of performing a specific behavior, whereas subjective norms reflect the perceived social pressure from important referent groups, such as family members, friends, or colleagues, regarding whether the behavior should be performed (Van, 2020; Martínez-Tur et al., 2020). TRA assumes that individuals engage in a rational decision-making process in which they systematically evaluate the expected outcomes of a behavior as well as the expectations of others before forming an intention that ultimately guides behavior (Javaid et al., 2020).

The explanatory strength of TRA lies in its assumption that human behavior is reasoned and goal-oriented, making attitudes and subjective norms powerful predictors of behavioral intentions across diverse contexts. Consequently, TRA has been widely applied in studies of health behavior, consumer decision-making, and social behavior, where researchers seek to understand how individual evaluations and social influences jointly shape behavioral choices (Kim et al., 2018;). The broad applicability of this model underscores its value as a general framework for understanding intentional behavior in both individual and organizational settings.

Despite its broad usefulness, TRA has demonstrated limitations when applied to the field of information systems and technology-related behaviors. Scholars have argued that the theory's general structure does not adequately capture the specific belief constructs required to explain technology usage and acceptance. In particular, TRA does not explicitly operationalize technology-related perceptions, which constrains its predictive power in technology adoption contexts (Du & Wang, 2024). This lack of specificity has led researchers to question its suitability for explaining complex technology acceptance behaviors that involve system characteristics, perceived usefulness, and ease of use (Slater & Narver, 2022).

To address these shortcomings, subsequent research has extended and refined TRA by incorporating more context-specific constructs and measurement scales. These efforts aim to enhance the explanatory precision of behavioral models in technology-

related research, leading to the development of more specialized frameworks that better account for users' cognitive evaluations and experiential perceptions of technological systems (Connolly et al., 2023).

2.2.2 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was proposed to explain and predict users' acceptance and use of information technology and has since become one of the most influential theoretical frameworks in information systems research (Davis, 1989). The central premise of TAM is that users' behavioral intention to use a technology and their actual usage behavior are primarily determined by two cognitive beliefs: perceived usefulness (PU) and perceived ease of use (PEOU). Perceived usefulness refers to the extent to which an individual believes that using a particular technology enhanced job or task performance, whereas perceived ease of use reflects the degree to which the technology is perceived as effortless to use. Due to its parsimonious structure and strong explanatory power, TAM has been widely applied across diverse technological contexts and digital applications (Chu & Majumdar, 2022; Slater & Narver, 2022).

The acceptance and use of information technologies can generate both immediate and long-term benefits at the individual and organizational levels, including improved performance, enhanced efficiency, and greater convenience. These potential benefits have consistently motivated information systems research to investigate individuals' willingness to adopt and utilize new technologies. With the rapid expansion of digital technologies and intelligent systems, understanding the determinants of technology acceptance has become increasingly important for both researchers and practitioners (Reis et al., 2023; AlNuaimi et al., 2022). As personal computing and digital platforms proliferated, research attention shifted toward explaining users' behavioral responses to system performance and technological characteristics.

Prior to the development and widespread adoption of TAM, early information systems research approached technology adoption primarily from technological, organizational, and design-oriented perspectives. These studies emphasized factors such as user involvement in system design, implementation processes, and system characteristics as critical determinants of successful information system use. However, many of these studies relied heavily on subjective performance perception measures without sufficiently validating their psychometric quality. As a result, the observed relationships between perceived system performance and actual system use were often weak or inconsistent, limiting the explanatory power of early adoption models (Lunardi et al., 2019).

To address these limitations, scholars recognized the need for a theoretically grounded and empirically validated framework that could capture the attitudinal mechanisms mediating the relationship between system characteristics and actual use behavior. While the Theory of Reasoned Action provided a general psychological explanation of behavior, its generic nature constrained its applicability in technology-specific contexts. In particular, the absence of constructs explicitly tailored to technology usage prompted concerns regarding its explanatory adequacy in information systems research (Chu & Majumdar, 2022; Slater & Narver, 2022).

Building on these theoretical gaps, TAM was developed as a context-specific extension that identifies beliefs directly relevant to technology use. The underlying logic of TAM is that, within technological environments, behavioral intention is shaped not by a general attitude toward behavior but by specific cognitive evaluations related to system performance and usability. By introducing perceived usefulness and perceived ease of use as core determinants, TAM offered a parsimonious yet powerful framework for examining user acceptance across a wide range of technological systems (Zucker et al., 2022; Chu & Majumdar, 2022).

The primary objective of TAM is to elucidate the cognitive processes underlying technology acceptance in order to predict user behavior and explain successful system implementation. From a practical perspective, the model provides actionable insights for system designers and managers by identifying key factors that can be influenced prior to and during technology deployment. To achieve these objectives, TAM conceptualizes the acceptance process as a causal chain linking external variables, cognitive beliefs, behavioral intention, and actual system use (Slater & Narver, 2022; Zucker et al., 2022).

A critical step in the development of TAM involved identifying and validating reliable measurement scales for perceived usefulness and perceived ease of use. Drawing on prior empirical research in human behavior and information systems management, multi-item scales were developed and empirically tested, demonstrating strong reliability and validity across organizational contexts. Empirical evidence consistently supports the assertion that individuals' decisions to use technology reflect a cognitive trade-off between expected performance benefits and the effort required to use the system. Accordingly, technology use is determined by users' evaluations of the balance between perceived usefulness and perceived ease of use (Chu & Majumdar, 2022; Slater & Narver, 2022).

Perceived usefulness captures users' expectations that technology improved task performance, while perceived ease of use reflects beliefs about the effort associated with system utilization. Extensive empirical validation has confirmed the robustness of these constructs and their significant relationships with behavioral intention and actual use behavior. As a result, TAM has become a foundational model in technology acceptance research and continues to inform contemporary studies on digital innovation, intelligent systems, and emerging technologies (Zucker et al., 2022). The development of the model and measures for technology acceptance have made significant theoretical contributions and have had a great practical value. The application of the model for testing IS usability has made it possible to evaluate the motivation of users to adopt a range of technologies, which had not been done before due to a lack of validated subjective measures. The development of constructs which had a strong and significant correlation with use behavior made it possible to understand the cognitive and affective factors mediating the effect of system characteristics on technology acceptance.

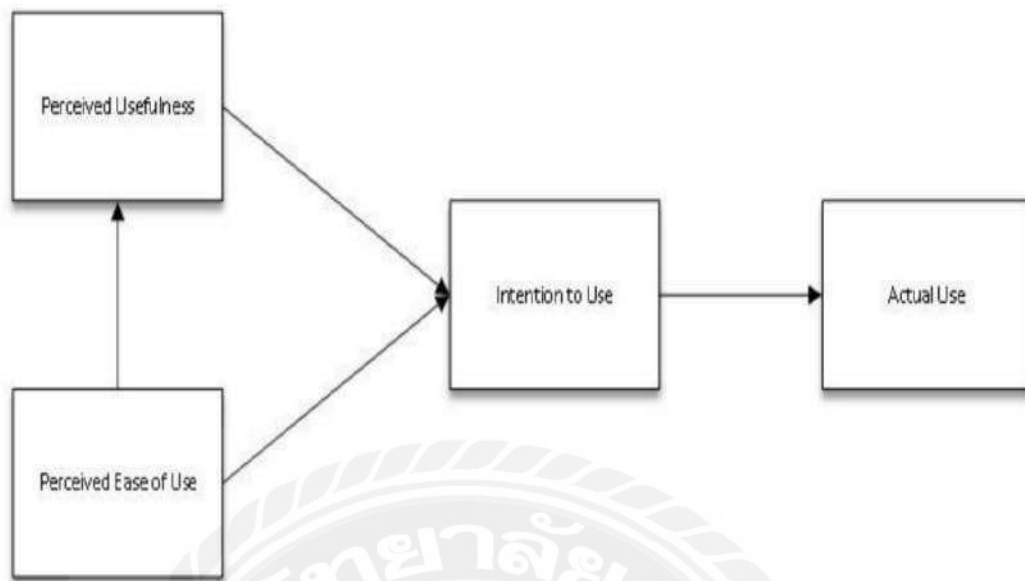


Figure 2.1 Technology Acceptance Model

The Technology Acceptance Model (TAM) provides a theoretical basis for research by understanding perceived usefulness (PU) and perceived ease of use (PEOU) and its actual use behavior (AU).

To examine whether administrative personnel differ significantly in the perceived usefulness and ease of use of digital technology training across age groups is an important aspect of this study. Based on the TAM model, it can be assumed that older managers may view the new technology as complex and difficult to use, while younger managers may be more receptive to and use the new technology. Verification of this hypothesis can help identify differences in the development of tailored training strategies (Qi et al., 2019; Reis et al., 2023)

2.2.3 Leadership Support Theory (LST)

2.2.3.1 Theoretical Background and Development

The development of Leadership Support Theory is accompanied by intensive research on organizational behavior and management. During the 1970s and 1980s, the importance of leadership support was increasingly recognized, especially in complex and dynamic work environments, which was considered a key factor in promoting administrator performance and organizational success (Qi et al., 2019; Reis et al., 2023). Research during this period began to focus on how leaders' behavior affected administrator attitudes, motivation, and performance, and gradually recognized the important role of leadership support in it.

The importance of leadership support is that it not only directly affects administrators' job satisfaction and performance, but also affects administrators' behavior and psychological state through indirect ways such as work environment and team atmosphere. Leadership support helps to reduce stress and burnout and enhance motivation and creativity, thus improving the overall effectiveness and performance of

the organization (Chu & Majumdar, 2022). In addition, leadership support promotes administrator career development, increases administrator organizational commitment and loyalty, and reduces administrator attrition (AlNuaimi et al., 2022).

Although the importance of leadership support was widely recognized at the time, earlier studies focused on leadership style and organizational structure and lacked detailed exploration of specific support behaviours and their effects (Lunardi et al., 2019). These studies typically divide leadership styles into task-oriented and relationship-oriented, and explore the impact of these two styles on administrator performance. However, this classification method ignores the diversity and complexity of leadership support and fails to fully explain the specific impact of different support behaviors on administrators.

With further research, scholars began to recognize the need to more carefully explore the specific behaviors of leadership support and their effects. In this period, the research gradually shifted from the leadership style at the macro level to the specific support behavior at the micro level, and began to focus on how to improve administrators' job satisfaction and performance through the specific support behavior (Lunardi et al., 2019). For example, research has found that specific behaviors such as resource support, emotional support, and technical guidance provided by leaders have significantly improved administrator performance and organizational commitment.

In the 21st century, the leadership supports the further development of the theory and combines the latest results of modern management and psychology. Modern Leadership Support Theory emphasizes the multi-dimensional nature of leadership support, and proposes that leadership support includes not only the provision of material resources, but also the psychological and emotional support. While providing support, leaders also need to pay attention to the individual needs of administrators and adopt personalized support strategies to better stimulate the potential and creativity of administrators (Borman, 2004).

In addition, the modern Leadership Support Theory also emphasizes the dynamic and situational nature of the support behavior. Leaders need to adjust their support strategies flexibly according to different work situations and administrator specific conditions to cope with the complex and changeable working conditions (Hofstede, 1980). This flexibility and adaptability make the Leadership Support Theory have a stronger guiding significance and practical value in the modern organizational management.

2.2.3.2 Core Elements of Leadership Support

Leadership Support Theory emphasizes that through various forms of support, leaders can effectively improve administrator job satisfaction and performance. Core elements of leadership support include resource support, emotional support, technical guidance, and feedback, and career development opportunities. These elements work together in different aspects to build a comprehensive support system to promote administrator career development and organizational efficiency.

Resource support refers to the provision of leaders providing administrators with the necessary material and technical resources to ensure that they can perform their tasks efficiently. Resource support includes not only equipment and

funding, but also information resources and time resources. By providing these resources, leaders can reduce barriers to work and improve efficiency and quality. For example, providing advanced technical equipment and software can enable administrators to complete tasks faster and reduce work stress. In addition, adequate time resources and information support can help administrators better plan and perform work tasks, thus improving work results (Widyanti & Usman, 2019).

Emotional support is an important part of leadership support, involving the care and understanding of administrators. By focusing on their personal needs and emotional states, leaders can build good working relationships and enhance their sense of belonging and satisfaction. Emotional support also includes the recognition and praise of administrators, which helps to improve their sense of self-worth and work motivation. For example, leaders can use regular one-on-one conversations to understand administrator confusion and needs, and provide help and support accordingly. In addition, emotional support is also reflected in the recognition and celebration of administrator achievements, which encourages administrators to continue working hard (Lunardi et al., 2019).

Technical guidance and feedback are an important means to improve administrators' skills and problem-solving skills. Leaders provide technical guidance to help administrators master the necessary skills and knowledge and improve their work ability. At the same time, leaders give administrators timely and specific feedback to help them understand their work performance and clarify the direction of improvement. Effective technical guidance and feedback mechanism can not only improve the work efficiency of administrators, but also enhance their confidence and motivation in career development. For example, regular technical training and workshops can help administrators master the latest techniques and methods, while specific feedback can help administrators to continuously improve and improve in their actual work (Vinish et al., 2021).

Providing career development opportunities is an important component of leadership support involving paths to administrator training, promotion and career development. By supporting their career growth, leaders can not only improve their skills, but also enhance their loyalty and commitment to the organization. The provision of career development opportunities helps administrators to learn and progress at work, thus contributing to the organization at a higher level. For example, leaders can promote administrator career development by developing career development plans, providing internal and external training opportunities, and supporting administrators to participate in professional conferences and workshops (Arayankalam et al., 2021).

Leadership support also includes building trust and transparency, which has important effects on administrator job satisfaction and organizational commitment. Through transparent communication and decision-making processes, leaders can enhance administrators' trust in the organization and reduce uncertainty and anxiety. For example, leaders can inform administrators about the organization's goals and progress through regular team meetings and open information sharing. This transparency not only increases trust among administrators, but also promotes teamwork and innovation (Deards & Puente, 2020).

2.2.3.3 Application of the Leadership Support Theory in This Study

In this study, Leadership Support Theory (LST) was employed to examine the role of leadership support in digital technology training and its influence on administrative effectiveness. Specifically, the study focused on four aspects: examining the effect of leadership support on administrators' behavioral intentions, analyzing differences in perceived leadership support across age groups, exploring the mediating role of leadership support in the relationship between training-related perceptions and behavioral intention, and developing effective leadership support strategies. By applying LST, this research aimed to provide both theoretical grounding and empirical evidence to enhance the effectiveness of digital technology training and administrative management in organizational settings (Arayankalam et al., 2021).

Within the context of digital technology training, leadership support is widely recognized as a critical factor shaping administrators' willingness to participate in training programs. Leadership support can manifest through multiple forms, including resource support, emotional encouragement, technical guidance, and career development opportunities. These forms of support can substantially enhance administrators' motivation and confidence to engage in digital technology training. This study evaluates the influence of different types of leadership support on behavioral intention through questionnaire-based analysis, aiming to identify which forms of support are most effective in motivating participation. Prior research suggests that technical guidance and timely feedback play a particularly important role, as they directly assist administrators in improving skills and resolving practical challenges associated with digital technology adoption (Lunardi et al., 2019; AlNuaimi et al., 2022).

The effects of leadership support may vary across different age groups of administrators. This study further investigates age-based differences in perceived leadership support and examines how such differences influence administrators' digital technology adoption supported by training. Older administrators may place greater emphasis on emotional support and long-term career development opportunities, whereas younger administrators may prioritize technical guidance and access to resources. By comparing responses across age groups, the study seeks to provide insights for tailoring leadership support strategies to meet the diverse needs of administrators at different career stages (Azman & Vaicondam, 2020; Widyanti & Usman, 2019).

In addition, this study explored the mediating role of leadership support in the relationship between perceived usefulness (PU), perceived ease of use (PEOU), and behavioral intention (BI). Leadership support may indirectly influence administrators' behavioral intentions by enhancing their perceptions of the usefulness and ease of use of digital technology training. For instance, resource provision and technical assistance from leaders can strengthen administrators' competence and confidence, thereby fostering more favorable attitudes toward training participation. Structural equation modeling (SEM) was employed to test the mediating effects of leadership support and to further clarify its role in improving training outcomes.

Based on the empirical findings, this study proposes targeted leadership support strategies to enhance both the effectiveness of digital technology training and overall administrative performance. These strategies include providing adequate resource support, such as advanced technological equipment and sufficient training materials, to facilitate efficient participation in training programs (AlNuaimi et al., 2022). Emotional support is also emphasized through the establishment of open communication channels, recognition of administrators' efforts, and attention to their emotional well-being, which can strengthen organizational commitment and work engagement (Widyanti & Usman, 2019). Furthermore, technical guidance and feedback should be reinforced through regular workshops, hands-on training sessions, and continuous performance feedback to support skill development (Lunardi et al., 2019). Finally, leadership should promote career development opportunities by offering structured development plans and encouraging participation in professional conferences and learning networks, thereby supporting administrators' long-term professional growth and adaptability in a digital environment (Arayankalam et al., 2021).

2.2.4 Knowledge Management (KM)

2.2.4.1 Theoretical Background and Development

The origins of knowledge management can be traced to the early development of organizational knowledge studies, which emphasized the strategic role of knowledge in organizational effectiveness and performance. Contemporary research conceptualizes knowledge management as a systematic process involving the creation, sharing, integration, and application of knowledge to support organizational goals. Recent studies highlight the dynamic interaction between different forms of knowledge and emphasize that effective knowledge management is essential for organizational adaptability and sustainable development in complex and digitalized environments (Chu & Majumdar, 2022; Zucker et al., 2022).

With the rapid advancement of information and digital technologies, both the practice and theoretical exploration of knowledge management have been significantly deepened. Scholars increasingly stress the enabling role of information technology in supporting knowledge-related processes, arguing that digital platforms, information systems, and data-driven tools are critical for facilitating efficient knowledge transfer, storage, and utilization. The integration of digital technologies into knowledge management practices has been shown to enhance organizational learning efficiency and decision-making quality (Reis et al., 2023; AlNuaimi et al., 2022).

Throughout the evolution of knowledge management research, information management, organizational learning, and innovation-oriented perspectives have played a central role. Information management theory underscores the importance of acquiring, processing, and leveraging information as a foundation for effective knowledge practices. Organizational learning theory focuses on how organizations continuously improve capabilities through collective learning, reflection, and adaptation. Meanwhile, innovation-oriented research emphasizes that new knowledge creation and recombination serve as critical drivers of organizational innovation and competitive renewal (Lunardi et al., 2019; Chu & Majumdar, 2022).

In addition, strategic perspectives on knowledge management emphasize knowledge as a core organizational resource that underpins long-term competitiveness. From this viewpoint, enterprises achieve sustainable competitive advantage by effectively integrating and deploying unique knowledge assets embedded in individuals, routines, and organizational processes. Empirical studies demonstrate that well-structured knowledge management practices strengthen innovation capability, operational efficiency, and market responsiveness, particularly in knowledge-intensive and digitally transformed organizations (Slater & Narver, 2022; Zucker et al., 2022).

In the 21st century, with the development of emerging technologies such as big data, cloud computing and artificial intelligence, the research and application fields of knowledge management are constantly expanding. Modern information technology provides a new tool and platform for knowledge management, making the acquisition, sharing and application of knowledge more convenient and efficient. For example, enterprise knowledge portals, social media platforms, and online collaboration tools greatly facilitate the flow and innovation of knowledge within the organization (Holmes, 2017).

The development course of knowledge management shows its importance in the organization and management practice. Through the continuous integration of new theories and technologies, knowledge management provides strong support for the improvement of organizational learning ability, innovation ability and competitive advantage. As times evolve, knowledge management theories keep advancing to meet emerging organizational demands and adapt to new technological landscapes, delivering sustained value to enterprises and institutions.

2.2.4.2 Application of Knowledge Management in the Organization

Through effective knowledge management, the organization can continuously create new knowledge and enhance its innovation ability and market competitiveness. The knowledge creation theory proposed by Morrow (1983) pointed out that knowledge is the core driving force of organizational innovation. Through the four processes of socialization, externalization, combination, and internalization (SECI), organizations are able to transform tacit knowledge into explicit knowledge and constantly generate new knowledge. This process not only promotes the development of new products and new services, but also promotes the innovation of organizational processes and management models. For example, Toyota has achieved lean production through knowledge management, which has significantly improved production efficiency and product quality (Nam et al., 2022).

Knowledge management helps organizations to better acquire and apply knowledge, support the decision-making process, and improve the decision-making quality and efficiency. Grant (1996) pointed out that, through effective knowledge management, organizations can integrate information and knowledge from different sources in the decision-making process to form a more comprehensive and accurate judgment. Specifically, knowledge management systems can store and analyze large amounts of data, provide decision support tools and knowledge base to help decision makers quickly obtain the information they need. For example, General Electric (GE) has improved the scientificity and timeliness of decision-making by establishing a

global knowledge-sharing platform that enables administrators in different regions and departments to share best practices and experiences (Greember & Baron, 1995).

Through knowledge sharing and application, promote learning and growth within the organization and improve overall performance. Hansen, Nohria and Tierney (1999) pointed out that knowledge-sharing is the key to organizational learning. Through the establishment of knowledge-sharing platforms and mechanisms, organizations can realize the flow of knowledge between different departments and levels and promote the formation of collective wisdom. For example, Price water house coopers (PwC), through the global knowledge management system, promotes knowledge exchange and collaboration among administrators in different countries and regions, and improves the overall service quality and customer satisfaction (Harrison & Klein, 2007).

Knowledge management can help organizations to optimize workflow, reduce repetitive work, and improve work efficiency and quality. Davenport and Prusak (1998) stressed that knowledge management involves not only the creation and sharing of knowledge, but also the effective application of knowledge. Through the knowledge management system, organizations can standardize and optimize workflow, reduce information isolation and repetitive labor. For example, IBM enables global administrator collaboration and improves the efficiency of project management and execution (Vinish et al., 2021). In addition, knowledge management helps organizations quickly find solutions when they encounter problems, reducing failure time and cost.

Through knowledge management, administrators are able to easily access the required knowledge and resources, thus improving their professional skills and job satisfaction. The knowledge management system provides abundant learning resources and training opportunities for administrators to continuously learn and grow. For example, Google provides a large number of training materials and courses through its internal knowledge base and learning platform to help administrators continuously improve their skills and enhance their satisfaction and sense of belonging (Arayankalam et al., 2021).

Effective knowledge management can enhance the core competitiveness of the organization and make it maintain a leading position in the market. Through systematic knowledge management, organizations can respond quickly to market changes and adjust strategies and actions. Apple, for example, remains a leader in technology through a highly integrated knowledge management system that supports its rapid innovation and market response capabilities (Azman & Vaicondam, 2020).

Knowledge management plays an important role in improving innovation ability, improving the quality of decision-making, promoting organizational learning, optimizing processes and efficiency, enhancing administrator ability and satisfaction, and enhancing the competitive advantage of the organization. Through systematic knowledge management, the organization can achieve continuous improvement and innovation, and maintain a long-term competitive advantage.

2.2.4.3 Application of Knowledge Management in This Study

Knowledge management was used to explore the role of knowledge in digital technology training and its impact on administrative effectiveness. The effective implementation of knowledge management can not only improve the technical ability of administrative personnel, but also promote their practical application in the work, so as to improve the overall administrative effectiveness (Cooper & Zmud, 2021; Liza & Andriyanti, 2020; Pimden, 2020).

Administration groups may differ significantly in knowledge acquisition and application. Younger managers may be more familiar with and adapt to new technologies, while older managers may rely on traditional knowledge and experience (Pimden, 2020). Therefore, this study assessed differences in administrative performance in WWM practices across age groups. By analyzing these differences, highly targeted training strategies can be developed to help managers of all ages effectively acquire and apply digital technology knowledge (Cooper & Zmud, 2021).

Knowledge management has an important impact on behavioral intention of administrative personnel (Behavioral intention, BI) (Pimden, 2020). Knowledge management practices can enhance the confidence and enthusiasm of managers in digital technology, thus enhancing their willingness to use digital technology in their work (Cooper & Zmud, 2021). By investigating and analyzing the impact of knowledge management on behavioral intentions, this study will reveal the key role of knowledge management in promoting the acceptance and application of technology. Specifically, through knowledge sharing and knowledge application, managers are able to better understand and apply digital technologies to improve their behavioral intentions (Bin Amin & Rabiul Basher Rubel, 2020).

The mediation role of knowledge management in the effect of digital technology training is an important concern of this study. Knowledge management practices can enhance the effectiveness of training by improving the acquisition and application of training content (Cooper & Zmud, 2021; Pimden, 2020). For example, through the knowledge base and online learning platform, managers can access training materials at any time and apply this knowledge in practical work, thus improving the effectiveness of training. This study explored how knowledge management can play an intermediary role between digital technology training and administrative effectiveness to reveal its specific mechanisms in improving the training effectiveness.

Based on the analysis of the role of knowledge management in different age groups, behavioral intentions, and training effects, this study proposed a series of effective knowledge management strategies (Cooper & Zmud, 2021). These strategies include building a knowledge-sharing platform, providing continuous learning opportunities, and promoting knowledge exchange and cooperation. For example, set up a knowledge management system to collect and organize the knowledge generated during the training process and share this knowledge with all administrators to improve the overall technical application ability and administrative effectiveness. These strategies help organizations optimize knowledge management practices, improve the effectiveness of digital technology training, and ultimately improve the overall effectiveness of administration.

By applying knowledge management, this study provided a solid theoretical basis and empirical support for improving the effectiveness of digital technology training and administrative management (Kajol et al., 2022). Knowledge management not only provides a framework for understanding the flow and application of knowledge in organizations, but also provides guidance for designing effective training and management strategies. An empirical study to verify the impact of knowledge management on technology acceptance and administrative effectiveness can provide specific operational guidelines and strategic recommendations for organizations when implementing knowledge management practices (Borman, 2004).

2.2.5 Key Performance Indicators (KPI) and Performance Improvement Theory (PIT)

Key performance indicators (KPI) and performance improvement theory (PIT) are important tools and methods to improve organizational performance. KPI is a set of specific indicators used to quantify and measure the performance of an organization or individual (Bin Amin & Rabiul Basher Rubel, 2020). They provide clear performance objectives and evaluation criteria for the organization, and reflect the operation status and goal achievement of the organization in a quantitative way. KPI helps managers monitor and evaluate performance in key business areas to identify opportunities for improvement and develop management strategies (Roscoe et al., 2019).

Performance Improvement Theory (PIT) emphasizes improving the performance of organizations and individuals through systematic interventions and continuous performance evaluation. The core idea of PIT is to identify existing performance gaps through detailed performance analysis, design and implement effective improvement measures, and ensure the durability and effectiveness of performance improvement through continuous monitoring and feedback (Javaid et al., 2020). The goal of PIT is to drive the organization to continuously optimize operational processes and improve overall performance through scientific methods and tools (Roscoe et al., 2019).

KPI and PIT have a close mutual relationship in the improvement of organizational performance (Kim et al., 2018). KPI provides clear performance objectives and evaluation criteria to provide a quantitative basis for the implementation of PIT (Chatterjee et al., 2021). By setting up and monitoring the KPIs, organizations can identify key areas for improvement and design and implement targeted improvements within the framework of PIT. At the same time, the continuous evaluation and feedback mechanism of PIT ensures real-time monitoring and adjustment of KPI to achieve sustained performance improvement.

2.2.5.1 Key Performance Indicators (KPI)

Key performance indicators (KPIs) are a set of specific indicators used to quantify and measure the performance of an organization or individual. KPI reflects the performance of organizations in a specific time period through clear quantification criteria. The KPI has the following main characteristics (Javaid et al., 2020; Kim et al., 2018):

Specific: KPI must be specific and reflect the specific performance areas to be measured. For example, the productivity of administrators can be measured by the time spent on tasks or the number of documents processed (Kaplan & Norton, 1996).

Quant ability: KPI should be quantified through data to ensure objectivity and accuracy. For example, performance is measured using percentage, quantity, or other quantitative criteria (Javaid et al., 2020).

Relevance: KPI should be closely related to the strategic objectives of the organization and can truly reflect the achievement of the goals. For example, the KPIs that measure the effectiveness of administrator training should directly reflect the improvement of administrator performance achieved by the training (Kim et al., 2018).

Time limitation: KPI are usually measured within a specific time frame, such as quarterly, annual, to ensure the timeliness of performance evaluation and the possibility of continuous improvement.

In this study, KPI was used to measure the impact of digital technology training strategies on the administrative effectiveness of private vocational colleges in Shandong Province. Through specific KPIs, including work efficiency (WE), decision quality (DQ), communication and collaboration (CAC), technology use frequency (TUF) and technology application ability (TAC), the effect of training strategy can be comprehensively evaluated, providing scientific basis and empirical support for optimizing training strategy and improving administrative management efficiency.

2.2.5.2 Performance Improvement Theory (PIT)

The Performance Improvement Theory (PIT) is a systematic approach to improving the performance of organizations and individuals by identifying and addressing performance gaps. The core idea of PIT is to achieve continuous performance improvement through scientific analysis and targeted interventions. This theory emphasizes identifying the key factors affecting performance based on the current performance status, and developing and implementing improvement strategies to achieve the expected performance goals.

One of the core ideas of Performance Improvement Theory (PIT) is to improve the performance of organizations and individuals through systematic analysis and intervention measures, and KPI, as a specific indicator of quantitative performance, provides clear measurement criteria and evaluation tools for the implementation of PIT.

PIT emphasizes driving performance improvement by setting specific, quantifiable performance goals. KPI plays a crucial role in this process. With clear KPIs, organizations can set specific performance expectations and goals, and measure current performance levels and improvement effects based on these indicators. This quantitative performance measurement method allows organizations to objectively assess performance gaps and develop corresponding improvement plans.

A key step in PIT is to identify performance gaps and opportunities for improvement by analyzing existing performance data. KPI provides specific data and basis for this analysis process (Martínez-Tur et al., 2020). Through detailed analysis of KPI, organizations can identify which areas are underperforming expectations to identify key areas for improvement (Parmenter, 2015). This data-based performance

analysis helps to improve the pertinence and effectiveness of performance improvements (Martínez-Tur et al., 2020).

PIT emphasizes achieving sustained performance improvement through the design and implementation of interventions. The KPI provides the criteria for monitoring and evaluation in this process. By setting improvement goals related to the KPI, organizations can design specific interventions, such as training plans, process optimization, and resource allocation. During the implementation of the intervention, KPI serves as a tool for continuous monitoring to help organizations evaluate the improvement effect in real time, and adjust and optimize according to the evaluation results to ensure the sustainability and effectiveness of performance improvement (Martínez-Tur et al., 2020).

PIT emphasizes continuous feedback mechanisms to ensure the effectiveness of improvement measures and continuous improvement. The KPI provides the quantitative evaluation data and basis for this feedback mechanism. Through regular monitoring and analysis of KPIs, organizations can obtain timely feedback on performance improvement, evaluate the effectiveness of interventions, and make scientific management decisions accordingly. This data-based feedback mechanism helps to optimize management strategies and improve the overall performance of the organization.

2.2.5.3 Application of KPI and PIT in this Study

In this study, key performance indicators (KPI) was used to measure the impact of digital technology training strategies on the administrative effectiveness of colleges of private vocational colleges in Shandong Province. Specific applications include:

Measure the work efficiency (WE) improvement of administrative personnel after using digital technology, such as task completion time, workload, etc (Zucker et al., 2022). The effect of digital technology training can be quantified by comparing the work efficiency data before and after the training.

Feedback the effect of digital technology in the decision-making process, mainly focusing on the accuracy and timeliness of decisions (Slater & Narver, 2022). Through the analysis of the decision-making process and results, we can judge the contribution of digital technology in improving the decision quality (DQ) (Parzefall, 2008).

Measure the effectiveness of digital technology in improving internal communication and collaboration (CAC), including the ease of information sharing and the efficiency of teamwork (Chu & Majumdar, 2022). Through questionnaires to understand the feelings and evaluation of communication and collaboration.

Statistics on the frequency of the use (TUF) of digital technology by administrative personnel in their daily work, reflecting the acceptance and application of the technology (Chu & Majumdar, 2022; Slater & Narver, 2022). The tracking of the frequency of technology use can assess the impact of training on the habit of technology use.

It reflects the mastery and application ability of digital technology, and pays attention to the training effect and technical proficiency. Understand the specific effectiveness of training in improving technology application capability (TAC).

The core concepts and methods of Performance Improvement Theory (PIT) was applied to design and feedback digital technology training strategies (Chu & Majumdar, 2022; Slater & Narver, 2022; Zucker et al., 2022). Specific applications include:

Existing data to identify performance gaps and opportunities for improvement through analysis of available performance data. KPI provided specific data and evidence to help identify key areas for improvement (Rousseau & Schalk, 2000).

Based on the performance analysis results, targeted interventions, such as customized training programs, process optimization, and resource allocation. During the intervention implementation, the KPI serve as a continuous monitoring tool to help assess the improvements in real time (Kanter, 1977).

Through regular monitoring and analysis of KPIs, timely feedback on performance improvement, effectiveness of the intervention is evaluated, and scientific management decisions are made accordingly. Continuous feedback mechanisms ensured the effectiveness and sustainability of improvement measures (Purohit & Goyal, 2016).

2.2.6 Perceived Usefulness (PU)

Perceived usefulness (PU) is the extent to which a user believes that using a technology improved their work performance. Perceived usefulness is usually measured by questionnaire surveys, and it is designed to understand users' views of specific technologies in improving work efficiency, improving work quality, and simplifying workflow. Common measurement items include:

1. Using this technology can significantly improve my work efficiency.
2. Using this technology can improve my work performance.
3. Using this technology can reduce my working hours.
4. The technology helps to simplify my workflow.

These items are usually scored using the Likert scale, with 1 indicating "strongly disagree" and 5 indicating "strongly agree". The statistical analysis of the questionnaire data quantified the perceived usefulness of the technology.

Perceived usefulness (PU) is an important factor affecting the acceptance of technology and training effectiveness. When users consider a technology to be significantly helpful in their work, they are more likely to accept and use the technology.

Perceived usefulness (PU) is directly related to the application effect of technology in practical work. If users believe that a technology can significantly improve their productivity and quality, they would prefer to use the technology in their work. This not only improves the acceptance of the technology, but also enhances the effectiveness of the technical training.

According to the Technical Acceptance Model (TAM), perceived usefulness has a direct impact on the user's behavioral intentions. When users perceive a technology as useful, they are more likely to show strong intentions to use it. This means that perceived usefulness can facilitate the actual use of technology by enhancing the user's behavioral intentions.

In the training process, emphasizing the practical application value and effect of technology can enhance the perceived usefulness of users, so as to improve the training effect. After learning about how technology improves their job performance, users are more likely to actively participate in the training and apply their skills at work.

High perceived usefulness helps users to consistently use the technology. After initial use, users are more likely to use the technology for a long time if they find that the technology does improve their performance. This is essential to ensure the efficient application of the technology and the return on the technology investment.

Perceived usefulness also affects overall user attitudes and satisfaction with the technology. If users find technology useful, they are more positive about technology and are more satisfied. This promoted the spread and application of the technology (Qi et al., 2019).

At the organizational level, high perceived usefulness can promote the wide application of technology, which in turn improves the overall efficiency and competitiveness of the organization. Organizations can improve administrator technical acceptance by enhancing training and promoting the usefulness of technology (Vinish et al., 2021).

Perceived usefulness (PU) is not only one of the core variables of the Technology Acceptance Model (TAM), but also an important factor affecting the effect of technology acceptance and training (Davis, 1989). By understanding and improving the perceived usefulness of technology, organizations can more effectively advance the application and adoption of technology and improve overall performance and competitiveness.

2.2.7 Perceived Ease of Use (PEOU)

Perceived ease of use (PEOU) is the extent to which the user believes that using a technology is difficulty-free and easy to understand. The definition of PEOU is derived from self-efficacy theory, which emphasizes the ease and difficulty of understanding users when using technology. This concept is one of the core elements of the Technology Acceptance Model (TAM), which is used to predict and explain the user's technology acceptance behavior.

The measurement of PEOU usually includes the following aspects:

Using the technology does not require much effort.

I find it easy to learn how to use the technology.

The operation of the technique is clear and easy to understand.

I don't require a lot of technical background to use this technology.

These items are usually scored using the Likert scale, with 1 indicating "strongly disagree" and 5 indicating "strongly agree". Through questionnaires and statistical analysis, the perceived ease of use of the technology can be quantified.

Perceived ease of use (PEOU) significantly affects the user's behavioral intention and actual use. Studies have shown that users are more likely to accept and use a technology if they find it easy to use. The following is the specific role of PEOU in influencing technology acceptance:

According to the technical acceptance model (TAM), PEOU indirectly affects the user's actual use behavior by enhancing the user's behavioral intention. When users think the technology is easy to use, they are more positive about it and are more willing to use it in their daily work. For example, the study by Venkatesh and Davis (2000) found that PEOU had a significant positive impact on BI, and the higher the user's perception of the technology, the stronger the intention to use it.

PEOU can reduce the psychological barriers of users in learning and using new technologies. If users feel that the technology is not complicated to use, it is easier for them to overcome their resistance to the new technology and thus to master and apply the technology more quickly. This is particularly important in the training process. If users think that the training content is easy to understand, their learning effect were better and their technical acceptance were improved.

Perceived ease of use also affects overall user satisfaction and usage experience. When users think a technology is easy to use, they experienced less stress and confusion during the use process, thus improving their satisfaction with the technology. The positive experience of the users further promotes the continuous use and promotion of the technology.

At the organizational level, PEOU improvement contributes to the continuous use and promotion of technology. If administrators generally believe that a technology is easy to use, they used it more frequently at work, which not only improves personal work efficiency, but also promotes the overall efficiency and competitiveness of the organization (Guest & Conway, 2002). By enhancing the ease of use of technology, the technical acceptance and willingness to use administrators can be improved.

In the training process, emphasizing the ease of use of the technology can improve the training effect. If users feel that the technology is easy to use, they are more likely to actively participate in the training and apply their skills at work. This is essential to improve the practical effectiveness of the training and the application rate of the technology.

Davis's (1989) seminal paper introduced the Technology Acceptance Model (TAM), defining perceived usefulness (PU) and perceived ease of use (PEOU) as the core independent variables within the model. These two factors influence users' attitudes and intentions to use it, subsequently impacting behavior. This paper has been widely cited and has established PU and PEOU as independent variables in technology acceptance. Verkijika (2018) extended the TAM model (known as TAM2), further exploring the determinants of PEOU and PU by introducing the roles of social influence and cognitive processes as antecedents to PEOU and PU.

Kräkel (2015) conducted a meta-analysis of TAM, encompassing numerous studies, which further confirmed that PU and PEOU are two critical independent variables in TAM. TAM3 is a further extension of TAM2, examining how various external intervention factors influence the formation of PEOU and PU. However, PEOU and PU serve as independent variables, playing pivotal roles in influencing users' technology acceptance. The extensive reviews proposed by Dwivedi et al. (2019) and Taherdoost (2018) summarize the core viewpoints of the TAM model, particularly emphasizing the importance of PU and PEOU as independent variables. Research suggests that PU and PEOU, as core independent variables, continue to dominate research on technology usage behavior.

Kajol et al. (2022) and Verkijika (2018) emphasized the widespread application of these variables in emerging technologies, such as digital payments and smartphone security. PU and PEOU are independent variables in explaining user acceptance of digital payment technologies. Empirical studies by Al-Adwan et al. (2024) and Chatterjee et al. (2021) further illustrate the role of PU and PEOU as predictors in education and manufacturing. As independent variables, PU and PEOU have a positive impact on users' intention to use. A systematic review by Tamilmani et al. (2021) demonstrates the ongoing application of PU and PEOU in medical technology. These literature contributions provide the latest theoretical and empirical support for the status of PU and PEOU as independent variables in modern technology acceptance research.

2.2.8 Leadership Support (LS)

Leadership support (LS) refers to a series of behaviors and actions that the leaders take to help administrators overcome challenges at work and improve their work ability and performance by providing resources, guidance, encouragement and feedback (Reis et al., 2023). Leadership support includes not only the provision of material and technical resources, but also covers emotional support, career development opportunities, and ongoing guidance and feedback. Through these support behaviors, leaders can enhance administrator motivation and satisfaction to promote the overall organizational performance.

Leadership support (LS) plays a crucial role in staff training and technology acceptance (Qi et al., 2019; Reis et al., 2023). Leadership support significantly improves administrator technical acceptance and training effectiveness by providing resources, encouraging participation, and giving feedback. Specifically, the impact of leadership support on staff training and technical acceptance includes the following aspects:

Resource delivery: Leaders provide administrators with the necessary material and technical resources to ensure that they can complete their training tasks efficiently (AlNuaimi et al., 2022). For example, providing advanced computer equipment, access to online training platforms, and professional training materials. The support of these resources can reduce technical barriers in the training process and focus more on learning, thus improving training effectiveness (Qi et al., 2019).

Emotional support: Leaders build a good working relationship by caring for and understanding their personal needs, and enhance their sense of belonging and satisfaction. When administrators feel the care and support from the leaders, they are more willing to participate in the training, and show higher enthusiasm and investment

in the training (House, 1981). This emotional support not only improves the training effect of administrators, but also enhances their sense of identity and loyalty to the organization (AlNuaimi et al., 2022; Lunardi et al., 2019).

Technical guidance and feedback: Leaders help administrators improve their work skills and problem-solving skills by providing technical guidance and timely, specific feedback (Lunardi et al., 2019). In the process of technical training, leaders can help administrators to better master the new technologies by personally demonstrating, guiding the practice, and answering questions (AlNuaimi et al., 2022; Lunardi et al., 2019). This technical guidance not only improves the technical level of the administrators, but also enhances their confidence and work ability.

Incentive and recognition: Leader's encouragement and recognition have a significant impact on administrator engagement in training and technical acceptance. When administrators are praised and recognized by their leaders during the training process, they felt that their efforts and achievements are recognized, thus stimulating higher training motivation and enthusiasm for participation. This incentive effect not only promotes their technical learning, but also improves their job satisfaction and performance.

Creating a learning culture: Leaders create a positive learning atmosphere by promoting and advocating a learning culture. In this culture, administrators felt the importance of continuous learning and development, and thus become more actively involved in training and technical learning (AlNuaimi et al., 2022; Lunardi et al., 2019; Qi et al., 2019). Leaders create an organizational atmosphere of emphasizing learning and innovation, which is of great significance to technology acceptance and application.

In educational management, leadership support is closely related to the career development of teachers and administrators (Qi et al., 2019). Studies have shown that leaders play an important role in supporting the career development of teachers and administrators, including providing career development opportunities, encouraging participation in training, and giving career guidance.

Leaders help teachers constantly improve their professional skills and teaching skills by providing career opportunities such as seminars, advanced courses and academic exchanges (Reis et al., 2023). This support not only improves the quality of their teaching, but also enhances their sense of professional achievement and satisfaction. In addition, guidance and support by leaders in teacher career development can help teachers better plan their career paths and achieve personal and career goals.

In educational management, leadership support also has important effects on the training and development of administrator. Leaders help administrators to improve their management skills and productivity by encouraging them to participate in training courses and providing career guidance and feedback (AlNuaimi et al., 2022). This support not only enhances the professionalism of the administrators, but also enhances their sense of identity and loyalty to the organization. The role of leadership support in promoting career development and technical acceptance of administrators has been extensively studied and validated.

Leaders drive knowledge sharing and innovation within the organization by creating supportive learning environments (AlNuaimi et al., 2022; Lunardi et al., 2019). In educational management, leaders promote the continuous learning and development of the organization by organizing training activities, promoting technology application and encouraging innovative thinking. This supportive learning environment helps to improve the professionalism and innovation ability of teachers and administrators, thereby improving the overall organizational performance (AlNuaimi et al., 2022; Lunardi et al., 2019).

Leaders stimulate training motivation and enthusiasm for teachers and administrators by creating incentives, such as performance rewards, promotion opportunities, and recognition systems. This incentive mechanism not only promotes the technical learning and application of administrators, but also improves their work performance and organizational contribution (AlNuaimi et al., 2022; Chu & Majumdar, 2022; Lunardi et al., 2019; Reis et al., 2023). In educational management, the motivation and recognition of leaders play an important role in improving the career satisfaction and performance of teachers and administrators.

2.2.9 Digital Technical Knowledge (DTK)

Knowledge refers to the relevant information, skills and experience of administrators in the process of technical training and application. It includes tacit knowledge, accumulated through practice and experience, and explicit knowledge, acquired through formal learning and documentation.

Digital technical knowledge plays a crucial role in technical training. By constantly learning and applying new knowledge, administrators can improve their skills and productivity (Reisdanaei & Jahan, 2022). In the process of technical training, knowledge transmission and acquisition is the key step (Troshina & Kalinkina, 2024). The accumulation of knowledge can not only improve the personal ability of administrators, but also enhance the competitiveness and innovation ability of the whole organization. Knowledge management is not limited to the transmission of information, but also includes the integration of existing knowledge and the creation of new knowledge (Edwards, 2021). Through systematic knowledge management practices, organizations can ensure that administrators have the necessary skills and knowledge in the application of technology to improve work efficiency and performance (Opletina & Tripolsky, 2020).

Research has shown that knowledge management practices can effectively promote knowledge sharing and innovation. In the process of knowledge management, knowledge acquisition and application are two important links. Knowledge acquisition involves the introduction of new knowledge from external environments, as well as mining and integrating existing knowledge from internal resources (Keve et al., 2024). In terms of application, organizations need to establish effective mechanisms to enable administrators to apply knowledge to practical work, solve problems and improve work performance.

The successful implementation of knowledge management requires a good cultural atmosphere and technical support (Connolly et al., 2023). Organizations should encourage administrators to actively participate in knowledge sharing activities such as team discussions, experience exchange and training seminars (Du & Wang, 2024). At

the same time, the application of information technology, such as knowledge base, enterprise Intranet and social software, can greatly promote the storage and dissemination of knowledge, and enhance the overall innovation ability and strain ability of the organization.

2.2.10 Behavioral intention (BI)

Behavioral intention (BI) refers to the user's intention to use a particular technology in the future. It is a key variable to predict the actual use behavior, reflecting the user's plan and determination to adopt and apply a technology in the future. In technology acceptance studies, BI is usually measured through questionnaires covering aspects of user attitudes towards technology use, intentions and expected behavior (Azman & Vaicondam, 2020). Common measures include the Likert scale, in which users reflect their behavioral intention by the degree of consent with a range of statements (Van, 2020).

BI is an important mediating variable in the technology acceptance process, which connects the relationship between factors such as user attitudes, subjective norms and perceived behavior control and actual use behavior (Widyanti & Usman, 2019). Studies have shown that when users perceive high usefulness and ease of use of a technology, their behavioral intentions increased accordingly, thus increasing the likelihood of actually using the technology.

In technical training and application, BI measurement and analysis can help organizations understand the acceptance of new technology and willingness to apply new technology (Widyanti & Usman, 2019). By improving the BI of administrators, the organization can improve the implementation effect of high and new technology, and ensure the effectiveness of training investment and the success rate of technology application (Azman & Vaicondam, 2020; Van, 2020; Widyanti & Usman, 2019).

2.2.11 Administrative Effectiveness (AE)

Administrative Effectiveness (AE) refers to the efficiency and effectiveness of administrative management, which is usually quantitatively evaluated through key performance indicators (KPI). The KPI is a standardized measure of the performance of an organization in a specific area or activity. Common KPI includes work efficiency, decision-making quality, communication and collaboration, frequency of technology use and technology application ability (Arayankalam et al., 2021). These indicators can help organizations monitor and evaluate the actual effects of administration, and improve and optimize the results.

Work efficiency (WE): measures the improvement of work efficiency of administrators after using digital technology, such as task completion time, work load, etc.

Decision quality (DQ): Evaluate the effect of digital technology in the decision-making assistance process, mainly focusing on the accuracy and timeliness of decisions.

Communication collaboration (CAC): measures the effectiveness of digital technology in improving internal communication and collaboration, including the convenience of information sharing and the efficiency of teamwork.

Frequency of technology use (TUF): the frequency of digital technology in daily work, reflecting the acceptance and application of technology.

Technology application ability (TAC): to evaluate the degree and application ability of administrative personnel to master digital technology, reflecting the training effect and technical proficiency.

The application of digital technology can significantly improve the efficiency and effect of administrative management. The Balanced Scorecard (Balanced Scorecard) proposed by Kanter (1968) provides an effective performance management tool that comprehensively measures the performance of an organization through four indicators (finance, customer, internal processes, and learning and growth) (Arayankalam et al., 2021). The introduction of digital technology can not only improve data processing and information management, but also enhance decision support and process optimization, thus improving administrative effectiveness.

Research has shown that the application of digital technology in administration can bring many benefits, such as improving work efficiency (Arayankalam et al., 2021; Jang & Eger, 2018), improving communication and collaboration, and enhancing the quality of decision-making. In addition, digital technology can also promote the sharing and application of knowledge, enhance the organization's innovation ability and resilience ability, and thus achieve sustained performance improvement:

Digital technology reduces repetitive tasks, and human error, and improves the efficiency of administrators. For example, the e-government system can make the administrative examination and approval process faster and more transparent, and reduce the use and flow time of paper documents (Arayankalam et al., 2021; Jang & Eger, 2018).

Online collaboration tools such as e-mail, instant messaging tools and collaborative office platforms make information sharing and team collaboration more convenient and efficient. This not only enhances the efficiency of communication between departments, but also promotes cross-departmental and cross-campus cooperation (Arayankalam et al., 2021; Meyer & Rowan, 2022).

Through big data and data analysis technology, managers can have a more comprehensive understanding of the school's operation status, find out potential problems, and make more scientific and reasonable management decisions. Digital technology provides real-time data support and analysis tools to make the decision-making process more transparent and grounded.

Digital technologies, such as knowledge management systems, online learning platforms, and content management systems, can effectively promote the creation, storage, and sharing of knowledge, and enhance the learning capabilities and innovation capabilities of organizations (Arayankalam et al., 2021; Meyer & Rowan, 2022).

A detailed literature review of the key variables clearly shows the importance and role of each variable in digital technology training and administrative effectiveness research. Perceived usefulness (PU) and perceived ease of use (PEOU) are the core of the Technology Acceptance Model (TAM), which directly affect

behavioral intention (BI) and actual use behavior of administrators. Leadership support (LS) and Digital technical knowledge, as important external factors, not only affect the technical Acceptance of administrators, but also significantly improve the training effect. Administrative effectiveness (AE), as the final measure, is evaluated through key performance indicators (KPI), demonstrating the actual impact of digital technology in improving the efficiency and effectiveness of administrative management (Arayankalam et al., 2021; Meyer & Rowan, 2022).

2.2.12 Gaps and Emerging Trends

In the areas where educational management, and digital technology training are rapidly evolving, understanding the complex dynamics between technology acceptance, leadership support, and administrative effectiveness is crucial. This study aimed to investigate the performance of these variables in private vocational colleges in Shandong Province, China. Despite substantial research that has been conducted in various aspects of these topics, there are several gaps and emerging trends that need further investigation (Hall & Schneider, 1972).

Most of technology acceptance and training strategies have focused on teachers and students. The views and needs of administrators are often overlooked, and they play a vital role in the effective functioning of educational institutions. This study aims to fill this gap by specifically targeting faculty administrators.

Despite much research on technology acceptance, there is a lack of specific background studies addressing the unique challenges and opportunities of private higher education institutions in China. The socio-economic, cultural and organizational environment of Shandong province provides a unique research context that urgently needs tailored research insights (Kajol et al., 2022).

Studies usually apply Technology Acceptance Models (TAM) alone. Studies integrating TAM with other relevant theories (e. g. Leadership Support Theory and knowledge management) are needed to provide a fuller understanding of the factors influencing technology acceptance and administrative effectiveness.

Despite the mediating role of behavioral intention in technology acceptance, specific empirical evidence within the framework of digital technology training and its impact on administrative effectiveness is limited. This study aimed to fill this gap by empirically testing the mediating role of behavioral intentions. Many studies rely on cross-sectional data, which limits the understanding of attitudes and behavior evolution over time. Longitudinal studies are needed to capture the dynamic nature of technology acceptance and its long-term impact on administrative performance (Edwards, 2021).

With the continuous adoption of advanced technologies by educational institutions, more and more attention has been paid to improving the digital literacy of administrators. This trend underlines the importance of continued professional development and targeted training programs to keep pace with technological progress (Glen, 2006).

The integration of both online and offline training approaches is becoming increasingly popular. The hybrid learning approach provides flexibility and accessibility to participate in professional development activities without

compromising their daily work (Holmes, 2017). Data analysis and the use of management information systems have become key trends in educational management. These tools can significantly increase the informatization of decision-making processes, thereby improving administrative effectiveness and effectiveness. There is increasingly a shift to personalized training programs to meet the specific needs and preferences of each administrator. This approach ensures that training is relevant and influential to improve engagement and effectiveness (Liu & Sun, 2019).

Collaboration platforms and tools are increasingly used to facilitate knowledge sharing and teamwork among administrators. These environments promote a culture of continuous learning and collective problem solving, and are critical to the growth and innovation of organizations. By addressing these gaps and leveraging emerging trends, this study aimed to contribute to the existing body of knowledge and provide actionable insights into improving digital technology training strategies and administrative effectiveness.

2.3 Theoretical Framework

The integration of the Technology Acceptance Model (TAM), Performance Improvement Theory (PIT), and Leadership Support Theory (LST) within the theoretical framework of this study is rooted in the aim to comprehensively understand the dynamic interplay of digital technology training strategies and their impact on administrative effectiveness in the context of private colleges in Shandong Province.

The Technology Acceptance Model provides a foundational understanding of how perceived usefulness (PU) and perceived ease of use (PEOU) influence users' behavioral intentions (BI) and actual use of technology. The Performance Improvement Theory contributes insights into the systematic process of identifying performance gaps and implementing targeted interventions to enhance organizational effectiveness. The Leadership Support Theory introduces key components that emphasize the critical role of leadership in providing resources, encouragement, and feedback to facilitate technology adoption and enhance administrative performance.

Integrating these theories offers a nuanced exploration of how digital technology training strategies, guided by the principles of TAM, interact with the structured interventions of PIT and the supportive behaviors outlined in LST. This comprehensive framework aims to elucidate the intricate dynamics influencing the acceptance and effective use of digital technologies in administrative settings and its implications for improving administrative effectiveness. By examining the relationships between leadership support, digital technical knowledge, behavioral intentions, and administrative effectiveness, this study seeks to provide a holistic understanding of how to optimize digital technology training strategies to achieve significant improvements in administrative effectiveness and effectiveness in private colleges.

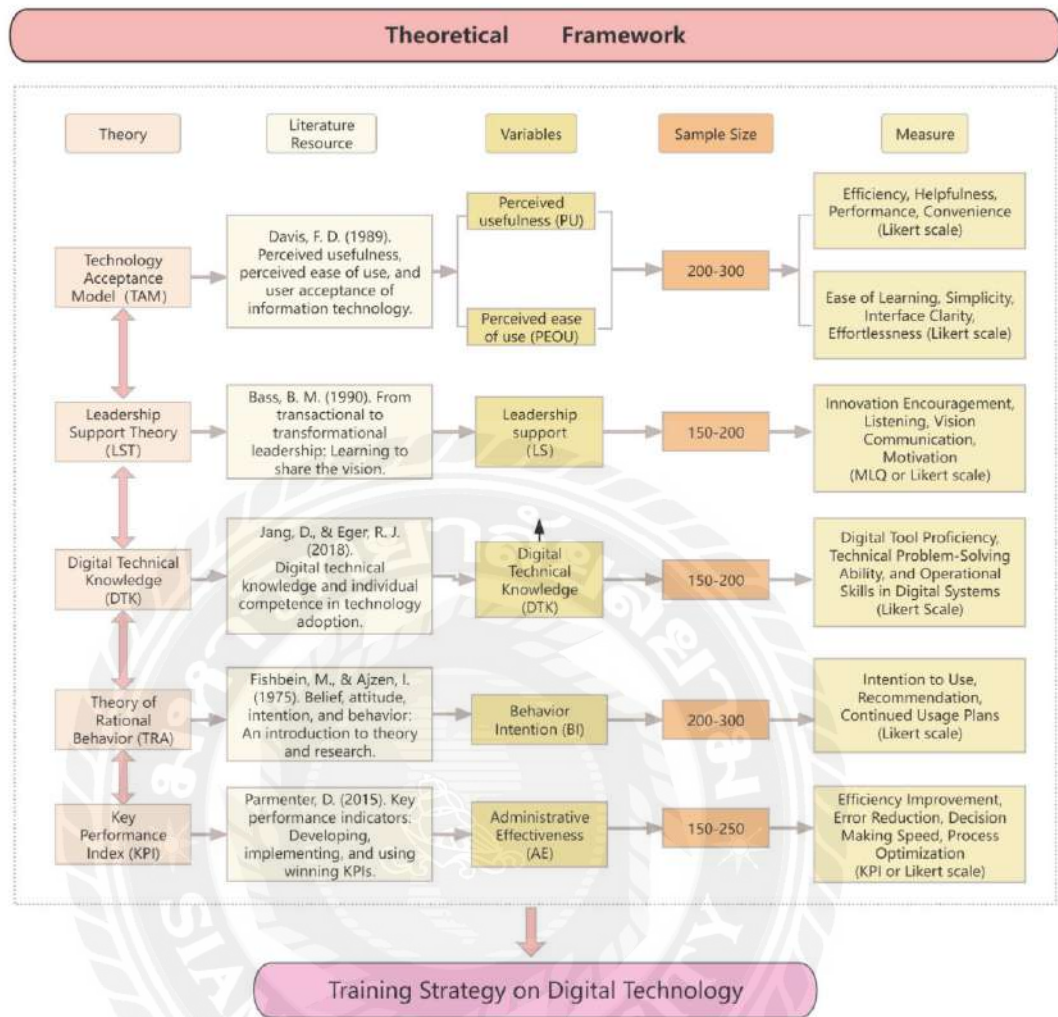


Figure 2.2 Theoretical Framework

2.4 Conceptual Framework

To fully understand the relationship between these variables, this study introduced the Technical Acceptance Model (TAM) as the theoretical basis, combining leadership support and knowledge management. The Technology Acceptance Model (TAM) was proposed by Davis (1989) to explain and predict the user's acceptance and use behavior of new technologies, and to predict behavioral intention (BI) and actual use behavior through the two core constructs of perceived usefulness (PU) and perceived ease of use (PEOU). The Leadership Support Theory and knowledge management further complement the application of TAM in the field of organizational management and personal learning, providing a more comprehensive perspective for research.

Specifically, TAM explains the technical acceptance behavior through two variables, PU and PEOU. PU refers to the extent to which a user believes that using a technology improved their work performance, while PEOU refers to the extent that the user believes that using a technology is not difficult and easy to understand. The Leadership Support Theory emphasizes the role of leadership in resource provision,

emotional support, technical guidance, and career development opportunities, which can significantly improve administrator technical acceptance and training effectiveness. Knowledge management focuses on the acquisition, sharing and application of knowledge, emphasizing the key role of knowledge in improving administrators' skills and organizational performance.

The independent variables in this study include perceived ease of use (PEOU), perceived usefulness (PU), leadership support (LS), and digital technical knowledge (DTK). Perceived ease of use (PEOU) is the extent to which the user believes that using a technology is free and easy to understand. High perceived ease of use is often positively associated with high behavioral intention because users consider the technology easy to use and more willing to use the technology. If users find the technology easy to use, they may use it more frequently, thus increasing the efficiency and effectiveness of administration. Perceived usefulness (PU) is the degree to which a user believes that using a technology improves their job performance. PU is often positively correlated with behavioral intentions because users believe the technology contributes to efficiency or effectiveness and are more likely to adopt the technology. When users perceive a technology as useful, they may use it more frequently, thus improving administrative effectiveness and effectiveness. Leadership support (LS) is the level of leadership support in encouraging, providing resources, and recognizing the use of technology (Arayankalam et al., 2021; Du & Wang, 2024; Widyanti & Usman, 2019). Leadership support can increase user confidence and acceptance of technology, often positively correlated with behavioral intention, as it may imply resource input and technology recognition. Leadership support can directly improve administrative effectiveness by promoting frequent and effective use of technology. Digital technical knowledge (DTK) refers to the user's relevant skills and understanding of the technology. Users with relevant knowledge and skills are more likely to understand the value of the technology and therefore have higher behavioral intentions (Arayankalam et al., 2021; Connolly et al., 2023; Jang & Eger, 2018; Vinish et al., 2021). Digital technical knowledge directly affects efficiency, as users with relevant knowledge and skills can use technology more effectively, and positive attitudes may encourage users to explore and apply technology more actively, thus improving management efficiency.

The mediating variable in this study is behavioral intention (BI). BI refers to the willingness of the users to adopt and use the technology. As a mediating variable, BI is a bridge between the independent and dependent variables. According to TAM, behavioral intention is a direct reflection of users' willingness to adopt technology, which affect their actual use of technology, and thus affect the efficiency of administrative management. Higher behavioral intention indicates a greater probability of actual use of technology, ultimately translating into improved administrative effectiveness.

The dependent variable in this study is administrative effectiveness (AE). AE refers to the efficiency and effectiveness of administrative management, which is usually evaluated quantitatively, through key performance indicators (KPI). Administrative effectiveness is influenced by independent variables (PEOU, PU, LS and DTK) and by mediating variable (BI). Through the ease of use, usefulness, leadership support and enhanced digital technical knowledge and skills, users can use the technology more

frequently and effectively, thus improving administrative effectiveness (Arayankalam et al., 2021; Jang & Eger, 2018; Keve et al., 2024; Opletina & Tripolsky, 2020).

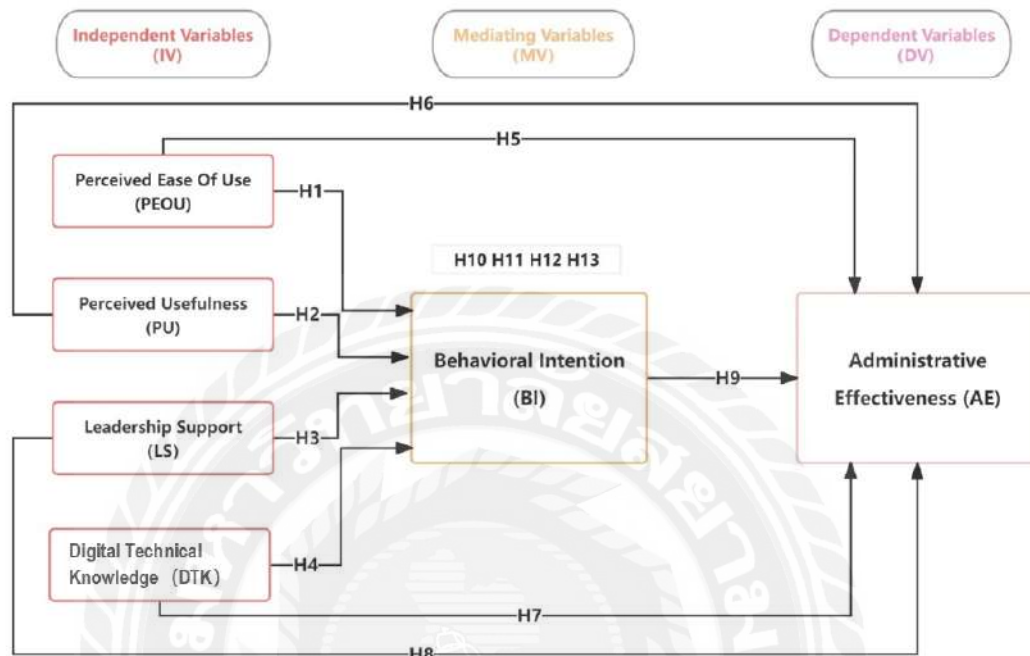


Figure 2.3 Conceptual Framework

According to the conceptual framework diagram, the research hypotheses were proposed as follows:

H1: Perceived ease of use (PEOU) has a positive impact on behavioral intention (BI), that is, the easier the technology is to use, the more willing they are to use it.

H2: Perceived usefulness (PU) has a positive impact on behavioral intention (BI), that is, the more useful the technology is, the more they intend to use it.

H3: Leadership support (LS) has a positive impact on behavioral intention (BI), the higher the leadership support for the technology, the stronger the users are to use the technology.

H4: Digital technical knowledge (DTK) has a positive impact on behavioral intention (BI), that is, the higher the digital technical knowledge skills, the more willing the user is to use the technology.

H5: Perceived ease of use (PEOU) has a positive impact on administrative effectiveness (AE), that is, the easier the technology is to use, the greater its contribution to improving administrative effectiveness.

H6: Perceived usefulness (PU) has a positive impact on administrative effectiveness (AE), that is, the more useful the technology, the greater its contribution to improving administrative effectiveness.

H7: Leadership support (LS) has a positive impact on administrative effectiveness (AE), that is, the higher the level of leadership support for technology, the greater the contribution of technology to improving administrative effectiveness.

H8: Digital technical knowledge (DTK) has a positive impact on administrative effectiveness (AE), that is, the higher the digital technical knowledge and skills, the greater the contribution of technology to improve administrative effectiveness.

H9: Behavioral intention (BI) has a positive impact on administrative effectiveness (AE), the higher the level of behavioral intention to adopt technology, the greater the contribution of technology to improving administrative effectiveness.

H10: Behavioral intention (BI) mediates the relationship between perceived ease of use (PEOU) and administrative effectiveness (AE), that is, perceived ease of use (PEOU) affects administrative effectiveness by influencing behavioral intention (BI).

H11: Behavioral intention (BI) mediates the relationship between perceived usefulness (PU) and administrative effectiveness (AE), that is, perceived usefulness (PU) affects administrative effectiveness by influencing behavioral intention (BI).

H12: Behavioral intention (BI) mediates the relationship between leadership support (LS) and administrative effectiveness (AE), that is, leadership support (LS) affects administrative effectiveness by influencing behavioral intention (BI).

H13: Behavioral intention (BI) mediates the relationship between digital technical knowledge (DTK) and administrative effectiveness (AE), that is, digital technical knowledge (DTK) affects administrative effectiveness by influencing behavioral intention (BI).

2.5 Conclusion

This literature review comprehensively discusses the theoretical basis and empirical research related to the digital technology adoption supported by training strategies by the administrative personnel of private higher vocational colleges in Shandong Province. The review focuses on key theoretical frameworks including technical acceptance model (TAM), Theory of Rational Behavior (TRA), Leadership Support Theory (LST) and knowledge management (KM), which provides a solid foundation for this study.

The Technology Acceptance Model (TAM) plays an important role in clarifying how perceived ease of use (PEOU) and perceived usefulness (PU) affect behavioral intention (BI) and ultimately technology use behavior. The model is based on extensive empirical research and has been widely used in various fields to predict and explain technology adoption behavior (Davis, 1989). The addition of TRA further strengthens the importance of understanding behavioral intention as a prerequisite for actual behavior, highlighting the psychological process behind technical acceptance.

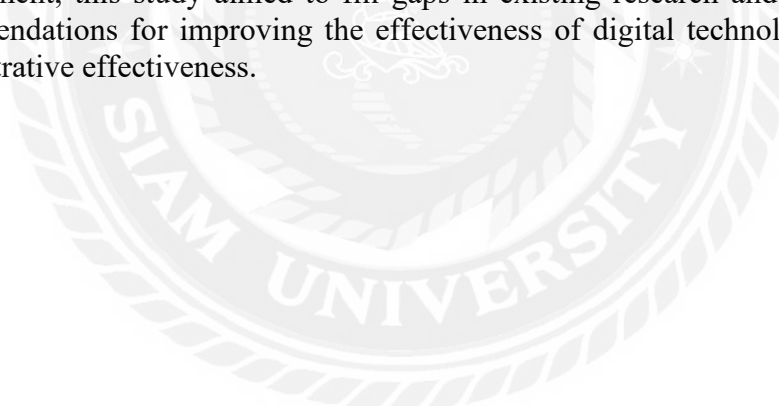
The Leadership Support Theory emphasizes the important role of leaders in promoting technology adoption through resource provision, encouragement, and creating environments conducive to learning and innovation. This review highlights that leadership support that significantly increases administrator willingness to participate in digital technology training and improves their overall acceptance of new technologies.

Knowledge management emphasizes the important role of knowledge acquisition, sharing and application in improving organizational efficiency and innovation ability. Effective knowledge management practices are essential to maximizing the benefits of digital technology training, ensuring that administrators can use new skills to improve administrative effectiveness.

A review of key variables including perceived usefulness (PU), perceived ease of use (PEOU), leadership support (LS), digital technical knowledge (DTK), and behavioral intention (BI) clarifies the individual and joint effects of these variables in improving administrative effectiveness (AE). Key performance metrics (KPIs), as measures of administrative effectiveness, provide specific and quantifiable indicators to measure the effectiveness of digital technology training strategies.

Despite extensive research in these areas, the specific research on the background of administrator in private vocational colleges in Shandong Province is still insufficient. The unique socioeconomic and cultural environment of the region presents different challenges and opportunities that the existing literature fails to adequately address. Furthermore, longitudinal studies are needed to capture the dynamism of technology adoption and its long-term impact on administrative effectiveness.

In conclusion, this literature review lays the foundation for a detailed discussion of the acceptance of digital technology training strategies by administrators. By integrating insights from TAM, TRA, Leadership Support Theory and knowledge management, this study aimed to fill gaps in existing research and provide feasible recommendations for improving the effectiveness of digital technology training and administrative effectiveness.



CHAPTER 3

RESEARCH METHODOLOGY

This chapter presents the research design, research instruments and data analysis methods in this study. The methodological procedures were organized into the following sections:

- 3.1 Research Design
- 3.2 Population and Sampling Methods
 - 3.2.1 Quantitative Research
 - 3.2.2 Qualitative Research
- 3.3 Research Tools
 - 3.3.1 Questionnaire
 - 3.3.2 Quality of the Questionnaire
 - 3.3.3 Focus Group Discussion
- 3.4 Data Collection
 - 3.4.1 Questionnaire Survey
 - 3.4.2 Focus Group Discussion
- 3.5 Statistical Method of Analysis
 - 3.5.1 Descriptive Statistics
 - 3.5.2 Inferential Statistics
 - 3.5.3 Qualitative Analysis
- 3.6 Ethical Considerations

3.1 Research Design

This study primarily adopted a mixed-methods research approach. Quantitative analysis served as the core methodological framework of the study and was designed to ensure statistical rigor and empirical validity. The quantitative component was conducted using a questionnaire survey, and the collected data were analyzed through structural equation modeling (SEM) to systematically test the relationships among perceived ease of use, perceived usefulness, leadership support, digital technical knowledge, behavioral intention, and administrative effectiveness.

In addition, a qualitative approach was employed as a supplementary method. Focus group discussions were conducted to provide contextual support and to corroborate the quantitative findings, thereby enhancing the robustness and interpretability of the overall research results.

3.2 Population and Sampling Methods

3.2.1 Quantitative Research

(1) Population

The population of this study consisted of administrative personnel aged 30 years and above working in private higher vocational colleges in Shandong Province, China. These administrators were defined as non-teaching staff engaged in management and administrative support roles within colleges and universities, including personnel such as deans, vice deans, section chiefs, deputy section chiefs, directors, and other staff responsible for administrative operations. These individuals typically did not directly participate in classroom instruction or research activities. Despite hierarchical differences, all participants were involved in daily administrative decision-making and digital system usage. They were responsible for the operational management, policy implementation, resource allocation, and handling of various administrative affairs of the institution. The responsibilities of administration encompassed multiple aspects, as follows:

1. **Managerial Affairs:** Formulating and executing various policies, rules, and regulations, as well as overseeing and managing daily operations such as finance, human resources, campus security, and logistical services.

2. **Support Services:** Providing administrative support for the school's teaching, research, student affairs, and other activities, coordinating communication and cooperation among various departments within the school to ensure the normal functioning of all school functions.

3. **Policy Implementation:** Serving as a bridge between the decision-making and executive levels of the school to ensure the implementation of strategic plans, development goals, and relevant policies.

4. **Public Relations Management:** Managing external relations, including communication and cooperation with government departments, communities, media, and other universities, to enhance the school's social influence and resource acquisition.

In the specific context of this study, the participants were selected from the broader population of 25 private higher vocational colleges in Shandong Province which reflect differences in geographic location, institutional type, school size, and intelligent campus construction status.

By the end of 2024, the 25 private higher vocational colleges in Shandong Province were distributed across multiple cities and included both intelligent campuses and non-intelligent campuses. The distribution of these institutions by city, type, scale, and intelligent campus construction status is presented in Table 3.1.

Table 3.1 Private Higher Vocational Colleges in Shandong Province

No.	University	City	Type	Scale	Intelligent Campus Construction or Not
1	Qilu Medical University	Zibo	Comprehensive	Large	Yes
2	Qingdao Binhai University	Qingdao	Comprehensive	Large	Yes
3	Yantai Nanshan University	Yantai	Comprehensive	Medium	Yes
4	Weifang University of Science and Technology	Weifang	Comprehensive	Medium	Yes
5	Shandong Yingcai University	Jinan	Comprehensive	Medium	Yes
6	Qingdao Hengxing Science and Technology University	Qingdao	Engineering	Small	Yes
7	Qingdao Huanghai University	Qingdao	Comprehensive	Medium	Yes
8	Shandong Modern University	Jinan	Comprehensive	Small	No
9	Binzhou Vocational College of Science and Technology	Binzhou	Engineering	Small	Yes
10	Shandong Engineering Vocational and Technical University	Jinan	Engineering	Medium	Yes
11	Yantai University of Technology	Yantai	Engineering	Small	Yes
12	Rizhao Marine Engineering Vocational College	Rizhao	Engineering	Small	Yes
13	Qingdao City University	Qingdao	Comprehensive	Medium	No
14	Weifang University of Technology	Weifang	Engineering	Small	No
15	Yanshan University of Shandong University of Finance and Economics	Jinan	Business	Small	No
16	Shandong Foreign Language Vocational and Technical University	Rizhao	Liberal Arts	Small	No
17	Taishan University of Science and Technology	Tai'an	Engineering	Small	No
18	Shandong Huayu University of Technology	Dezhou	Engineering	Small	Yes

No.	University	City	Type	Scale	Intelligent Campus Construction or Not
19	Shandong Foreign Affairs Vocational University	Weihai	Liberal Arts	Small	No
20	Qingdao Qiushi Vocational and Technical College	Qingdao	Engineering	Small	No
21	Shandong Cultural Industry Vocational College	Qingdao	Liberal Arts	Small	Yes
22	Qilu University of Technology	Jinan	Engineering	Medium	Yes
23	Oriental University of Shandong University of Finance and Economics	Tai'an	Business	Small	No
24	Yantai University of Science and Technology	Yantai	Engineering	Small	No
25	Shandong Liming Vocational College of Science and Technology	Tai'an	Engineering	Small	No
Proportion					Y:56% N:44%

Source: Shandong Provincial Department of Education

According to the statistics provided by the Shandong Provincial Department of Education, there were 25 private higher vocational colleges in Shandong Province by the end of 2024, of which 14 had completed the construction of intelligent campuses, accounting for 56%, while 11 had not completed intelligent campus construction, accounting for 44%. There were six universities in Qingdao, four of which were intelligent campuses; in Jinan, three universities were intelligent campuses; among the three universities in Yantai, two were intelligent campuses; in Weifang and Rizhao, two universities were located, with one intelligent campus in Weifang and one in Rizhao; in Zibo, Binzhou, and Dezhou, one intelligent campus was located in each city; three universities in Tai'an were non-intelligent campuses; and Weihai had one non-intelligent campus. In terms of institutional type, there were eight comprehensive colleges, five of which were intelligent campuses; eleven engineering colleges, seven of which were intelligent campuses; two business colleges, both of which were non-intelligent campuses; and four liberal arts colleges, two of which were intelligent campuses. In terms of school size, there were two large colleges, both of which were intelligent campuses; five medium-sized colleges, four of which were intelligent campuses; and eighteen small colleges, of which eight were intelligent campuses and ten were non-intelligent campuses.

Based on the study objective and actual situation, the following four stratification criteria were determined:

Urban distribution: The economic development level, educational resource allocation, and policy support level of different cities affected administrative management efficiency and the level of digital technology application in universities (Zacher & Rudolph, 2020). Differences between cities led to different needs and effects in digital technology training and application. Previous studies have shown that universities in more developed cities had greater advantages in resource acquisition and technology application, while universities in less developed cities required more flexible and innovative solutions under limited resources (Wang, 2022). Therefore, selecting universities from different cities helped to achieve a comprehensive understanding of the diversity and practical needs of digital technology application in universities across Shandong Province.

Type of institutions: Different types of universities (engineering, business, liberal arts, and comprehensive) had different priorities in teaching, research, and management, leading to significant differences in digital technology application and training needs (Chen & Wang, 2017). Engineering colleges often focused more on technological innovation and application, while business and liberal arts colleges placed greater emphasis on management and humanities. Studies have indicated that the acceptance and application of digital technology in engineering colleges were generally higher than those in business and liberal arts colleges (Li, 2021). Therefore, selecting different types of institutions enabled a comprehensive evaluation of the applicability and effectiveness of digital technology training strategies across diverse educational contexts.

Intelligent campus: Intelligent campuses had higher levels of hardware facilities, informatization, and technology application, which directly affected administrative management efficiency in colleges and universities (Qi et al., 2019). In contrast, non-intelligent campuses faced greater challenges and limitations in digital infrastructure and technology application. Therefore, selecting a proportion of both intelligent and non-intelligent campuses helped to compare differences in training needs and outcomes and to identify targeted digital technology training strategies.

School size: School size affected management complexity, resource allocation, and technology application (Holmes, 2017). Large institutions usually possessed more resources and more complex management systems, while small institutions required more efficient management and technology application strategies under limited resources. Although large institutions had advantages in technology application, their management complexity also introduced additional challenges (Liu & Sun, 2019). With limited resources, small and medium-sized colleges needed digital technology training and application programs suited to their specific characteristics. Therefore, selecting institutions of different sizes provided a comprehensive understanding of the needs and effects of digital technology application and training across institutions of varying scales. Urban distribution, institutional type, intelligent campus construction status, and school size were regarded as appropriate stratification standards. These criteria ensured the representativeness and diversity of the study sample and provided a scientific basis and practical guidance for the research.

According to the stratification criteria classification, the 25 institutions were classified according to the above stratification criteria,

- City distribution: Qingdao, Jinan, Yantai, Weifang, Zibo, Rizhao and other cities.
- Type of colleges: engineering colleges, business colleges, liberal arts colleges, comprehensive colleges.

- Intelligent campus: smart campus and non-smart campus.
- School size: large colleges, medium-sized colleges, small colleges.

Table 3.2 shows the steps of randomly selecting study institutions to ensure that representative institutions are represented under each stratification criterion:

Table 3.2 Intelligent Campus and Non-Intelligent Campus

Category	University	Intelligent Campus	Proportion
Intelligent Campus	Qilu Medical University	Yes	62.50%
	Qingdao Binhai University	Yes	
	Weifang University of Science and Technology	Yes	
	Shandong Engineering Vocational and Technical University	Yes	
	Qingdao Hengxing Science and Technology University	Yes	
Non-Intelligent Campus	Yanshan University of Shandong University of Finance and Economics	No	37.50%
	Rizhao Marine Engineering Vocational College	No	
	Shandong Foreign Language Vocational and Technical University	No	
		No	

Smart campuses accounted for 56% of the total, and 4.48 schools (about 5 schools) should be selected in proportion, while 5 smart campuses were actually selected, accounting for 62.5%, which is close to the overall proportion. Smart campuses are more advanced in the application of digital technology, and choosing more smart campuses helps to deeply understand its impact on administrative effectiveness, especially when evaluating digital technology training strategies.

Table 3.3 City Distribution

City	University	Proportion
Qingdao	Qilu Medical University	25%
	Qingdao Binhai University	
Jinan	Weifang University of Science and Technology	25%
	Shandong Engineering Vocational and Technical University	
Weifang	Qingdao Hengxing Science and Technology University	12.50%
Zibo	Yanshan University of Shandong University of Finance and Economics	12.50%
	Rizhao Marine Engineering Vocational College	
Rizhao	Shandong Foreign Language Vocational and Technical University	25%

The proportion values indicate the share of valid questionnaires allocated to each city relative to the total sample size of the study, rather than the proportion of universities or the population size of each city. A stratified random sampling strategy was adopted, with cities treated as stratification units to ensure regional representativeness and diversity in the level of digital technology application and administrative practices. Cities such as Qingdao, Jinan, and Rizhao were assigned higher proportions due to their stronger concentration of higher vocational institutions and more advanced digital campus development, while Weifang and Zibo were assigned smaller proportions to reflect their relatively limited institutional scale. Within each city, administrative staff from selected universities were randomly surveyed to maintain randomness at the individual level. Cities with highly similar educational and technological profiles to Qingdao, such as Weihai and Yantai, were excluded to avoid regional overlaps, while the overall number of cities was controlled to ensure feasibility and analytical robustness.

- Qingdao (2): Qingdao is an important education and science and technology center in Shandong Province. Choosing two universities could represent the application level of digital technology in this region.

- Jinan (2): As the capital of Shandong Province, Jinan has many institutions of higher learning, and two universities were selected to ensure the geographical diversity of the samples.

- Weifang (1): Weifang higher education also has a certain representative; one university is selected to reflect the situation of this region.

- Zibo (1): Zibo is an important industrial city, and choose one university was chosen to reflect its educational situation.

- Rizhao (2): Rizhao city has developed rapidly in education and technology in recent years, and two universities were selected to reflect their digital level.

The education and science and technology levels of Weihai and Yantai were similar to those of the selected city Qingdao; therefore, in order to avoid regional overlap and duplication in the sample, other cities with more distinctive characteristics were preferred. To ensure the operability of the study and the feasibility of data analysis, the number of study samples needed to be controlled within a reasonable range. Although Binzhou and Dezhou had a certain foundation in vocational education, cities such as Qingdao and Jinan were more representative in terms of intelligent campus construction and the distribution of higher education resources. The research focused on analyzing management effectiveness across different institutional types, school sizes, and levels of digitalization; therefore, the selected cities were more representative in these aspects.

Table 3.4 University Type

Type	University	Proportion
Engineering	Qilu Medical University	37.50%
	Qingdao Binhai University	
	Weifang University of Science and Technology	
Business	Shandong Engineering Vocational and Technical University	12.50%

Type	University	Proportion
Liberal Arts	Qingdao Hengxing Science and Technology University	12.50%
	Yanshan University of Shandong University of Finance and Economics	
Comprehensive	Rizhao Marine Engineering Vocational College	37.50%
	Shandong Foreign Language Vocational and Technical University	

Engineering colleges relied heavily on digital technology, and the selection of three engineering colleges was helpful to evaluate the effect of technical training strategies. One business college and one liberal arts college were selected to ensure the representativeness of different professional fields. Comprehensive institutions covered multiple disciplines, and the selection of three comprehensive institutions helped to comprehensively assess the impact of digital technology training strategies.

Table 3.5 School Size

Size	University	Proportion
Large	Qilu Medical University	25%
	Qingdao Binhai University	
Medium	Weifang University of Science and Technology	25%
	Shandong Engineering Vocational and Technical University	
	Qingdao Hengxing Science and Technology University	
Small	Yanshan University of Shandong University of Finance and Economics	50%
	Rizhao Marine Engineering Vocational College	
	Shandong Foreign Language Vocational and Technical University	

Large universities were rich in resources, so choosing two large institutions was helpful to evaluate the effect of digital technology training under resource-rich conditions. Medium-sized institutions were moderate in terms of resources and management, and the selection of two medium-sized institutions helped to assess their unique needs and challenges. Small institutions had relatively limited resources but accounted for a high proportion. The selection of four small institutions helped to understand the application of digital technology and training needs under limited resources.

After identifying the study institutions, administrators aged 30 years and older were selected from each selected institution. The selection process ensured that the administrators covered different age groups (30–39, 40–49, and 50 and above) and that the age distribution was representative.

Officials over 30 usually had longer work experience. These experiences covered not only practical operations in the field of educational management but also the ability to respond to and solve a variety of complex problems. Rich work experience gave them a deeper understanding of university administration, which was particularly important for assessing the impact of digital technology on administrative effectiveness (Robbins & Judge, 2013). In administrative positions in colleges and universities, higher positions usually required substantial management experience and professional knowledge. Managers over the age of 30 were more likely to hold these senior positions, and their feedback and comments were more valuable for the development of practical training strategies (Greenhaus et al., 2010). Managers over 30 years old generally received higher education in 2000 or earlier, and the popularity and educational content of computer technology varied. Studying this group helped to understand their technical foundation and learning needs.

Through the above steps, the representativeness and diversity of the study sample in terms of geographical distribution, institutional type, level of digitalization, and school size were ensured, thereby providing comprehensive and accurate data support for the study.

(2) Sample and Sampling

After identifying the 8 institutions, the number of administrators at the 8 universities is as follows, as described in the university profile.

Table 3.6 Number of APs in 8 Universities

University	Number of APs
Qilu Medical University	76
Qingdao Binhai University	69
Weifang University of Science and Technology	64
Shandong Engineering Vocational and Technical University	53
Qingdao Hengxing Science and Technology University	48
Yanshan University of Shandong University of Finance and Economics	39
Rizhao Marine Engineering Vocational College	35
Shandong Foreign Language Vocational and Technical University	35
Total	419

This study used stratified random sampling technology, to ensure that fully represented from eight different universities: including Qi lu medical college, Qingdao binhai college, Qingdao star institute of science and technology, Shandong engineering vocational technology university, Shandong university of yanshan college, Weifang institute of science and technology, Rizhao Marine engineering vocational college, Shandong foreign language vocational technical university.

Stratified random sampling is a probability sampling method used to improve sample representativeness and accuracy. It ensures that each subpopulation is well represented by

dividing the population into multiple non-overlapping subpopulations (i. e., stratification) and then randomly sampling samples from each subpopulation. Stratified random sampling ensures that each subpopulation is properly represented in the sample, thereby increasing sample representation and accuracy. Because individual characteristics are similar within each subgroup and features differ significantly among different subgroups, stratified random sampling can effectively reduce the sampling error. In this study, the overall size was limited (419), and the use of the limited population sample size calculation formula ensured sufficient sample size for each stratification, reduced sampling error, and ensured the representativeness of the sample and the accuracy of the study results. The sample size calculation formula is as follows:

$$n = \frac{(z)^2(\pi)(1 - \pi)(N)}{(z)^2(\pi)(1 - \pi) + (N)(e)^2}$$

Among:

n was the sample size

N was the overall size (419)

Z was the standard normal distribution cut-off (Z=1.96 for the 95% confidence level)

P was the estimated ratio (50%, or 0.5)

E was the allowable error range (5%, or 0.05)

Generation formula calculation,

$$n = 419 * 1.96^2 * 0.5 * (1 - 0.5) / (419 - 1) * 0.05^2 + 1.96^2 * 0.5 * (1 - 0.5)$$

$$n = 419 * 3.8416 * 0.25 / 418 * 0.0025 + 3.8416 * 0.25$$

$$n = 402.0796 / 2.0054$$

$$n \approx 200.4$$

The recommended sample size was 200.4. Since having a proportion of the participants was not possible, the researcher rounded up to the next integer, 201. To ensure that the study had safe and effective data, the study was designed for an additional 10% of the participants:

$$201 + 201 * 10\% = 221.1$$

Therefore, a 222 sample size was selected for this study. The percentage of participants from each university was used for proportional allocation based on data information from the eight universities listed below.

Table 3.7 Proportional Allocation of APs in the 8 Colleges

University	Number of APs	Percentage
Qilu Medical University	76	18.14%
Qingdao Binhai University	69	16.47%
Weifang University of Science and Technology	64	15.27%

University	Number of APs	Percentage
Shandong Engineering Vocational and Technical University	53	12.65%
Qingdao Hengxing Science and Technology University	48	11.46%
Yanshan University of Shandong University of Finance and Economics	39	9.31%
Rizhao Marine Engineering Vocational College	35	8.35%
Shandong Foreign Language Vocational and Technical University	35	8.35%
Total	419	100%

Since the calculated total was 222, participants from the eight universities were assigned as follows. Participants were randomly selected from each university. The sampling frame was divided into different levels according to the age, gender, working years and position level. Then, participants from each stratum were selected proportionally to ensure representation from different groups. Contact the selected participants and collect the data required for the study.

Table 3.8 Sample Allocation of the 8 Colleges

University	Percentage	Sample size
Qilu Medical University	18.14%	40
Qingdao Binhai University	16.47%	36
Weifang University of Science and Technology	15.27%	34
Shandong Engineering Vocational and Technical University	12.65%	28
Qingdao Hengxing Science and Technology University	11.46%	25
Yanshan University of Shandong University of Finance and Economics	9.31%	21
Rizhao Marine Engineering Vocational College	8.35%	19
Shandong Foreign Language Vocational and Technical University	8.35%	19
Total	100%	222

3.2.2 Qualitative Research

Principles For Selection of Focus Group Participants

The principles in selecting participants for the focus group to ensure the validity and reliability of the findings.

(1) Number of Participants

A total of 8 participants were selected for the discussion, which aligned with the typical norm of having 6 - 12 participants in a focus-group interview. This ensured in-depth and diverse discussions. The number of 8 participants guaranteed the breadth of

the discussion, covering multi-dimensional perspectives, and control the group size to ensure that participant had ample opportunities to speak, facilitating an in-depth exploration of the impact of digital technology on administrative effectiveness.

(2) Selection Criteria

• Teaching Experience

All participants possessed more than 7 years of experience in educational management or teaching. Senior managers (with over 10 years of experience) account for 50%, and middle-aged and young managers (with 7 - 10 years of experience) make up the other 50%. This arrangement ensured that the focus group samples cover different management levels and experience levels, capable of reflecting the actual effects and demands of digital technology in educational practice and administrative management.

• Gender Representation

The sample included 5 males and 3 females, with males accounting for 62.5% and females 37.5%, achieving a reasonable gender distribution. This gender ratio is generally in line with the gender composition of the management in vocational colleges, ensuring diverse feedback on digital technology acceptance, usage experience, and management needs from different genders.

• Professional Backgrounds

The sample encompassed 7 core functional departments, namely academic affairs, administration, human resources, scientific research, finance, student affairs, and information technology. This ensured that managers from various fields had a multi-dimensional understanding of the application of digital technology in improving administrative effectiveness, avoiding biases from a single perspective.

• General Representativeness

The participants came from 8 different types of private vocational colleges in Shandong Province, covering a variety of academic backgrounds such as medicine, engineering, finance and economics, languages, and maritime affairs, including comprehensive universities and specialized colleges. This guarantees the universality of the research conclusions.

• Role Diversification

The sample included participants from different management levels and functional roles, as follows:

- Senior Managers (Vice-Presidents): 1 person, responsible for decision-making and overall planning, providing strategic insights.

- Middle - Level Managers (Directors/Heads): 6, from core departments such as academic affairs, administration, human resources, finance, student management, and information technology. They are responsible for policy implementation and execution and can delve into the applications and challenges of digital technology in specific businesses.

- GrassRoots Managers (Deputy Directors): 1 person, focusing on the actual impact of digital technology on daily affairs, and able to reflect the actual difficulties and needs in technology usage.

The multi-level and multi-departmental role setup ensure a panoramic observation of how digital technology affects administrative effectiveness, enhancing the diversity and rationality of the sample. This focus group sample is reasonable, teaching experience, gender, professional backgrounds, general representativeness, and role diversification. It could comprehensively reflect the impact of digital technology on the administrative effectiveness of private vocational colleges in Shandong Province, ensuring the objectivity, scientificity, and broad applicability of the research results.

3.3 Research Tools

3.3.1 Questionnaire

The quantitative phase of this study was carried out through a structured questionnaire survey. Data were collected from administrative personnel working in private higher vocational colleges in Shandong Province to evaluate their acceptance of digital technology training and its impact on administrative effectiveness.

In this study, the quantitative research tool was a questionnaire used to collect data on the administrative effectiveness of the administrative administrators of private universities in Shandong Province.

In order to ensure the scientificity and effectiveness of the research tool, the questionnaire design of this study drew on various sources, including Davis's Technology Acceptance Model (TAM), and proposed that perceived usefulness (PU) and perceived ease of use (PEOU) are the key factors affecting users' acceptance of new technologies.

In addition, the questionnaire refers to Chen & Wang's (2017) research on the application of digital technology in education, and Sun's (2021) research on the evaluation of intelligent campus efficiency. These literatures provide specific cases and analysis for this study to help design more targeted questionnaire items to understand the needs and effects of digital technology training.

To assess administrative effectiveness (AE), the questionnaire was designed using Greenhaus et al.'s (2010) study on occupational management and Robbins & Judge's (2013) study on organizational behavior. Key performance indicators (KPIs) include work efficiency, decision-making quality, communication and collaboration, frequency of technology use, and technology application capabilities to ensure a comprehensive assessment of the effectiveness of administrative personnel.

The questionnaire was designed based on a theoretical framework and relevant literature to ensure that the questions agreed with the structure of the measurement. Five Likert scales were used to calculate the study variables from (1) strong disagreement to (5) strong agreement. This scale was chosen mainly because it was useful in producing continuous data.

Table 3.9 Questionnaire Items

Variable	Definition	Item	Reference	Likert Scale
Perceived Usefulness (PU)	Administrators' subjective evaluation of the benefits of digital technology training in their work.	<ol style="list-style-type: none"> 1. I think using digital technology can improve my work efficiency. 2. I think using digital technology can improve my decision-making quality. 3. I think digital technology can improve the overall performance of our department. 	Davis (1989)	5-Strongly Agree 4-Agree 3-Neutral 2-Disagree 1-Strongly Disagree
Perceived Ease of Use (PEOU)	Administrators' subjective assessment of the ease with which digital technologies are learned and used.	<ol style="list-style-type: none"> 1. I find it easy to learn how to use new digital technology. 2. I think operating digital technology systems is simple. 3. I find using digital technology does not require much effort. 	Davis (1989)	5-Strongly Agree 4-Agree 3-Neutral 2-Disagree 1-Strongly Disagree
Leadership Support (LS)	The incentives, resources, and assistance that executives receive from their immediate leaders in the digital technology training process.	<ol style="list-style-type: none"> 1. I think the leadership provides sufficient support for digital technology training. 2. My leader encourages us to participate in digital technology training. 3. My leader provides the necessary resources and support when I need help. 	Martínez-Tur et al. (2020)	5-Strongly Agree 4-Agree 3-Neutral 2-Disagree 1-Strongly Disagree

Variable	Definition	Item	Reference	Likert Scale
Digital Technical Knowledge (DTK)	The ability of the executive to understand, grasp and apply digital technology.	<p>1. I have sufficient basic knowledge of digital technology.</p> <p>2. I know how to use common digital technology tools and software.</p> <p>3. I am aware of the latest developments and trends in digital technology.</p> <p>4. I have the ability in solving technical problems of digital technology devices.</p> <p>5. I have the ability in installing digital technology devices.</p>	Greenhaus et al. (2010); Sun (2021)	<p>5-Strongly Agree</p> <p>4-Agree</p> <p>3-Neutral</p> <p>2-Disagree</p> <p>1-Strongly Disagree</p>
Behavior Intention (BI)	Executive managers' willingness and plans to train and participate in the use and participation of digital technologies in their future work.	<p>1. I am willing to use more digital technology in my work.</p> <p>2. If given the opportunity, I would participate in more digital technology training.</p> <p>3. I plan to rely more on digital technology in my future work.</p>	Anderson et al. (1998)	<p>5-Strongly Agree</p> <p>4-Agree</p> <p>3-Neutral</p> <p>2-Disagree</p> <p>1-Strongly Disagree</p>
Administrative Effectiveness (AE)	The impact of digital technology training on the actual performance and efficiency of executives at work.	<p>1. Using digital technology has improved my work efficiency (WE).</p> <p>2. My decision-making quality (DQ) has improved after using digital technology.</p>	N/A (Customized items for this variable)	<p>5-Strongly Agree</p> <p>4-Agree</p> <p>3-Neutral</p> <p>2-Disagree</p> <p>1-Strongly Disagree</p>

Variable	Definition	Item	Reference	Likert Scale
		3. Digital technology has improved my communication and collaboration (CAC) with colleagues.		
		4. I frequently use digital technology in my daily work (TUF).		
		5. My ability to apply digital technology has improved (TAC).		

3.3.2 Quality of the Questionnaire

(1) Reliability Testing

Reliability analysis: The internal consistency of the questionnaire (PU, PEOU, LS, DTK, BI, AE) was measured using the Cronbach's Alpha coefficient to ensure the good reliability of the scale. Reliability refers to the reliability of the scale measurements. A scale is less affected by time, location, and other factors, thus leading to reliable test results. Internal consistency and reliability of the scale were assessed using Cronbach's alpha coefficient indicating the degree to which multiple items measuring the same variable point to the same attribute. Cronbach's $\alpha > 0.7$, the reliability of the questionnaire scale was reliable.

Table 3.10 Cronbach's α Scale

NO.	Cronbach's α	Reliability
1	$0.8 < \alpha < 0.9$	Very good
2	$\alpha > 0.7$	Good
3	$0.3 < \alpha < 0.7$	Unacceptable
4	$\alpha < 0.3$	Low

According to the questionnaire's pre-test, 30 valid questionnaires were collected to analyze its reliability. The Cronbach's Alpha should be above 0.7, which indicates that the questionnaire's internal consistency and reliability meet the requirements.

Table 3.11 Cronbach's Alpha Coefficients

Variable	Number Of Items	Cronbach's alpha
Perceived usefulness (PU)	3	0.843
Perceived ease of use (PEOU)	3	0.756

Variable	Number Of Items	Cronbach's alpha
Leadership support (LS)	3	0.835
Digital technical knowledge (DTK)	5	0.867
Behavior Intention (BI)	3	0.823
Administrative Effectiveness (AE)	5	0.863

(2) Validity Testing

Validity analysis: The Index of Item-Objective Congruence (IOC) was used to assess the quality of the questionnaire items, and the research experts scored the content validity of each item to ensure that it accurately reflected the relevant theoretical constructs.

Score: 1 if the expert determines that the item aligns with the research objectives.

Score: -1 if the expert determines that the item does not align with the research objectives.

Score: 0 if the expert is not certain that the item aligns with the research objectives.

The IOC value for a qualified item shall be equal to or greater than 0.60. This study invited 5 experts to score the items according to the research objectives. After the judgment of the experts, the IOC of each item was collected as shown in Table 3.12.

Table 3.12 IOC Values

Item	Expert1	Expert2	Expert3	Expert4	IOC
Q1	1	1	1	1	1
Q2	1	1	1	1	1
Q3	1	1	1	1	1
Q4	1	1	1	1	1
Q5	1	1	1	1	1
Q6	1	1	1	1	1
Q7	1	1	1	1	1
Q8	1	1	1	1	1
Q9	1	1	1	1	1
Q10	1	1	1	1	1
Q11	1	1	1	1	1
Q12	1	1	1	1	1
Q13	1	1	1	1	1
Q14	1	1	1	1	1
Q15	1	1	1	1	1
Q16	1	1	1	1	1
Q17	1	1	1	1	1
Q18	1	1	1	1	1
Q19	1	1	1	1	1
Q20	1	1	1	1	1
Q21	1	1	1	1	1

Item	Expert1	Expert2	Expert3	Expert4	IOC
Q22	1	1	1	1	1

3.3.3 Focus Group Discussion

The qualitative phase of the study was designed to complement the quantitative findings by providing deeper insights into administrators' perceptions, experiences, and expectations regarding digital technology training. Focus group discussions were conducted to explore participants' practical experiences in using digital technologies, differences in training needs across age groups, and the perceived role of leadership support and digital technical knowledge in facilitating technology adoption.

The discussion questions were formulated as open-ended items aligned with the research objectives and conceptual framework. The discussion topics focused on perceived ease of use and usefulness of digital technologies, leadership support, digital technical knowledge, and behavioral intention, as well as their influence on administrative effectiveness. All focus group discussions were recorded, transcribed, and systematically organized for subsequent qualitative analysis.

3.4 Data Collection

3.4.1 Questionnaire Survey

Preparation: Send a questionnaire invitation to the target institution, and introduce the purpose and importance of the study to ensure that participants understand the content and confidentiality of the survey. Questionnaire distribution: questionnaire distribution through e-mail or online survey platform. Ensure that each respondent can easily fill out and submit the questionnaire. Questionnaire collection: Set a recovery period and remind the participants to submit the questionnaire before the deadline. After completion of the collection, the questionnaire was checked for completeness and validity.

3.4.2 Focus Group Discussion

The operational procedure of the focus-group method encompasses the following steps. First, the researcher clarified the research objectives, identified the core themes of the discussion, and determine the questions to be explored, then, recruited and screened participants based on criteria such as age, job responsibilities, and management levels. Next, open-ended questions were formulated centered around the research theme, ensuring that the questions are concise and clear, and capable of guiding in-depth discussions. The moderator facilitated the discussion, while the recorder took notes. The discussion process included the introduction stage (introducing the purpose and rules), the discussion stage (engaging in exchanges based on the outline), and the summary stage (reviewing the key points, soliciting additional opinions, and expressing gratitude to the participants). Subsequently, the researcher transcribed the audio recordings into written text, employed coding analysis to extract themes and summarized consensus and divergent views. Finally, the discussion outcomes were summarised, key viewpoints and suggestions were extracted and provided support for the research conclusions. This procedure was systematic and rigorous, ensuring the scientificity and effectiveness of the focus-group discussion.

3.5 Statistical Method of Analysis

3.5.1 Descriptive Statistics

Descriptive statistical analysis was conducted as the first step of quantitative data processing in this study, with the primary purpose of ensuring data quality and presenting the basic characteristics of the research sample. Prior to formal statistical analysis, the collected questionnaire data were subjected to a rigorous data cleaning procedure. Questionnaires containing missing values, incomplete responses, or abnormal response patterns were carefully screened and removed.

Following data cleaning, all questionnaire items were coded and entered into SPSS for statistical processing. Likert scale responses were transformed into numerical values to facilitate quantitative analysis. Descriptive statistics were then employed to summarize the demographic characteristics of the respondents, including gender, age, education, position, and tenure. Frequency analysis, percentages, means, and standard deviations were used to describe the overall distribution of the sample. This step provided a clear overview of the structural composition of administrative staff in private higher vocational colleges in Shandong Province and ensured that the sample was suitable for further inferential analysis.

In addition to demographic variables, descriptive statistics were also applied to the research constructs, including perceived ease of use, perceived usefulness, leadership support, digital technical knowledge, behavioral intention, and administrative effectiveness. By examining the mean values and standard deviations of each construct, the study obtained an initial understanding of respondents' overall perceptions, attitudes, and evaluations regarding digital technology training and its application in administrative work. This analysis laid a necessary foundation for subsequent reliability testing, validity assessment, and structural model analysis.

3.5.2 Inferential Statistics

Inferential statistical analysis was employed to examine the relationships among the research variables and to test the proposed hypotheses derived from the theoretical framework. This study adopted a multi step inferential analysis strategy, combining multiple regression analysis, mediation effect testing, and structural equation modeling to comprehensively explore the causal mechanisms underlying digital technology acceptance and administrative effectiveness.

Structural equation modeling was conducted using SPSS to examine the direct effects of the independent variables, including perceived usefulness, perceived ease of use, leadership support, and digital technical knowledge, on the mediating variable, behavioral intention. This step aimed to identify whether these factors significantly influenced administrators' willingness to adopt and use digital technologies. Subsequently, regression analysis was performed to test the effect of behavioral intention on the dependent variable, administrative effectiveness. Through this process, the direct predictive relationships among the key variables were preliminarily verified.

Mediation effect analysis was conducted to examine whether behavioral intention played a mediating role between the independent variables and administrative effectiveness. Following the classical mediation testing logic proposed by Bogler & Somech (2004), the study assessed the effect of independent variables on the dependent variable, the effect of independent variables on the mediating variable, and the effect of the mediating variable on

the dependent variable while controlling for the independent variables. In addition, Spector's (2004) test was employed to statistically verify the significance of the mediation effects. This approach allowed the study to determine whether behavioral intention served as a significant psychological mechanism through which digital technical knowledge and other antecedents influenced administrative effectiveness.

Structural equation modeling enabled the simultaneous examination of multiple dependent relationships while accounting for measurement error, thereby providing a more robust test of the theoretical model. Confirmatory factor analysis was first conducted to assess the measurement model, ensuring satisfactory construct validity and discriminant validity among the latent variables. Reliability was evaluated using Cronbach's Alpha coefficients, while standardized factor loadings were examined to confirm item adequacy.

The structural model was constructed to test the hypothesized paths among perceived usefulness, perceived ease of use, leadership support, digital technical knowledge, behavioral intention, and administrative effectiveness. Model fit was evaluated using multiple goodness of fit indices, including the Goodness of Fit Index, Normed Fit Index, Comparative Fit Index, Adjusted Goodness of Fit Index, and Root Mean Square Error of Approximation. These indices were jointly considered to assess whether the proposed model adequately represented the observed data. When necessary, the model was revised based on modification indices and theoretical justification to achieve an acceptable level of model fit.

Finally, path analysis was conducted to examine the significance and strength of the relationships among the variables, allowing for the verification of the research hypotheses. Through this inferential statistical process, the study not only identified significant predictors of behavioral intention and administrative effectiveness but also clarified the mediating mechanisms and structural relationships that underpin digital technology acceptance in private higher vocational colleges.

3.5.3 Qualitative Analysis

In this study, the focus group discussion and content analysis were employed as complementary qualitative research techniques to enhance the depth and interpretability of empirical findings. The focus group approach enabled interactive discussions among participants, allowing the researchers to capture not only individual perceptions but also shared experiences, collective reflections, and divergent viewpoints regarding digital technology training and administrative effectiveness. Through guided discussion and group interaction, participants were encouraged to articulate their practical experiences, challenges, and expectations, thereby generating rich and contextualized qualitative data that could not be fully obtained through questionnaire surveys alone. Using NVivo14 software, the transcribed interview texts were subjected to a rigorous coding procedure that involved open coding, axial coding, and selective coding. This multi level coding process facilitated the identification of key concepts, the establishment of relationships among categories, and the extraction of core themes relevant to leadership support, digital technical knowledge, behavioral intention, and administrative effectiveness. By quantifying reference code points and integrating them with descriptive interpretations, the analysis ensured both analytical rigor and transparency in theme development.

The integration of focus group discussion and content analysis strengthened the credibility and validity of the qualitative findings. This methodological triangulation not only enriched the interpretation of quantitative results but also offered empirical support for explaining underlying mechanisms and contextual factors influencing digital technology acceptance and administrative performance in private higher vocational colleges.

3.6 Ethical Considerations

In the conduct of this study, strict ethical standards and norms were followed to ensure the scientific and ethical nature of the study. The main ethical considerations included four aspects: informed consent, confidentiality and privacy, data use, risks and benefits, and ethical review and approval. Detailed informed consent was provided to all participants prior to data collection. The informed consent form contained information on the purpose of the study, content, rights of participants, potential risks and benefits, data use and confidentiality measures to ensure that participants voluntarily agreed to participate in the study with a full understanding of the study content and their rights. All participants signed informed consent indicating their voluntary participation and relevant information. The participants were explicitly informed that they had the right to withdraw from the study at any time without suffering any form of punishment or adverse effect to ensure that participants were aware of their right not to answer any questions that they did not wish to answer.

During data collection, storage, and analysis, the personal identifiable information of all participants was made anonymous, ensuring that the data could not be traced back to the individual identity. A coding system was used instead of the participant's real name and other identifying information. All collected data were stored on encrypted and password-protected storage devices to prevent unauthorized access. Data access was limited to allow only team members to access the data. The informed consent form clearly stated that the data collected were used for the academic purposes of this study only and were not used for any other commercial or non-academic use. During the study design phase, potential risks were assessed to ensure that the study process did not cause any physical or psychological harm to the participants. If any potential risks were identified during the study, immediate measures were taken to reduce or eliminate the risks. Participants were informed on the potential benefits of research participation, including improvements to educational management practices and assistance with personal career development and ensured that they understood the benefits that participation in research brought to academic and practical applications. By strictly following the above ethical considerations, this study ensured that the rights and privacy of participants were fully respected and protected, ensuring the transparency and ethics of the data collection and use process, thus enhancing the scientificity and credibility of the study, while maintaining the trust and confidence of participants who generously contributed their time and views.

CHAPTER 4

RESEARCH RESULTS

This chapter primarily focuses on data analyses and results and comprises five sections:

- 4.1 Demographic Characteristics of Respondents
- 4.2 Discriminatory Power, Reliability Analysis, and Validity Analysis
- 4.3 Correlation Analysis
- 4.4 Structural Equation Models and Hypothesis Testing
- 4.5 Qualitative Data Analysis
- 4.6 Conclusion

This study employed a mixed-methods approach, integrating quantitative and qualitative research, to comprehensively examine the acceptance of digital technology training among administrative staff in private higher vocational colleges in Shandong Province and its impact on administrative effectiveness. The quantitative approach utilized structural equation modeling to explore the relationships among variables. Hypotheses were proposed based on the interactions between these variables. SPSS and AMOS software were employed in the data analysis process.

Reliability and validity analyses were conducted on the survey data. Cronbach's Alpha was used for reliability analysis, while Confirmatory Factor Analysis, including path coefficients, was employed for validity testing. Based on the analysis results, it was ensured that the survey data was reliable and discriminatory power. After the data passes reliability and validity tests, correlation analysis and structural equation model construction were carried out. The structural equation model necessitated verifying the model's goodness of fit. GFI, NFI, CFI, AGFI, and RMSEA were referenced for the model's goodness-of-fit analysis. The data-driven model fit must meet the requirements. The model was revised according to the indicators to ensure model fit conforms to the standards. Finally, path analysis was conducted for each variable to verify the hypotheses and draw conclusions.

In this study, a total of 222 questionnaires were distributed, and 202 were returned. During the process of organizing the questionnaire data, those with missing values were deleted. Additionally, questionnaires with a completion time of only 30 seconds were excluded. Ultimately, 202 valid questionnaires were collected, with an effective response rate of 90.99%.

The qualitative research approach aimed to collect and analyze the acceptance, perceptions, needs, and expectations of administrative staff in private higher vocational colleges in Shandong Province regarding digital technology training. As a supplement to the quantitative research results, qualitative research provides more in-depth background and explanations, contributing to a comprehensive understanding of the attitudes and behaviors of the research subjects. The primary objectives of qualitative research were to gain insights into the practical experiences and feelings of administrative staff in using and learning digital technologies; to explore the differences in training needs and preferences among administrative staff of different age groups; to analyze the role and influence of leadership

support and knowledge in digital technology training; and to identify and understand the challenges and obstacles encountered in the application of digital technologies.

A total of eight individuals were selected to participate in the focus group discussions of this study. The interviewees were leaders from eight universities (Qilu Medical University, Qingdao Binhai University, Weifang University of Science and Technology, Shandong Engineering Vocational and Technical College, Qingdao Hengxing University of Science and Technology, Shandong University of Finance and Economics Yanshan College, Rizhao Ocean Engineering Vocational College, and Shandong Foreign Studies Vocational and Technical College). The discussions outline revolved around the ease of use of digital technologies, the availability of digital technologies, leadership support, digital technology knowledge, and the mediating variable (behavioral intention), exploring their impact on the administrative effectiveness of private higher vocational colleges in Shandong Province. The content of each focus group discussion was recorded and organized, and relevant research viewpoints were summarized and collated.

4.1 Demographic Characteristics of Respondents

The description of sample characteristics in this study encompasses the distribution of variables such as gender, age, educational background, job position, and work experience among the respondents. By examining the distribution of these variables, the basic background information of the respondents, thereby providing crucial contextual support for the analysis of the research findings. The data reveal that female respondents account for 55.4%, while male respondents make up 44.6%. This indicates a slight predominance of female respondents in the research sample, reflecting a certain degree of gender balance.

The respondents are predominantly concentrated in the 30 - 39 age group, accounting for 46.5%; followed by the 40 - 49 age group, which constitutes 40.1%. Respondents aged 50 and above are relatively few, accounting for only 13.4%. This suggests that the research sample is composed of middle-aged and young adults, which aligns with the age distribution characteristics of administrative staff in vocational colleges.

In this study, respondents with a bachelor's degree account for 66.3%, those with a master's degree account for 30.7%, and only 3.0% possess an educational background higher than a master's degree. This demonstrates that the respondents have a relatively high educational background, with a prominent higher-education profile.

A significant proportion of the respondents are in operational positions (52.5%), followed by lecturers/teachers (21.3%) and other positions (23.8%). Management-level personnel are relatively few, accounting for only 2.5%. This distribution of job positions reflects a large number of administrative and operational staff in the research sample, which is of great significance for analyzing the application and impact of digital technology at different management levels.

The respondents' work experience is relatively dispersed. Respondents with 5 years or less of work experience account for 32.7%. The proportions of respondents with 5 - 10 years and 11 - 15 years of work experience are similar, at 31.7% each. Respondents with more than 16 years of work experience are few, accounting for only 4.0%. This indicates that most in the sample have relatively rich work experience in higher vocational colleges, enabling them to provide a multi-dimensional perspective on the impact of digital technology training on administrative effectiveness.

The distribution of sample characteristics showcases that the respondent group in this study is representative. Moreover, these characteristics provide a data foundation for the subsequent analysis of the acceptance of digital technology training and its impact on administrative effectiveness.

Table 4.1 Sample Characteristics

Characteristics	Option	Frequency	Percent%
Gender	Female	112	55.4%
	Male	90	44.6%
Age	30-39	94	46.5%
	40-49	81	40.1%
	50 and above	27	13.4%
Education	Bachelor's degree	134	66.3%
	Master degree	62	30.7%
	Higher than the Master's degree	6	3.0%
Position	Operation	106	52.5%
	Manager/senior	5	2.5%
	Lecturer/instructor	43	21.3%
Tenure	Other	48	23.8%
	Less than/or equal to 5	66	32.7%
	Between 5-10	64	31.7%
	Between 11-15	64	31.7%
	16 and over	8	4.0%
	Total	202	100%

4.2 Discriminatory Power, Reliability Analysis and Validity Analysis

The research questionnaire garnered 202 valid responses. Reliability and validity tests were performed on the questionnaire data. Upon passing these tests, structural equation modeling analysis was carried out.

4.2.1 Reliability Analysis

This study employed SPSS software for the research and analysis of the questionnaire. In the reliability analysis conducted using SPSS, Cronbach's Alpha is a commonly used indicator. This study utilized Cronbach's Alpha to analyze the internal consistency of the relevant options in the questionnaire, that is, to perform reliability analysis. Cronbach's Alpha typically ranges from 0 to 1. If the coefficient falls between 0.5 and 0.7, it indicates a moderate level of reliability, necessitating further analysis. If the coefficient is greater than 0.7, it suggests a relatively high level of reliability for the indicator.

As can be seen from the results in Table 4.2, Cronbach's Alpha values for all variables are relatively high, indicating that the scale possesses good internal consistency. The data presents the reliability analysis results for each dimension in this study, using Cronbach's Alpha coefficient to evaluate the internal consistency of each dimension. Cronbach's Alpha is a frequently - used metric for measuring the consistency among items in a scale or questionnaire. The closer the value is to 1, the higher the reliability. The Cronbach's Alpha coefficients for all dimensions are above 0.7, indicating a relatively high level of reliability for the scale.

The Cronbach's Alpha for the Perceived Ease of Use (PEOU) dimension is 0.852, demonstrating a high level of consistency in the measurement of this dimension and reflecting strong reliability in respondents' perceptions of the ease of use of digital technology. The Cronbach's Alpha for the Perceived Usefulness (PU) dimension is 0.784, indicating that the perception of the usefulness of digital technology among respondents exhibits relatively good stability and consistency. The Cronbach's Alpha for the Leadership Support (LS) dimension is 0.830, suggesting a strong internal consistency in the influence of leadership support on respondents. Cronbach's Alpha for the Behavioral Intention (BI) dimension is 0.767. Although slightly lower, it is still above 0.7, indicating relatively good reliability in reflecting respondents' behavioral intentions. The Cronbach's Alpha for the Digital Technical Knowledge (DTK) dimension is 0.874, implying a high level of consistency and reliability in respondents' mastery of digital technology knowledge, which means this dimension can accurately reflect respondents' digital technology knowledge level. The Cronbach's Alpha for the Administrative Effectiveness (AE) dimension is 0.876, indicating that the measurement of the administrative effectiveness dimension is highly reliable and can truly reflect the impact of digital technology on administrative effectiveness.

The reliability analysis results demonstrate that the measurements of each dimension have a relatively high level of internal consistency and good reliability, providing a solid foundation for subsequent statistical analyses. This indicates that the scale is well-designed and can accurately measure the various factors of interest.

Table 4.2 Reliability Analysis

Dimension	Cronbach's Alpha	No. of Items
Perceived Ease of Use (PEOU)	0.852	3
Perceived Usefulness (PU)	0.784	3
Leadership Support (LS)	0.830	3
Digital Technical Knowledge (DTK)	0.874	5
Behavior Intention (BI)	0.767	3
Administrative Effectiveness (AE)	0.876	5

4.2.2 Validity Analysis

The data present the model fit indicators and their observed values of Confirmatory Factor Analysis (CFA), aiming to evaluate the goodness-of-fit and validity of the research model. The latent variables measured by CFA, such as perceived ease of use of digital technology, perceived usefulness, and leadership support, can be effectively reflected by the observed variables. The Model Fit Indicators in the Table 4.3 encompass several commonly used goodness-of-fit test parameters. By comparing the observed values of these indicators with the recognized threshold ranges, one can determine whether the model's goodness-of-fit meets the statistical requirements.

CMIN (Chi-Square Minimum Discrepancy) is a fundamental indicator for assessing the quality of model fit, with a smaller value indicating a better fit. The CMIN value of this model is 263.809. Combined with a degrees of freedom (DF) of 194, the calculated CMIN/DF value is 1.360, which is far below 5 and close to the ideal range (less than 3). This result suggests that the fit of the model is good, indicating a good match between the theoretical model and the actual data.

The Goodness - of - Fit Index (GFI) and the Adjusted Goodness - of - Fit Index (AGFI) are 0.900 and 0.870, respectively. The GFI value of 0.900 meets the critical value for a good fit, indicating that the model can explain the sample data well. Although the AGFI is slightly lower than 0.900, it still falls within the acceptable range of 0.8 - 0.9, further validating the rationality of the model. These two indicators suggest that the model has a high explanatory power and maintains a good fit after error adjustment.

The Root Mean Square Error of Approximation (RMSEA) is a key indicator reflecting the parsimony of the model. A smaller value indicates a higher fit between the model and the actual data. The RMSEA value of this model is 0.042, significantly lower than the threshold of 0.08 and close to the ideal level. This indicates that the model has an excellent fit to the overall data, with an appropriate level of complexity, avoiding the problem of over-fitting.

The Incremental Fit Index (IFI), Normed Fit Index (NFI), Tucker - Lewis Index (TLI), and Comparative Fit Index (CFI), which are four indicators reflecting the incremental goodness-of-fit of the model, are 0.970, 0.951, 0.963, and 0.900, respectively. All these indicators are greater than 0.9, indicating that the model has a strong improvement effect when compared with the null hypothesis model (an independent model where variables are uncorrelated) and meets the standards for a good fit. Among them, the IFI value of 0.970, which is close to 1, indicates that the model has a strong ability to explain the data, further enhancing the model's goodness-of-fit and robustness.

In conclusion, all the model fit indicators meet the threshold values. This demonstrates that the theoretical model of this study is a good fit with the actual data and can effectively explain the acceptance of digital technology training among administrative staff in private higher vocational colleges in Shandong Province and its impact on administrative effectiveness. The model has a good fit, validating the construct validity of the measurement tool and laying a foundation for subsequent path analysis and hypothesis testing.

Table 4.3 Confirmatory Factor Analysis Model Fit Intercept (N=202)

Model Fit Indicator	Threshold Range	Observed Value
CMIN		263.809
DF		194
CMIN/DF	Below 5, best below 3	1.360
GFI	Above 0.9, 0.8-0.9Acceptable	0.900
AGFI	Above 0.9, 0.8-0.9Acceptable	0.870

Model Fit Indicator	Threshold Range	Observed Value
RMSEA	Below 0.08	0.042
IFI	Above 0.9, 0.8-0.9Acceptable	0.970
NFI	Above 0.9, 0.8-0.9Acceptable	0.951
TLI(NNFI)	Above 0.9, 0.8-0.9Acceptable	0.963
CFI	Above 0.9, 0.8-0.9Acceptable	0.900

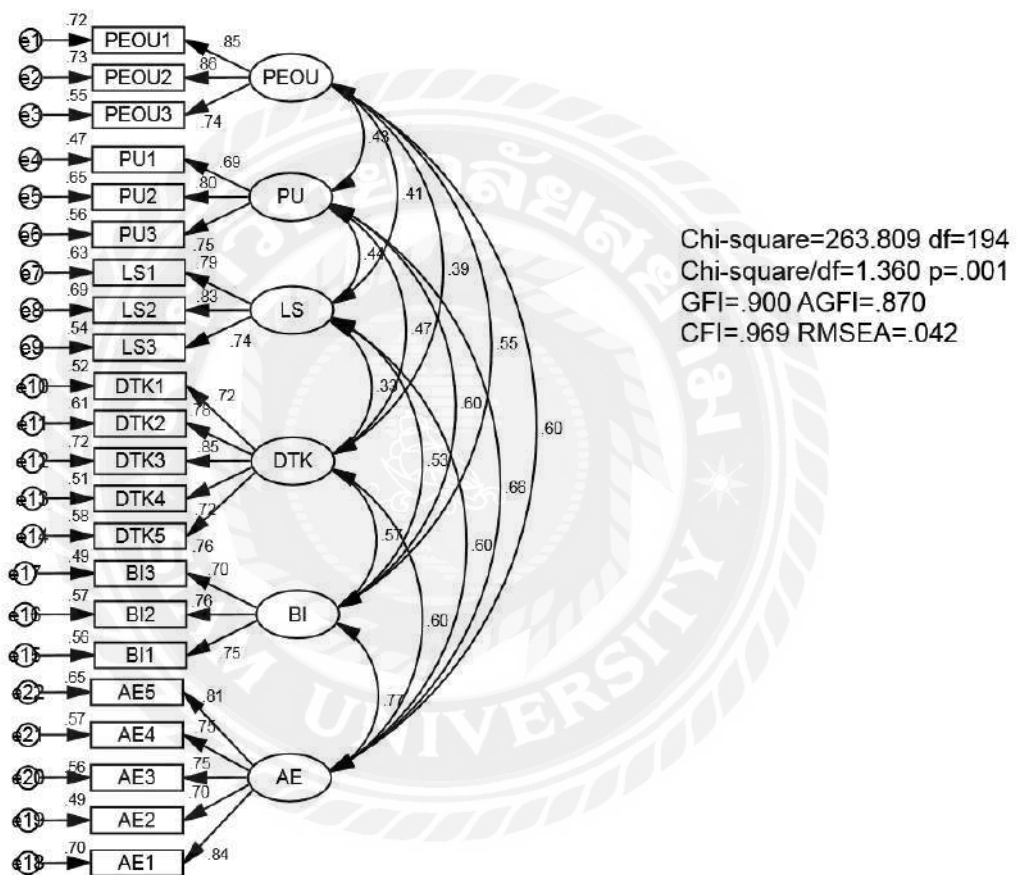


Figure 4.1 Confirmatory Factor Analysis

Table 4.4 presents the results of factor loadings, Average Variance Extracted (AVE), and Composite Reliability (CR) values for each factor in the Confirmatory Factor Analysis (CFA) of this study. These indicators provide crucial evidence for evaluating the construct validity and reliability of the model. By analyzing the factor loadings, AVE, and CR values of each dimension (such as perceived ease of use of digital technology, perceived usefulness, leadership support, etc.), we can evaluate the validity and reliability of this model.

All factor loading values exceed 0.7, indicating a strong relationship between each observed variable and its corresponding latent variable. The higher the factor loading value, the stronger the explanatory power of the measurement item for its latent variable, and the better it can represent the underlying construct.

Average Variance Extracted (AVE) is an indicator that measures the proportion of variance explained by the latent variable. A higher AVE value better reflects the validity of the latent variable. An AVE value greater than 0.5 indicates good construct validity of the latent variable. As can be seen from the table, the AVE value for Perceived Ease of Use (PEOU) is 0.667, and that for Digital Technical Knowledge (DTK) is 0.589, both of which are higher than 0.5, suggesting that the measurement models of these constructs have good construct validity. The AVE values for Behavioral Intention (BI) and administrative effectiveness (AE) are 0.541 and 0.595, respectively. Although slightly lower than 0.6, they are still within an acceptable range, indicating a relatively strong explanatory power for the latent variables.

Composite Reliability (CR) is used to assess the internal consistency of the measurement tool, and a CR value greater than 0.7 is generally required. According to the Table 4.4, the CR values for all constructs are greater than 0.7, which means that the measurement tool in this study has good internal consistency across various dimensions. The results indicate that the measurement model in this study has high construct validity and reliability. The factor loadings, AVE, and CR values of each latent variable all meet the statistical requirements, further validating the goodness-of-fit and reliability.

Table 4.4 AVE and CR of Confirmatory Factor Analysis

Path Relationship	Estimate	S.E.	C.R.	P	Factor Loading	AVE	CR
PEOU1 <--- PEOU	1				0.849		
PEOU2 <--- PEOU	0.984	0.076	13.019	***	0.857	0.667	0.857
PEOU3 <--- PEOU	0.953	0.084	11.419	***	0.738		
PU1 <--- PU	1				0.685		
PU2 <--- PU	1.580	0.179	8.847	***	0.804	0.559	0.791
PU3 <--- PU	1.200	0.136	8.794	***	0.750		
LS1 <--- LS	1				0.794		
LS2 <--- LS	1.053	0.094	11.238	***	0.833	0.623	0.832
LS3 <--- LS	0.945	0.093	10.143	***	0.738		
DTK1 <--- DTK	1				0.723		
DTK2 <--- DTK	1.053	0.100	10.499	***	0.780	0.589	0.877
DTK3 <--- DTK	1.296	0.114	11.34	***	0.849		
DTK4 <--- DTK	1.103	0.115	9.567	***	0.716		

Path Relationship			Estimate	S.E.	C.R.	P	Factor Loading	AVE	CR
DTK5	<---	DTK	0.952	0.094	10.121	***	0.761		
BI1	<---	BI	1				0.747		
BI2	<---	BI	1.288	0.135	9.518	***	0.758	0.541	0.780
BI3	<---	BI	0.819	0.092	8.926	***	0.701		
AE1	<---	AE	1				0.839		
AE2	<---	AE	0.928	0.084	11.017	***	0.703		
AE3	<---	AE	0.932	0.077	12.038	***	0.748	0.595	0.880
AE4	<---	AE	1.09	0.090	12.130	***	0.752		
AE5	<---	AE	1.139	0.085	13.373	***	0.808		

Note: Digital Technology Ease of Use (PEOU), Digital Technology Knowledge (DTK), Behavioral Intent (BI) and Administrative Effectiveness (AE)

4.3 Correlation Analysis

Table 4.5 presents the results of Pearson correlation analysis among various dimensions, encompassing Perceived Ease of Use of Digital Technology (PEOU), Perceived Usefulness of Digital Technology (PU), Leadership Support (LS), Digital Technology Knowledge (DTK), Behavioral Intention (BI), and Administrative Effectiveness (AE). Pearson correlation unveils the linear relationships between dimensions, offering crucial statistical evidence for subsequent path analysis.

All variables exhibit significant positive correlations, indicating strong statistical significance ($p < 0.01$). The correlation coefficient between Perceived Ease of Use of Digital Technology (PEOU) and Perceived Usefulness of Digital Technology (PU) is 0.366, suggesting a moderate positive correlation where a higher level of digital technology ease of use is associated with greater perceived usefulness. The correlation coefficient between Leadership Support (LS) and Perceived Ease of Use of Digital Technology (PEOU) is 0.353, demonstrating leadership support for technology administrators' perceptions of technology ease of use. Digital Technology Knowledge (DTK) demonstrates relatively strong correlations with other variables. The correlation coefficient between Digital Technology Knowledge (DTK) and Behavioral Intention (BI) is 0.482, implying that technological knowledge can strengthen administrators' behavioral intentions. This is also evident in administrative effectiveness (AE), as the correlation coefficient between Digital Technology Knowledge (DTK) and Administrative Effectiveness (AE) is 0.536, indicating the pivotal role of digital technology knowledge in improving administrative effectiveness.

Administrative Effectiveness (AE) exhibits the strongest correlations with all other variables. The correlation coefficients between Administrative Effectiveness (AE) and Perceived Ease of Use of Digital Technology (PEOU), Perceived Usefulness of Digital Technology (PU), Leadership Support (LS), Digital Technology Knowledge (DTK), and Behavioral Intention (BI) are 0.531, 0.552, 0.521, 0.536, and 0.643, respectively.

This indicates a robust positive correlation between enhancing administrative effectiveness and improving other variables such as technology ease of use and leadership support, further corroborating the significant impact of various dimensions of digital technology on enhancing administrative effectiveness.

The correlation coefficients are moderate, signifying a balanced relationship among the dimensions. The absence of extreme correlation values suggests a natural linear connection among the variables in the dataset. These results furnish reliable statistical evidence for subsequent path analysis and causal inference. The findings of the Pearson correlation analysis reveal significant positive correlations among all variables. The high correlations between Administrative Effectiveness and other variables further validate the substantial influence of various dimensions of digital technology on improving administrative effectiveness. Moreover, these correlations lay a solid foundation for subsequent Structural Equation Modeling (SEM) analysis. Table 4.5 presents the results of the correlation analysis and discriminant validity assessment based on the Fornell-Larcker criterion. The diagonal elements represent the square roots of the average variance extracted (\sqrt{AVE}) for each construct, while the off-diagonal elements indicate the correlations between constructs. As shown in Table 4.5, the square root of the AVE for each construct is greater than its corresponding inter-construct correlations, demonstrating adequate discriminant validity.



Table 4.5 Results of Correlation Analysis for Each Dimension

	$\sqrt{\text{AVE}}$	PEOU	PU	LS	DTK	BI	AE
PEOU	0.817	0.817					
PU	0.748	.366**	0.748				
LS	0.789	.353**	.352**	0.789			
DTK	0.767	.352**	.390**	.296**	0.767		
BI	0.736	.439**	.467**	.430**	.482**	0.736	
AE	0.771	.531**	.552**	.521**	.536**	.643**	0.771

NOTE: * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

4.4 Structural Equation Models and Hypothesis Testing

In this study, AMOS was employed to conduct model fit analysis on the statistical data from SPSS to evaluate the goodness-of-fit of the model. It is generally acknowledged that a Chi-square to Degrees of Freedom ratio (CMIN/DF) less than 3 indicates a high degree of fit between the model and the data. An Approximate Error Mean Square Root (RMSEA) value less than 0.08 suggests a good fit and a value less than 0.05 is even more desirable. The goodness-of-fit can also be assessed through indicators such as the Comparative Fit Index (CFI). The values of these goodness-of-fit indicators fall within the range of 0 - 1. It is commonly believed that values greater than 0.8 indicate a good fit, and values greater than 0.9 are even better, with values closer to 1 being optimal. The specific criteria for testing the goodness-of-fit indicators are presented in Table 4.6.

Table 4.6 Fit Indicator Test Criteria

Indicator	Range of Values	Judgment Criteria
CMIN/DF	>0	Best: ≤ 2.00 Good: ≤ 3.00 Acceptable: ≤ 5.00
Root Mean Square Error of Approximation (RMSEA)	>0	Maximum: 0.00 Good: ≤ 0.05 Acceptable: ≤ 0.08
The Bentler-Bonett's Normed Fit Index (NFI)	0-1	Maximum: =1.00 Best: > 0.98 Good: > 0.95 Acceptable: > 0.90
Incremental Fit Index (IFI)	0-1	> Maximum: =1.00 Best: > 0.97 Better: > 0.95 Good: ≥ 0.92 Acceptable: > 0.90
Tucker-Lewis Index (TLI)	0-1	Maximum: =1.00 Best: > 0.97 Better: > 0.95 Good: ≥ 0.92 Acceptable: > 0.90
Comparative Fit Index of Bentler (CFI)	0-1	Maximum: =1.00 Best: > 0.97 Better: > 0.95 Good: ≥ 0.92 Acceptable: > 0.90

After establishing the structural equation model, the model path significance test was conducted using software to obtain the standardized path coefficients, critical ratio (C.R.) values, and significance P-values of the influencing factors. If the critical ratio (C.R.) is 1.96 and the p-value is less than 0.05, the path coefficient is significant at the 95% confidence level, supporting the hypothesis. If not, the hypothesis is not supported.

The model demonstrates a good fit, with all fit indices meeting the standard requirements. The CMIN/DF ratio is 1.360, significantly lower than 5, suggesting an excellent model fit. The Goodness-of-Fit Index (GFI) is 0.900, approaching the ideal value of 0.9, and the Adjusted Goodness-of-Fit Index (AGFI) is 0.870, falling within an acceptable range. The Root Mean Square Error of Approximation (RMSEA) value is 0.042, much lower than 0.08, indicating a small model fit error. The Incremental Fit Index (IFI) and Comparative Fit Index (CFI) are 0.970 and 0.969, higher than 0.9, demonstrating a good model fit. The Normed Fit Index (NFI) and Tucker-Lewis Index (TLI, also known as NNFI) are 0.894 and 0.963, within acceptable ranges. Overall, the model exhibits an excellent fit and can effectively explain the data structure.

Table 4.7 Model Fit Intercept (N=202)

Model Fit Indicator	Threshold Range	Observed Value
CMIN		263.809
DF		194
CMIN/DF	Below 5, best below 3	1.360
GFI	Above 0.9, 0.8-0.9Acceptable	0.900
AGFI	Above 0.9, 0.8-0.9Acceptable	0.870
RMSEA	Below 0.08	0.042
IFI	Above 0.9, 0.8-0.9Acceptable	0.970
NFI	Above 0.9, 0.8-0.9Acceptable	0.894
TLI(NNFI)	Above 0.9, 0.8-0.9Acceptable	0.963
CFI	Above 0.9, 0.8-0.9Acceptable	0.969

4.4.1 Verification of Direct Effects

The results of the Structural Equation Modeling (SEM) analysis reveal that Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Leadership Support (LS), and Digital Technology Knowledge (DTK) all exert significant and positive direct influences on both Behavioral Intention (BI) and Administrative Effectiveness (AE). Additionally, Behavioral Intention (BI) demonstrates a positive direct impact on Administrative Effectiveness (AE).

The standardized estimate of Perceived Ease of Use (PEOU) on Behavioral Intention (BI) is 0.232 ($p = 0.006$), indicating that when administrative personnel perceive digital technology as easier to use, their intention to use it becomes stronger. The standardized estimate of Perceived Usefulness (PU) on Behavioral Intention (BI)

is 0.270 ($p = 0.005$), suggesting that if administrative personnel perceive digital technology as effective in enhancing work efficiency, their intention to use it was strengthened. The standardized estimate of Leadership Support (LS) on Behavioral Intention (BI) is 0.231 ($p = 0.005$), implying that the application of digital technology, policy, and resource support from the management can significantly enhance administrative personnel's willingness to use digital technology. The standardized estimate of Digital Technology Knowledge (DTK) on Behavioral Intention (BI) is 0.271 ($p = 0.001$), indicating that the higher the level of administrative personnel's mastery of digital technology, the more willing they are to use it in their work.

In terms of Administrative Effectiveness (AE), the standardized estimate of Perceived Ease of Use (PEOU) is 0.167 ($p = 0.016$), suggesting that an increase in ease of use can directly enhance administrative effectiveness. The standardized estimate of Perceived Usefulness (PU) on Administrative Effectiveness (AE) is 0.204 ($p = 0.010$), indicating that administrative personnel's recognition of the usefulness of digital technology can significantly improve administrative work efficiency. The standardized estimate of Leadership Support (LS) on Administrative Effectiveness (AE) is 0.196 ($p = 0.005$), implying that active support from the leadership can directly promote the efficiency improvement of digital technology in administrative work. The standardized estimate of Digital Technology Knowledge (DTK) on Administrative Effectiveness (AE) is 0.178 ($p = 0.011$), suggesting that administrative personnel's possession of more digital technology knowledge contributes to enhancing administrative work efficiency.

The standardized estimate of Behavioral Intention (BI) on Administrative Effectiveness (AE) is the highest, reaching 0.352 ($p < 0.001$), indicating that administrative personnel's intention to use is the strongest direct factor influencing administrative effectiveness. Strengthening the intention to apply digital technology can significantly improve administrative work efficiency. This model validates that Perceived Ease of Use, Perceived Usefulness, Leadership Support, and Digital Technology Knowledge can all promote the use intention of digital technology and administrative effectiveness through direct pathways.

Table 4.8 Results of Structural Equation Modeling

Path Relationship	Estimate	S.E.	C.R.	P	Standardized Estimate
BI <--- PEOU	0.191	0.070	2.735	0.006	0.232
BI <--- PU	0.354	0.127	2.790	0.005	0.270
BI <--- LS	0.198	0.071	2.789	0.005	0.231
BI <--- DTK	0.256	0.080	3.214	0.001	0.271
AE <--- PEOU	0.141	0.058	2.420	0.016	0.167
AE <--- PU	0.276	0.106	2.593	0.010	0.204
AE <--- LS	0.172	0.062	2.796	0.005	0.196

Path Relationship	Estimate	S.E.	C.R.	P	Standardized Estimate
AE <--- DTK	0.174	0.068	2.551	0.011	0.178
AE <--- BI	0.363	0.105	3.451	***	0.352

NOTE: * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$



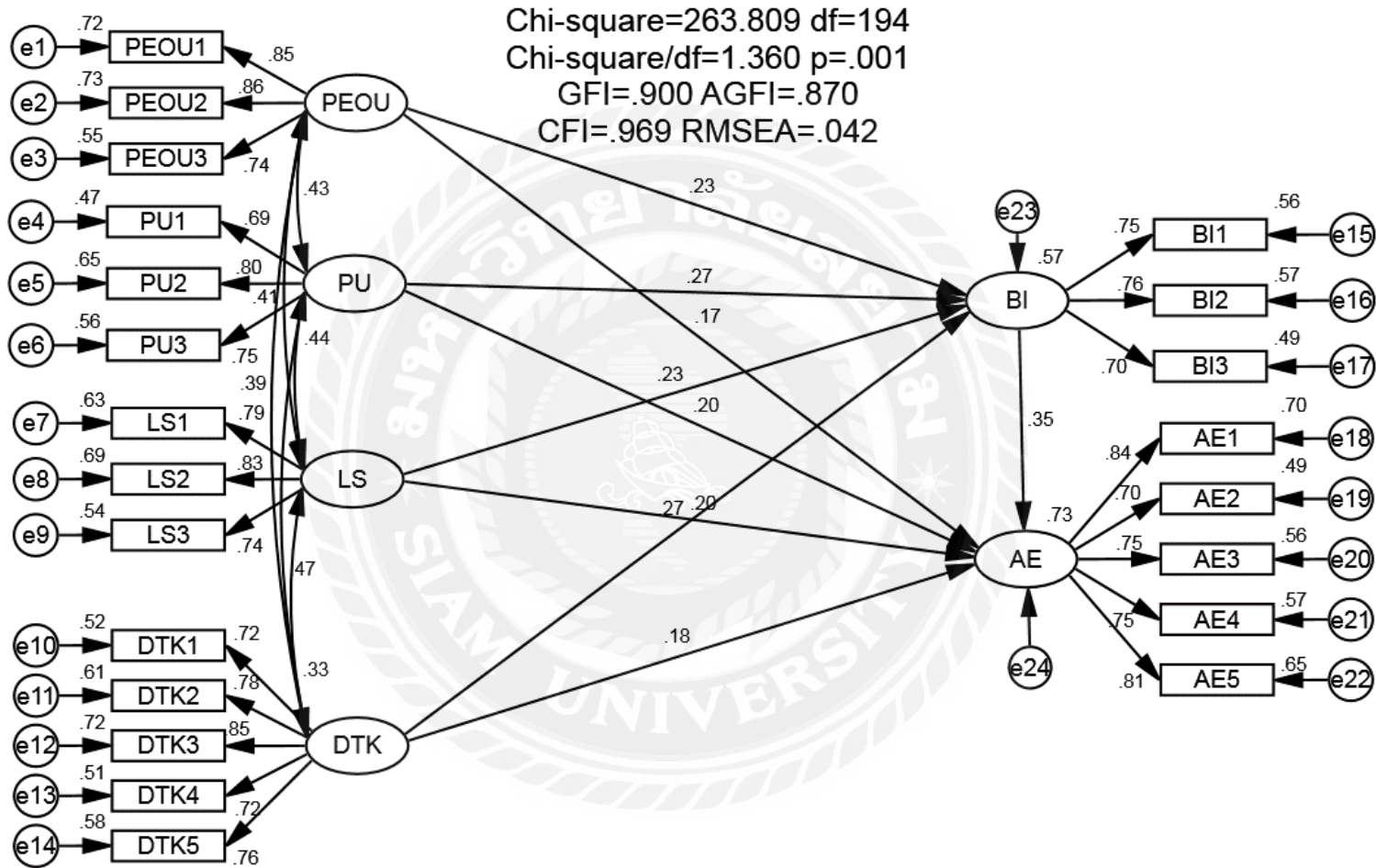


Figure 4.2 Modified Structural Equation Model

4.4.2 Mediation Effect Verification

To verify the mediating effects within the model, the Bootstrap method for mediating effect testing was employed to examine whether the mediating effects were significant. The moderated mediating effect test was conducted by Hayes' Bootstrap approach (Hayes, 2013). With a sample size of 202, under a 95% confidence interval, 5000 repeated samplings were carried out to test the mediating effect results.

The results of the mediating effect test indicate that Behavioral Intention (BI) plays a significant partial mediating role between Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Leadership Support (LS), Digital Technology Knowledge (DTK), and Administrative Effectiveness (AE). Moreover, the direct, indirect, and total effects have reached significant levels ($p < 0.05$ or $p < 0.01$).

In the path of Perceived Ease of Use (PEOU) → Behavioral Intention (BI) → Administrative Effectiveness (AE), the total effect of PEOU on AE is 0.248 ($p = 0.000$), with a direct effect of 0.167 ($p = 0.035$) and an indirect effect of 0.082 ($p = 0.004$). The indirect effect accounts for 33.1% of the total effect. This suggests that Perceived Ease of Use can directly enhance Administrative Effectiveness and improve it by strengthening administrative personnel's intention to use digital technology. The indirect effect accounts for one-third of the total effect, indicating that Behavioral Intention has a certain mediating role in this path.

In the path of Perceived Usefulness (PU) → Behavioral Intention (BI) → Administrative Effectiveness (AE), the total effect of PU on AE is 0.299 ($p = 0.000$), with a direct effect of 0.204 ($p = 0.008$) and an indirect effect of 0.095 ($p = 0.004$). The indirect effect accounts for 31.8% of the total effect. This implies that when administrative personnel perceive digital technology as practically helpful for their work, it can not only directly enhance Administrative Effectiveness but also further promote it by strengthening their intention to use digital technology. Behavioral Intention plays a relatively significant mediating role in this path.

In the path of Leadership Support (LS) → Behavioral Intention (BI) → Administrative Effectiveness (AE), the total effect of LS on AE is 0.277 ($p = 0.000$), with a direct effect of 0.196 ($p = 0.010$) and an indirect effect of 0.081 ($p = 0.010$). The indirect effect accounts for 29.2% of the total effect. This indicates that leadership support has a dual impact in promoting the application of digital technology. It can directly improve the efficiency of administrative personnel and indirectly enhance Administrative Effectiveness by strengthening their intention to use it. The indirect effect accounts for nearly 30% of the total effect, showing that Behavioral Intention has a strong mediating role in this path.

In the path of Digital Technology Knowledge (DTK) → Behavioral Intention (BI) → Administrative Effectiveness (AE), the total effect of DTK on AE is 0.273 ($p = 0.000$), with a direct effect of 0.178 ($p = 0.010$) and an indirect effect of 0.095 ($p = 0.002$). The indirect effect accounts for 34.8% of the total effect. This suggests that administrative personnel's mastery of digital technology can not only directly improve Administrative Effectiveness but also further promote it by strengthening their intention to use it. Behavioral Intention also plays a significant mediating role in this path, with the indirect effect accounting for a large proportion.

Perceived ease of use, perceived usefulness, leadership support, and digital technology knowledge can all have a positive impact on administrative effectiveness through the mediating path of behavioral intention. The proportion of the indirect effect in the total effect ranges from 29.2% to 34.8%, indicating that Behavioral Intention has a stable and significant mediating effect between the application of digital technology and Administrative Effectiveness. These results suggest that enhancing administrative personnel's intention to use digital technology is an important path to promote the effective implementation of digital technology and improve Administrative Effectiveness, emphasizing the necessity of focusing on enhancing users' subjective willingness to use it during the technology promotion process.



Table 4.9 Results of Behavioral Intention Indirect Effects Tests

Path Relationship	Effect	SE	Bias Corrected (95%)			Percentile method (95%)			%	
			LLCI	ULCI	P	LLCI	ULCI	P		
PEOU-BI-AE	Direct Effect	0.167	0.077	0.012	0.314	0.035	0.011	0.313	0.036	66.9%
	Indirect Effect	0.082	0.040	0.021	0.183	0.004	0.018	0.176	0.006	33.1%
	Total Effect	0.248	0.073	0.095	0.385	0.000	0.098	0.388	0.000	
PU-BI-AE	Direct Effect	0.204	0.076	0.055	0.355	0.008	0.049	0.350	0.009	68.2%
	Indirect Effect	0.095	0.043	0.028	0.199	0.004	0.024	0.191	0.006	31.8%
	Total Effect	0.299	0.074	0.149	0.442	0.000	0.150	0.443	0.000	
LS-BI-AE	Direct Effect	0.196	0.072	0.051	0.334	0.010	0.049	0.333	0.011	70.8%
	Indirect Effect	0.081	0.042	0.017	0.184	0.010	0.014	0.176	0.013	29.2%
	Total Effect	0.277	0.064	0.148	0.403	0.000	0.151	0.405	0.000	
DTK-BI-AE	Direct Effect	0.178	0.069	0.037	0.309	0.010	0.033	0.304	0.012	65.2%
	Indirect Effect	0.095	0.044	0.027	0.203	0.002	0.022	0.194	0.003	34.8%
	Total Effect	0.273	0.065	0.142	0.399	0.000	0.140	0.398	0.000	

Table 4.10 Hypotheses Test Results

Hypothesis	Result
H1: Perceived ease of use (PEOU) has a positive impact on behavioral intention (BI), that is, the easier the technology is to use, the more willing they are to use it.	Supported
H2: Perceived usefulness (PU) has a positive impact on behavioral intention (BI), that is, the more useful the technology is, the more they intend to use it.	Supported
H3: Leadership support (LS) has a positive impact on behavioral intention (BI), the higher the leadership support for the technology, the stronger the users are to use the technology.	Supported
H4: Digital technical knowledge (DTK) has a positive impact on behavioral intention (BI), that is, the higher the digital technical knowledge skills, the more willing the user is to use the technology.	Supported
H5: Perceived ease of use (PEOU) has a positive impact on administrative effectiveness (AE), that is, the easier the technology is to use, the greater its contribution to improving administrative effectiveness.	Supported
H6: Perceived usefulness (PU) has a positive impact on administrative effectiveness (AE), that is, the more useful the technology, the greater its contribution to improving administrative effectiveness.	Supported
H7: Leadership support (LS) has a positive impact on administrative effectiveness (AE), that is, the higher the level of leadership support for technology, the greater the contribution of technology to improving administrative effectiveness.	Supported
H8: Digital technical knowledge (DTK) has a positive impact on administrative effectiveness (AE), that is, the higher the digital technical knowledge and skills, the greater the contribution of technology to improve administrative effectiveness.	Supported
H9: Behavioral intention (BI) has a positive impact on administrative effectiveness (AE), that is, the higher the level of behavioral intention to adopt technology, that is, the greater the contribution of technology to improving administrative effectiveness.	Supported
H10: Behavioral intention (BI) mediates the relationship between perceived ease of use (PEOU) and administrative effectiveness (AE), that is, perceived ease of use (PEOU) affects administrative effectiveness by influencing behavioral intention (BI).	Supported
H11: Behavioral intention (BI) mediates the relationship between perceived usefulness (PU) and administrative effectiveness (AE), that is, perceived usefulness (PU) affects administrative effectiveness by influencing behavioral intention (BI).	Supported
H12: Behavioral intention (BI) mediates the relationship between leadership support (LS) and administrative effectiveness (AE), that is, leadership support (LS) affects administrative effectiveness by influencing behavioral intention (BI).	Supported
H13: Behavioral intention (BI) mediates the relationship between digital technical knowledge (DTK) and administrative effectiveness (AE), that is, digital technical knowledge (DTK) affects administrative effectiveness by influencing behavioral intention (BI).	Supported

The hypotheses regarding the relationships among variables were verified based on the research results, as shown in Table 4.10. An explanation for each hypothesis was provided by the results.

This study conducted an empirical analysis of the Technology Acceptance Model (TAM) and its applicability in enhancing administrative effectiveness and validated several key hypotheses. The findings indicate that the perceived ease of use of technology, perceived usefulness, leadership support, and digital technology knowledge all significantly influence users' behavioral intention (BI), which has a positive impact on administrative effectiveness (AE). Behavioral intention plays a mediating role in the relationship between the aforementioned variables and administrative effectiveness, further revealing the internal mechanisms of various factors in the technology adoption process.

The study confirms that both perceived ease of use (PEOU) and perceived usefulness (PU) have a significant positive impact on users' behavioral intention (H1, H2). This discovery suggests that when evaluating new technologies, users' perceptions of operational convenience and practical utility are the core factors determining their willingness to accept them. When users perceive a technology as easy to operate, they are inclined to try it out. When a technology is deemed capable of effectively enhancing work efficiency, users' willingness to adopt it increases significantly. Leadership support (LS) and digital technology knowledge (DTK) were found to have a positive effect on behavioral intention (H3, H4). The research revealed that organizational-level support, such as leadership recognition, resource investment, and training support, helps enhance administrators' trust in and willingness to use the technology. Users with a higher level of digital technology knowledge are more likely to understand and master new technologies, thus exhibiting a stronger willingness to use them. This result indicates that in the process of promoting technology application, both management support and administrators' technological literacy are non-negligible influencing factors.

When exploring the impact of technology acceptance on administrative effectiveness, the study found that both perceived ease of use and perceived usefulness can directly promote the improvement of administrative effectiveness (H5, H6). When a technology is easy to use and proves to be of practical value, the organization's administrative management became more efficient. Enhancements in leadership support and digital technology knowledge can also effectively drive improvements in administrative effectiveness (H7, H8). Behavioral intention plays a mediating role in the relationship between the above-mentioned factors and administrative effectiveness (H10 - H13). Perceived ease of use, perceived usefulness, leadership support, and digital technology knowledge promote the improvement of administrative effectiveness by enhancing users' behavioral intention. This finding indicates that users' acceptance of technology is a bridge in transforming technological advantages into actual performance. The study further validated the direct impact of behavioral intention on administrative effectiveness (H9). The results show that the stronger the behavioral intention, the more likely users are to adopt and actively use the technology, and the widespread application of technology was reflected in administrative effectiveness. This conclusion further solidifies the core position of behavioral intention in the technology acceptance process, suggesting that when organizations promote

technology applications, they should prioritize enhancing users' behavioral intention to ensure the smooth progress of technology adoption and its ultimate conversion into performance improvement.

4.5 Qualitative Data Analysis

4.5.1 Content Analysis

Based on the results of coding analysis conducted on the content of 8 discussions using NVivo14, the findings were organized and summarized according to five dimensions: Select Coding, Axial Coding, Open Coding, Reference Code Point, and Description, to form a systematic interview analysis table and an overview of the results. The results are presented in Table 4.11.



Table 4.11 Focus Group Text Analysis Category System

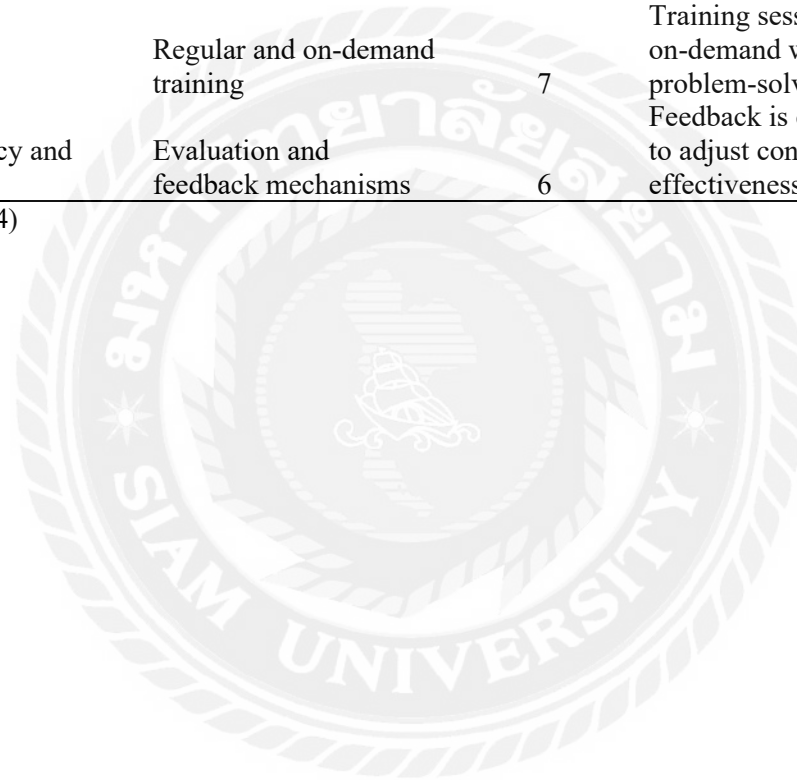
Select Coding	Axial Coding	Open Coding	Reference Code Point	Description
Perceived ease of Use (PEOU)	Impact of training on ease of use Major Difficulties in Use	Improvement of basic operation proficiency	8	Digital technology training has significantly improved proficiency in basic operations, especially in matters such as daily reimbursement, course management, and data analysis.
		Automated processes to simplify administrative affairs	6	Digital technology has realized automated flow, reduced manual intervention and enhanced the efficiency and accuracy of administrative work.
	Clarity of training content and need for improvement Impact of training on ease of use	Complexity of system operation	4	The data processing process involving multiple departments and dimensions is complicated, especially the problem of cumbersome operation in special funds and cross-departmental data verification.
		Lack of system compatibility	5	The poor compatibility of data interfaces between systems and the need to rely on manual checking affect the efficiency and accuracy of data flow.
	Major Difficulties in Use	Clarity of basic content, lack of guidance for complex scenarios	6	The current training focuses on basic operations, and there is insufficient guidance on the operation of complex finance, research fund management, and cross-system collaboration, which is in urgent need of improvement.
	Perceived usefulness (PU)	The contribution of digital technology to administrative effectiveness	Increased speed of approval	7
Data analysis to support decision-making			5	Data analysis tools help generate accurate financial and research performance reports, providing intuitive data support for management decision-making.

Select Coding	Axial Coding	Open Coding	Reference Code Point	Description
Leadership Support (LS)	Limitations of the usefulness of digital technology	Difficulty in managing specialized funds and cross-departmental management	4	For multi-departmental collaboration and special fund management, the current system is not flexible enough to adapt to complex administrative and financial scenarios.
		Difficulty in data security and privacy protection	3	Cross-departmental data sharing poses sensitive information security risks, and data rights management and security measures need to be strengthened.
	The role of leadership in facilitating digital technology	Policy and resource support	8	The leadership actively promotes digital transformation, provides policies, resources and technical support, and ensures that the construction and maintenance of the system are continuously guaranteed.
Digital Technical Knowledge (DTK)	Effect of leadership support on willingness to accept technology	Increased willingness to learn	6	Leadership's encouragement, policy guarantee and training investment have strengthened administrators' willingness to learn and use digital technology.
	Effect of training on digital knowledge enhancement	Good mastery of basic knowledge	7	Digital technology training has improved proficiency in the use of basic systems such as finance, research and school registration, and facilitated the transfer of knowledge to practical work.
	Need for knowledge deepening	Insufficient in complex business scenarios	5	There is a need to increase more hands-on case-based training covering in-depth learning content on complex financial scenarios, cross-departmental collaboration, and system upgrades.
Behavioral Intention (BI)	Willingness to use digital technology	Active use	6	The majority of respondents have a strong willingness to promote digital technology in their daily management, expecting it to further improve administrative effectiveness and management transparency.
	Motivation for self-initiated learning	Constrained by time and training resources	4	The willingness to learn on their own is limited by training resources and time and energy. If leaders increase their

Select Coding	Axial Coding	Open Coding	Reference Code Point	Description
Administrative Effectiveness (AE)	Performance of digital technology on administrative effectiveness	Speed up information processing	7	support, it will enhance administrators' initiative to learn digital technology. Through the digital platform, the processing speed and accuracy of financial reimbursement, scientific research data analysis, student registration management and other affairs have been significantly improved.
	Factors affecting administrative effectiveness	Insufficient system compatibility and user experience	6	The current digital technology has a lack of compatibility in complex business and cross-system collaboration, which affects the promotion of comprehensive digitization and the improvement of administrative effectiveness.
	Suggestions for improvement	Intensive training and system upgrades	5	It is recommended that thematic training be conducted on a regular basis, especially for pain points such as cross-system data sharing and complex business operation processes, so as to promote the in-depth integration of digital technology and administrative business.
Digital Technology Training Strategies (DTTS)	Training content and relevance	Coverage of core skills	8	Training includes core topics such as basic system operation, financial reimbursement, research data management, and use of communication platforms.
		Advanced scenario training	6	Case-based modules are introduced for complex scenarios such as cross-departmental collaboration, specialized fund management, and system troubleshooting.
	Training methods and delivery	Blended learning approach	7	Combines online interactive courses, offline workshops, and hands-on practice to cater to different learning preferences.
		Follow-up and continuous support	5	Post-training technical support and refresher courses are provided to consolidate skills and address new challenges.

Select Coding	Axial Coding	Open Coding	Reference Code Point	Description
		Regular and on-demand training	7	Training sessions are scheduled quarterly with additional on-demand workshops for urgent technology updates or problem-solving needs.
	Training frequency and consistency	Evaluation and feedback mechanisms	6	Feedback is collected after each training session and used to adjust content, pacing, and delivery to maximize effectiveness.

Source: The Researcher (2024)



4.5.2 Analysis of Qualitative Data

The focus group discussion results indicate that digital technology plays a significant role in enhancing the administrative effectiveness of private vocational colleges in Shandong Province. However, digital technology still faces numerous challenges and has room for improvement in its promotion and practical application. Through in-depth focus group discussion with eight middle - and high-level managers from different colleges who are in charge of various administrative fields, the analysis reveals that there exists a complex and close relationship among the perceived ease of use, perceived usefulness, leadership support, digital technology knowledge, and behavioral intention of digital technology. Moreover, these factors collectively influence the effect of digital technology on improving administrative effectiveness.

The focus group discussion results show that the promotion of digital technology has reached a relatively mature stage at the basic operational level. In daily affairs such as financial reimbursement, curriculum management, scientific research data analysis, and student record information maintenance, digital technology has significantly improved work efficiency and data accuracy. Several participants mentioned that the automated processes based on digital platforms have simplified a large number of cumbersome manual operations and accelerated information processing. Digital technology has become an indispensable tool in matters such as financial approval, student record management, and scientific research performance analysis. Despite the high convenience of basic operations, great difficulties still exist in handling complex businesses. In scenarios involving cross-departmental collaboration, special fund management, and scientific research project accounting, the lack of system compatibility and high operational complexity lead users to rely on manual intervention, making it difficult to achieve full automation. These technological limitations hinder the further improvement of administrative effectiveness, increase the operational burden on users, and weaken the actual effectiveness of digital technology.

Training plays a crucial role in enhancing the perceived ease of use and knowledge mastery of digital technology. Most participants believe that the existing digital technology training has effectively improved their mastery of basic functions and operational proficiency, helping administrators better adapt to the digital systems in daily administrative work. However, the training content is one-sided and limited. While there is sufficient training on simple business operations, there is a lack of in-depth training on complex, cross-system scenarios. In areas such as scientific research fund management, performance appraisal, and cross-departmental data integration, there is a lack of targeted practical guidance. Some respondents pointed out that although the training has helped them improve their basic technical knowledge, they still have to figure things out when encountering complex problems in actual work. Due to the complexity of system operations and the inadequacy of training resources, administrators are prone to resist when facing more challenging digital application scenarios. Therefore, improving the training content and enhancing guidance and technical support for complex scenarios have become key to improving the effectiveness of digital technology.

Leadership support has a significant driving role in digital technology. All participants mentioned that college leaders have provided sufficient support in terms of policy guarantees, capital investment, and resource allocation, creating the necessary environment and conditions for the promotion of digital technology. Through the active promotion of leaders, many colleges have established systematic digital platforms covering multiple areas such as administrative approval, financial management, and scientific research data analysis, ensuring the in-depth application of digital technology at all levels. Leadership policy support and positive incentives have increased administrators' willingness to accept and learn about digital technology. Some respondents clearly stated that without the support and policy guarantees from the leadership, their willingness to learn about digital technology would significantly decrease. Given the limited training time and the rapid pace of technological updates, continuous attention, and resource investment from leaders have become the core driving force for the effective implementation of digital technology.

The accumulation and deepening of digital technology knowledge have an impact on the improvement of administrative effectiveness. Participants generally believe that systematic training has improved their understanding and operational capabilities of digital technology. In areas such as data analysis, information retrieval, and automated processes, digital technology has significantly enhanced the refinement and scientific nature of administrative affairs. However, knowledge mastery is uneven. The existing training content mainly focuses on basic operations and lacks in-depth training on complex business scenarios. In areas such as cross-platform operations between the financial system and the human resources system, and multi-dimensional data management of scientific research performance, administrators still face knowledge blind spots. Since administrative work involves multi-departmental and multi-dimensional data collaboration, respondents generally hope to strengthen professional training for complex businesses. Systematic explanations based on actual cases and combined with specific business processes can more effectively integrate digital technology with daily work and improve work efficiency.

The participants also revealed the key role of behavioral intention in the application of digital technology. Most participants showed a willingness to actively use digital technology, believing that it helps improve work efficiency, reduce human errors, and enhance data transparency. In areas such as financial reimbursement, scientific research data management, and student information services, digital technology has become an irreplaceable tool. However, this positive willingness is constrained by training resources, time, and energy. Encourage administrators to learn spontaneously and enhance their technological adaptability, it depends on the organic combination of institutional incentives, training guarantees, and technical support to ensure the long-term effective application of digital technology.

The positive effect of digital technology on improving administrative effectiveness is evident, but system compatibility and user experience are still important factors restricting the improvement of efficiency. Participants generally believe that digital systems have increased information processing speed, simplified approval processes, and enhanced data integration capabilities. In areas such as scientific research data statistics, financial audits, and student affairs management, digital technology has significantly reduced the error rate of manual operations and saved a

great deal of time. However, the insufficient data interoperability between systems and the complexity of operation interfaces remain bottlenecks affecting the improvement of administrative effectiveness. In cross-departmental collaboration and special business processing, data sharing is hindered, and system integration is difficult, leading to limited work efficiency. Therefore, participants suggested further strengthening system upgrades and optimization, enhancing data compatibility and system interoperability, and providing specialized training for complex business scenarios to promote the deep integration of digital technology and administrative affairs and achieve an overall improvement in administrative effectiveness.

The Digital Technology Training Strategies (DTTS) in this study emphasize a systematic approach to enhancing the technical capabilities of administrative personnel in private colleges. The training content is designed to cover both core skills—such as basic system operations, financial reimbursement processing, research data management, and communication platform usage—and advanced scenario training that addresses complex situations like cross-departmental collaboration, specialized fund management, and system troubleshooting. A blended learning approach is adopted, integrating online interactive courses, offline workshops, and hands-on practice to meet diverse learning preferences. To ensure continuous skill development, post-training technical support and refresher sessions are provided, helping staff adapt to evolving technological requirements. Training frequency is maintained through quarterly sessions complemented by on-demand workshops to address urgent needs. Furthermore, feedback is collected after each training session and used to refine training content, pacing, and delivery, thereby ensuring the strategies remain relevant, practical, and effective in improving administrative effectiveness and supporting digital transformation. The validation of research outcomes was conducted through expert evaluation. Detailed validation procedures and results are presented in Appendix E.

CHAPTER 5

RESEARCH CONCLUSION, DISCUSSION AND RECOMMENDATION

This chapter summarizes the research's data analysis, presents conclusions and recommends strategies. It addresses the execution of the investigation results, gives recommendations for private colleges in Shan Dong province, and proposes future study areas based on the research findings. This chapter is further divided into four sections as follows:

5.1 Research Conclusion

5.2 Discussion

5.3 Recommendation

5.4 Future Research

5.1 Research Conclusion

The study addressed the following four questions:

(1) What are the differences in perceived ease of use (PEOU) and perceived usefulness (PU) among administrators of different ages?

According to the focus group discussion, there are significant differences in the perceptions of perceived ease of use (PEOU) and perceived usefulness (PU) among interviewees. Perceived ease of use (PEOU) pertains to the operational simplicity of digital technology and the user-friendliness of the system. Interviewees mentioned that the ease of operation of digital tools, interface design, and technical support are crucial to their user experience. In administrative management and daily affairs, a streamlined operational process can reduce operational errors and enhance work efficiency. Perceived usefulness (PU) focuses on the practical benefits that digital technology can bring to administrative management. For private colleges, the perceived usefulness in improving work efficiency and optimizing resource management is of great importance. Several interviewees stated that digital technology can significantly enhance their work efficiency and provide decision-making support.

In the structural equation model, the average factor loadings for PEOU are 0.849 (PEOU1), 0.984 (PEOU2), and 0.953 (PEOU3), indicating that users have a high perception of operational simplicity. The factor loadings for PU are 0.685 (PU1), 0.804 (PU2), and 0.750 (PU3), showing that respondents have a relatively high recognition of the practical application benefits of digital technology in their work. The correlation between PEOU and PU is 0.366 ($p < 0.01$), suggesting a positive correlation between the two. However, they focus on different aspects. PEOU influences users' behavioral intention to use, while PU determines users' continuous support and practical application of digital technology.

The differences between PEOU and PU lie in the fact that PEOU emphasizes the convenience and learnability of technology, primarily affecting users' willingness to accept and use the technology. In contrast, PU focuses on the actual utility of

technology and work outcomes, determining whether users continued to use the technology. The two are interrelated but have different influencing factors and focuses. PEOU provides support for the initial acceptance of technology, while PU affects users' continuous use and further investment in the technology.

(2) What is the role of leadership support (LS) and digital technical knowledge (DTK) on behavioral intention (BI) for using digital technology?

Leadership support (LS) and digital technical knowledge (DTK) play significant roles in the behavioral intention (BI) to use digital technology. The interview results indicate that leadership support can enhance administrators' acceptance of and willingness to use digital technology. When leaders encourage and support digital transformation, administrators are willing to invest time and effort in learning new technologies. The positive attitude, resource allocation, and policy support from leaders can increase administrators' intention to use technology. Digital technical knowledge (DTK), on the other hand, influences administrators' behavioral intentions by improving their technical competence and self-confidence. The interviews show that administrators with a strong technical background tend to actively adopt and apply new technologies.

In the data analysis, the estimated path coefficient of the impact of leadership support on BI is 0.198 ($p < 0.01$), indicating that leadership support has a significant positive influence on the behavioral intention to use digital technology. The path coefficient of DTK on BI is 0.256 ($p < 0.01$), with a standardized estimate of 0.271, suggesting that digital technical knowledge plays an important role in promoting administrators' behavioral intention. Leadership support and digital technical knowledge significantly enhance administrators' behavioral intention by boosting their confidence and enthusiasm for digital technology, thereby promoting the practical application of digital technology.

(3) What is the mediating role of behavioral intention (BI) in the relationship between digital technical knowledge (DTK) and administrative effectiveness (AE)?

Behavioral intention (BI) plays a partial mediating role in the relations between digital technical knowledge (DTK) and administrative effectiveness (AE). Digital technical knowledge directly enhances administrative effectiveness, with a path coefficient of 0.178 ($p < 0.05$). However, strengthening administrators' behavioral intentions further amplifies its impact on administrative effectiveness. The indirect effect is 0.095, accounting for approximately 34.8% of the total effect ($p < 0.01$). This indicates that digital technical knowledge directly improves administrative effectiveness and further promotes the efficiency and quality of administrative work by enhancing administrators' intention to adopt and use digital technology.

(4) How does digital technical knowledge (DTK) of administrators of different ages affect administrative effectiveness (AE)?

There are significant differences in the relationship between administrators' acceptance of digital technical knowledge (DTK) and administrative effectiveness (AE) across different age groups. The 30 - 39 age group has the highest acceptance of digital technical knowledge and can use digital technology actively, thereby enhancing administrative effectiveness. The total effect of DTK on AE is 0.273 ($p < 0.001$). The

40 - 49 age group, although possessing a certain level of digital technical knowledge, relies on leadership support and systematic training, demonstrating strong adaptability, with an indirect effect accounting for 34.8%. The 50 - and - above age group has a relatively low acceptance of digital technology, mainly relying on institutional norms and simplified processes, and has a weaker effect on improving administrative effectiveness. Therefore, the younger the age, the higher the acceptance of digital technical knowledge and the more significant the positive impact on administrative effectiveness. Conversely, as age increases, both the acceptance of digital technical knowledge and the improvement in administrative effectiveness show a decreasing trend.

(5) How can digital technology training strategies be formulated to effectively improve the administrative effectiveness of private colleges in Shandong Province?

To effectively formulate digital technology training strategies that improve administrative effectiveness in private colleges in Shandong Province, this study concludes that training programs should be systematic and modular, covering both basic operations and complex business scenarios. A blended learning approach combining online and offline methods ensures broad coverage and practical skill development. Training frequency should balance regular sessions with on-demand refreshers. Comprehensive evaluation and feedback mechanisms are essential for continuous improvement. Moreover, strong leadership support and incentive systems foster proactive learning and technology adoption. Implementing these strategies significantly enhances administrative staff's digital capabilities, streamlines workflows, and improves overall administrative effectiveness.

5.2 Discussion

Based on the research findings in Chapter 4, an analysis of the survey data from all private higher vocational colleges in Shandong Province has led to the proposal of recommendations for improving the digital technology used to enhance administrative effectiveness in private colleges in Shandong.

PEOU in this study primarily influences users' initial acceptance and willingness to engage with digital systems. Extensive empirical research has established that ease of use reduces cognitive effort and uncertainty, thereby lowering resistance to new technologies. Recent studies further emphasize that user-friendly system design and accessible technical support are particularly critical in organizational contexts where users are not technology specialists (Lunardi et al., 2019; AlNuaimi et al., 2022). The present findings reinforce this view by showing that administrative staff evaluate digital technologies first through an operational lens, focusing on whether systems are intuitive, stable, and supported by timely assistance.

However, this study extended existing research by demonstrating that PEOU functions largely as a prerequisite rather than a decisive determinant of sustained usage. While ease of use encourages experimentation and early adoption, it does not by itself guarantee continued use. This observation aligns with the arguments of Slater and Narver (2022), who contend that in performance-oriented organizational environments, usability must translate into tangible outcomes to remain relevant. Thus, PEOU operates as an enabling condition that allows users to experience the system, but its influence diminishes once basic operational competence is achieved.

PU emerges as the dominant factor shaping administrators' long-term behavioral intention. This finding is consistent with a substantial body of research indicating that perceived usefulness is a stronger predictor of continued technology use than perceived ease of use, particularly in professional and task-oriented settings (Zucker et al., 2022; Chu & Majumdar, 2022). Administrators in private colleges tend to evaluate digital technologies instrumentally, prioritizing improvements in efficiency, transparency, and decision support. Similar conclusions have been drawn in recent studies of digital transformation in educational and public-sector organizations, which highlight that users are more likely to internalize and promote technologies that demonstrably enhance work outcomes (Reis et al., 2023; AlNuaimi et al., 2022).

Prior research suggests that when the benefits of technology use are observable and directly linked to job performance, users develop stronger positive attitudes and behavioral intentions (Lunardi et al., 2019; Zucker et al., 2022). This finding extends TAM by illustrating that usefulness perceptions are not purely cognitive evaluations but are shaped by organizational workflows and performance accountability mechanisms, which are particularly salient in private colleges.

While TAM traditionally treats PEOU as an antecedent of PU, the present findings suggest a more dynamic interplay. An overly complex system may prevent users from fully realizing its potential usefulness, thereby weakening PU perceptions, whereas strong perceived usefulness may motivate users to tolerate moderate usability challenges. This interaction has been increasingly acknowledged in recent TAM extensions and digital transformation studies, which argue for a more holistic understanding of user perceptions (Chu & Majumdar, 2022; Slater & Narver, 2022).

Compared with public institutions, private colleges often operate under greater pressure to demonstrate operational effectiveness, making administrators more sensitive to the actual performance impact of digital tools. This contextual sensitivity supports recent arguments that technology acceptance models must be interpreted through organizational and institutional lenses rather than applied uniformly across contexts (Reis et al., 2023; Zucker et al., 2022).

The findings related to Research Question 2 underscore the joint and differentiated roles of leadership support (LS) and digital technical knowledge (DTK) in shaping administrators' behavioral intention (BI) toward the use of digital technology. Rather than operating as isolated predictors, LS and DTK function as organizational and individual-level drivers, respectively, reflecting the multi-level nature of digital technology adoption in private college administration. From a theoretical perspective, the significant role of leadership support aligns with and extends the Technology Acceptance Model (TAM) by incorporating organizational context as a critical external facilitating condition (Lunardi et al., 2019; Reis et al., 2023). The present findings reinforce this argument by demonstrating that leadership support serves as a symbolic and instrumental signal that legitimizes digital technology use within the organization.

In private college settings, leadership support carries particular weight due to hierarchical governance structures and strong top-down management traditions. Leaders act not only as decision-makers but also as role models who shape organizational norms and priorities. When leaders actively endorse digital initiatives, allocate resources, and participate in technology-related decision-making,

administrators are more likely to interpret digital transformation as an organizational priority rather than a temporary or optional task. This interpretation reduces psychological resistance and enhances trust in the long-term value of digital systems, consistent with prior research emphasizing leadership's role in fostering technology-oriented organizational cultures (AlNuaimi et al., 2022).

This finding is consistent with the Knowledge - Attitude - Behavior (KAB) model, which posits that individuals' knowledge structures shape attitudes and subsequently guide behavioral intentions. Empirical studies in digital adoption contexts similarly report that users with higher technological competence are more proactive, exploratory, and resilient in the face of system changes (Chu & Majumdar, 2022; Zucker et al., 2022). This internalization strengthens intrinsic motivation and encourages not only use but also advocacy of digital systems, echoing recent findings in organizational digital capability research (Slater & Narver, 2022).

Leadership support can partially offset deficiencies in administrators' technical knowledge by providing structured training, peer learning opportunities, and psychological safety for experimentation. This compensatory mechanism is particularly important for administrators with lower initial DTK, as leadership encouragement reduces fear of failure and learning-related stress, facilitating gradual capability development (Widyanti & Usman, 2019; Azman & Vaicondam, 2020).

Recognition, autonomy, and strategic encouragement from leaders enhance these administrators' willingness to assume informal leadership roles, such as technology champions or peer mentors. This dynamic accelerates internal knowledge diffusion and promotes bottom-up digital innovation, consistent with research on distributed leadership and digital transformation (Arayankalam et al., 2021; Reis et al., 2023).

In such environments, digital transformation is not solely a technical upgrade but a socio-organizational process requiring alignment between leadership vision and individual capability. The dual influence of LS and DTK suggests that successful digital adoption depends on both top-down institutional support and bottom-up cognitive readiness, reinforcing calls for integrated multi-level models of technology acceptance (Chu & Majumdar, 2022; Zucker et al., 2022).

The partial mediating role of behavioral intention (BI) in the relationship between digital technical knowledge (DTK) and administrative effectiveness (AE). The research findings unveil the underlying mechanism by which digital technical knowledge indirectly enhances administrative effectiveness by influencing administrators' willingness to adopt technology. The findings of Research Question 3 reveal that behavioral intention (BI) plays a partial mediating role in the relationship between digital technical knowledge (DTK) and administrative effectiveness (AE). This result provides important theoretical insight into the mechanism through which individual-level technological competence is translated into organizational-level performance outcomes. Rather than exerting a purely direct influence, DTK enhances administrative effectiveness largely through shaping administrators' psychological readiness and willingness to engage with digital technologies.

Although TAM was originally developed to explain technology usage behavior rather than performance outcomes, subsequent studies have extended its applicability by linking behavioral intention to task efficiency and organizational effectiveness

(Lunardi et al., 2019; Chu & Majumdar, 2022). The present study advances this line of research by empirically demonstrating that behavioral intention serves as a key transmission mechanism through which digital technical knowledge contributes to administrative effectiveness in private college settings.

Digital technical knowledge provides administrators with the cognitive foundation necessary to understand system logic, interpret digital outputs, and troubleshoot operational problems. Prior research suggests that individuals with higher levels of technological knowledge exhibit greater self-efficacy, lower technology-related anxiety, and stronger perceptions of control, all of which are conducive to technology acceptance (Zucker et al., 2022; Slater & Narver, 2022). However, this study confirms that knowledge alone does not automatically translate into performance improvement. Without a corresponding intention to use digital systems, technical knowledge remains underutilized and fails to generate tangible administrative benefits.

The mediating role of behavioral intention underscores the importance of psychological activation in the knowledge - performance relationship. Consistent with the Knowledge - Attitude - Behavior (KAB) framework, knowledge influences behavior indirectly by shaping attitudes and intentions, which then guide actual actions. Empirical studies in organizational digitalization contexts similarly indicate that employees' technological competence must be accompanied by positive usage intentions to produce meaningful improvements in work efficiency and process optimization (Reis et al., 2023; AlNuaimi et al., 2022). The present findings extend this logic by situating behavioral intention as the pivotal link between DTK and AE.

Qualitative evidence from the focus group discussion further reinforces the validity of this mediating mechanism. Administrators with strong digital technical knowledge tended to exhibit proactive usage behaviors, integrating digital tools into routine administrative tasks and actively exploring system functionalities. This behavioral engagement led to streamlined workflows, faster information processing, and improved accuracy in administrative decision-making. In contrast, administrators who possessed basic technical knowledge but lacked strong usage intentions often reverted to traditional manual practices, resulting in limited gains in administrative effectiveness. These observations echo prior research emphasizing that technology-related performance gains depend more on usage intensity and depth than on mere access or training exposure (Chu & Majumdar, 2022; Zucker et al., 2022).

The partial nature of the mediation effect is also theoretically meaningful. While behavioral intention accounts for a substantial portion of the impact of DTK on AE, the remaining direct effect suggests that digital technical knowledge may also influence administrative effectiveness through other pathways, such as problem-solving efficiency, informal technical support to colleagues, or improved communication with technical departments. This finding is consistent with recent studies that advocate for multi-path models of digital capability and performance, recognizing that knowledge can exert both direct and indirect effects on organizational outcomes (Slater & Narver, 2022; Reis et al., 2023).

Administrators are unlikely to invest effort in adopting digital systems unless they perceive clear personal and organizational benefits. Behavioral intention thus functions as a motivational filter that determines whether digital technical knowledge is

mobilized in daily administrative practice. This insight supports calls for integrating motivational and cultural factors into digital transformation strategies in educational organizations (AlNuaimi et al., 2022; Lunardi et al., 2019).

The findings reveal that administrators' acceptance of digital technical knowledge (DTK) varies significantly across age groups, and these differences substantially influence administrative effectiveness (AE). This result highlights the existence of age-related disparities in technological adaptability and performance outcomes during the digital transformation of higher education institutions.

Administrators aged 30 – 39 demonstrate the highest level of acceptance of digital technical knowledge and the strongest positive relationship between DTK and administrative effectiveness. This group tends to be more open to technological innovation, possesses stronger self-directed learning abilities, and shows a higher intrinsic motivation to adopt digital tools. These characteristics enable them to rapidly acquire digital technical knowledge and flexibly apply it to administrative tasks, resulting in notable improvements in work efficiency. This finding is consistent with prior studies suggesting that younger and early-career professionals exhibit greater digital fluency and learning agility, which enhances their ability to leverage technology for performance improvement (Lunardi et al., 2019; Zucker et al., 2022).

The 40 – 49 age group shows a moderate level of acceptance of digital technical knowledge. Although administrators in this cohort generally possess basic digital competencies and demonstrate reasonable adaptability, their technology adoption behavior relies more heavily on external support mechanisms such as leadership encouragement, formal training programs, and institutional mandates. Compared with younger administrators, they are less inclined toward autonomous exploration of new digital tools. As a result, the positive impact of DTK on administrative effectiveness, while still significant, is relatively weaker. Nevertheless, the mediation analysis indicates that behavioral intention accounts for a substantial indirect effect (34.8%) in this group, suggesting that digital technical knowledge enhances administrative effectiveness mainly by shaping willingness to use technology rather than through direct application. This finding aligns with previous research emphasizing the importance of organizational support and motivational factors for mid-career employees' technology acceptance (Chu & Majumdar, 2022; Slater & Narver, 2022).

Administrators aged 50 and above exhibit the lowest acceptance of digital technical knowledge and the weakest relationship between DTK and administrative effectiveness. This group tends to display higher levels of technological resistance and lower motivation to acquire new digital skills. While they can rely on standardized procedures, simplified digital functions, and institutional norms to complete routine administrative tasks, such passive adoption limits the depth and effectiveness of technology use. Consequently, the potential of digital technical knowledge to enhance administrative effectiveness remains largely underutilized. This pattern reflects the well-documented phenomenon of age-related digital divide, where older employees often experience higher cognitive load, technology anxiety, and perceived complexity when interacting with digital systems (Reis et al., 2023; AlNuaimi et al., 2022).

The negative association between age and acceptance of digital technical knowledge observed in this study is consistent with technology acceptance and

cognitive aging theories. As age increases, individuals may face declining information-processing speed and greater apprehension toward rapidly evolving technologies, which reduces their confidence and willingness to engage in digital practices. In dynamic digital environments, older administrators typically require more time, personalized guidance, and continuous support to adapt to new work methods. In contrast, younger administrators are more likely to actively participate in digital transformation initiatives and translate digital technical knowledge into tangible administrative performance gains (Zucker et al., 2022; Lunardi et al., 2019).

These findings indicate that age plays a critical moderating role in the relationship between digital technical knowledge and administrative effectiveness. Younger administrators demonstrate higher levels of technological acceptance, self-motivation, and adaptability, enabling them to fully exploit digital technical knowledge. Middle-aged administrators benefit from DTK primarily through enhanced behavioral intention under supportive organizational conditions, while older administrators rely more on external structures and simplified processes, resulting in diminishing efficiency gains during digital transformation.

Effective digital technology training strategies for private colleges in Shandong Province should adopt a systematic and modular approach that covers both basic skills and complex administrative scenarios. Utilizing a blended learning model—combining online courses, offline workshops, and hands-on practice—ensures diverse learning needs are met and knowledge is effectively transferred. Training should be conducted regularly with additional on-demand sessions to address urgent needs, supported by continuous evaluation and feedback mechanisms to optimize content and delivery. Moreover, strong leadership support and appropriate incentives are essential to encourage active participation and application of digital skills among administrative staff. Providing ongoing technical assistance and refresher training helps sustain skill levels and address emerging challenges. By addressing practical constraints such as time limitations and system compatibility, these well-rounded strategies can significantly enhance administrative effectiveness and promote the successful digital transformation of private colleges.

This study makes important theoretical contributions to the literature on technology acceptance and digital governance in higher education. By extending the Technology Acceptance Model, this research incorporates leadership support and digital technical knowledge as key antecedents of behavioral intention, thereby enhancing the explanatory power of TAM in organizational and training contexts. This extension responds to recent scholarly calls to move beyond individual cognitive perceptions and to integrate organizational and knowledge-based factors into technology acceptance research. In addition, the study deepens the theoretical understanding of the mediating role of behavioral intention by empirically demonstrating how digital technical knowledge influences administrative effectiveness through behavioral intention. This finding clarifies the internal mechanism linking knowledge, intention, and performance, and highlights behavioral intention as a crucial bridge between individual capabilities and organizational outcomes. Moreover, by focusing on administrative staff in private higher vocational colleges, the study contributes to the digital governance literature by extending technology acceptance theory to an underexplored institutional context characterized by constrained resources, diverse age structures, and varying levels of

digital maturity, thereby enhancing the contextual relevance and theoretical generalizability of existing technology adoption frameworks.

5.3 Recommendation

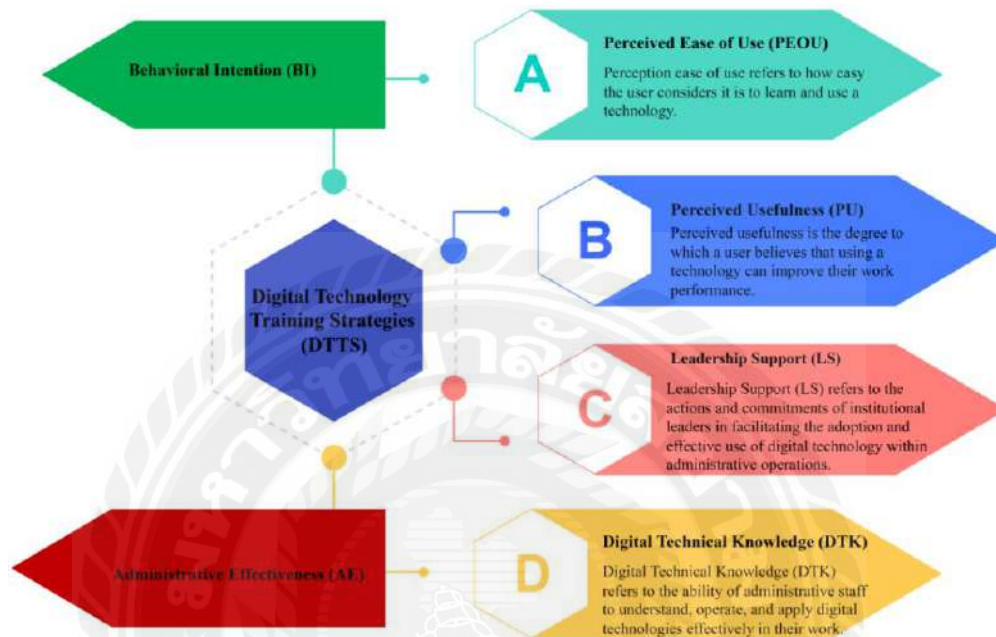


Figure 5.1 Training Strategy Model on Digital Technology of Administrative Effectiveness for Private Colleges

Based on the empirical findings of this study, the proposed recommendations are developed in alignment with the identified partial mediation mechanism. In addition to enhancing behavioral intention through training, direct investments in administrators' digital technical competence are equally critical, as digital technical knowledge not only shapes behavioral intention but also exerts a direct and independent effect on administrative effectiveness. Accordingly, the following recommendations address both the motivational and capability-based pathways through which digital technology contributes to administrative effectiveness.

The training strategy model on digital technology for administrative effectiveness in private colleges illustrates how four key factors—Perceived Ease of Use (PEOU), Perceived Usefulness (PU), Leadership Support (LS), and Digital Technical Knowledge (DTK)—interact through Behavioral Intention (BI) to influence Administrative Effectiveness (AE). Specifically, positive perceptions of technology's ease of use and usefulness, combined with strong leadership support and enhanced technical skills, significantly strengthen administrators' behavioral intention to adopt digital technology. This heightened intention promotes actual technology utilization, thereby improving administrative effectiveness. The model further emphasizes a comprehensive training approach that integrates foundational operational skills with complex, scenario-based competencies, delivered through blended online and offline

methods and supported by continuous technical assistance and feedback mechanisms. Leadership support plays a dual role by directly enhancing administrative effectiveness and indirectly facilitating technology adoption through reinforcing behavioral intention, thereby enabling the deep integration of digital technology into private college administration.

5.3.1 Enhancing the Ease of Use and Practical Application Value of Digital Technology

Private colleges and universities should prioritize enhancing the ease of use of digital technology and ensuring the manifestation of its practical application value. Based on the research findings, perceived ease of use (PEOU) and perceived usefulness (PU) play pivotal roles in influencing administrators' technology adoption intentions. Colleges and universities ought to optimize the user interface design and operational processes of digital tools to ensure their simplicity and operability. Moreover, they should highlight the benefits of digital technology in administrative management, such as improving work efficiency and optimizing resource allocation, thereby further strengthening administrators' sense of identification and acceptance of the technology. During this process, the IT department should regularly collect administrator feedback, conduct user experience improvements, and enhance administrators' understanding and application of the technology through training, thus strengthening their perception of the practical utility of digital technology.

5.3.2 Strengthening Leadership Support to Promote Digital Technology Adoption

Leadership support serves as a crucial driving force for digital technology adoption. Research indicates that leadership support significantly influences administrators' behavioral intentions (BI). Therefore, college leaders should play a pivotal role in actively promoting digital transformation. In practical operations, leaders should provide administrators with necessary resource support, policy guarantees, and training opportunities, and enhance administrators' learning motivation through incentive measures. Leaders should demonstrate a supportive attitude to ensure the efficient implementation of relevant technical training to help administrators understand the value and application of the technology. Colleges and universities should establish a digital technology promotion team to ensure that leaders' commitments to digital transformation are effectively implemented, thereby enhancing the adoption willingness of the entire staff.

5.3.3 Improving Administrators' Digital Technical Knowledge and Enhancing Technological Self-Confidence

Digital technical knowledge (DTK) has a significant impact on administrators' behavioral intentions. Colleges and universities should intensify digital technology training for administrators to help them improve their technical capabilities and enhance their confidence in using new technologies. Colleges and universities should enhance administrators' mastery and application abilities of digital technology by organizing specialized training sessions, technical seminars, etc. For administrators with a weaker technical background, colleges, and universities should provide personalized training and support to help them better adapt to the digital transformation. Meanwhile, they should encourage experienced administrators to share their application experiences,

enhance the technological literacy of the entire team, and foster a favorable atmosphere for knowledge inheritance and sharing.

5.3.4 Optimizing the Incentive Mechanism for Behavioral Intentions

Behavioral intentions (BI) play an important mediating role between digital technical knowledge (DTK) and administrative effectiveness (AE). To stimulate behavioral intentions, schools should formulate effective incentive mechanisms to enhance administrators' participation and intentions to apply the technology. In addition to traditional salary incentives, schools can motivate administrators to learn and apply new technologies through means job promotions and skill certificates. Schools should design targeted incentive policies to encourage administrators to use digital tools in administrative work. This improved administrators' job satisfaction and enhance their enthusiasm and initiative during the transformation process, thereby promoting the improvement of administrative effectiveness.

5.3.5 Formulating Differentiated Training Strategies for Different Age Groups

According to the research findings, there are significant differences in the acceptance of digital technology among different age groups. When implementing digital transformation, colleges and universities should design differentiated training strategies based on the age characteristics of administrators. For administrators in the 30 - 39 age bracket, opportunities for self-directed learning should be provided to encourage them to explore and innovate ways of using the technology. This group is usually more open to new technologies and possesses strong learning abilities and technological adaptability. Therefore, schools can adopt more online learning and self-study platforms to offer flexible learning methods. For the 40 - 49 age group, emphasis should be placed on providing systematic training and external support. Practical application cases of new technologies should be introduced to help them better understand the value and usage methods of the technology. Meanwhile, leadership support should be provided during the technology adoption to encourage this group to participate in the digital transformation. For administrators aged 50 and above, training methods should be more flexible. Considering the lower acceptance of new technologies in this group, they can be helped to gradually adapt to the application of digital technology by simplifying operational processes, providing technical support, and strengthening institutional training. The training for this group should focus on practicality, helping them improve work efficiency through simplified operational steps.

5.3.6 Focusing on the Long-term Impact of Digital Technology Application on Administrative Effectiveness

Research indicates that digital technology has an immediate effect on administrative effectiveness and brings about significant improvements in long-term work efficiency and decision-making support. Therefore, colleges and universities should regard digital transformation as an integral part of their long-term development strategies, continuously evaluate and optimize the effects of technology application, and ensure its long-term value in administrative management. Schools should regularly conduct technology benefit assessments, and the feedback mechanism should be timely and effective to ensure the continuous optimization and enhancement of technology applications. Schools should also encourage administrators to share successful cases of

technology application, form best practices, and promote the popularization and application of digital technology in administrative management.

This study provides important practical guidance for the digital transformation of private colleges and universities. By enhancing the ease of use and usefulness of digital technology, strengthening leadership support, intensifying administrator training, optimizing incentive mechanisms, and formulating differentiated training strategies, colleges and universities can effectively promote the adoption of digital technology, improve administrative effectiveness, and thus drive the sustainable development and innovation of the schools.

5.4 Future Research

Future research should further expand and deepen in multiple dimensions to enhance the breadth and depth of the study. Although this research has explored the impact of digital technical knowledge, leadership support, perceived ease of use, and perceived usefulness on administrative effectiveness with private colleges and universities as the research object, the sample scope is relatively limited. In the future, the research can be extended to public universities, vocational colleges, and even other educational institutions to verify the universality of the influence of digital technical knowledge on administrative effectiveness.

Different types of organizations, such as government departments and enterprises, may exhibit variations in the relationship between technology adoption and administrative effectiveness during the digital transformation. Future studies can conduct comparative analyses of the applicability across different industries, regions, and organizational cultures to investigate how environmental factors moderate the relationships among variables.

This study focuses on the mediating effects of leadership support and behavioral intentions. However, other potential mediating and moderating variables, such as digital technology literacy, organizational learning capability, and cultural atmosphere, may also have a crucial impact on administrative effectiveness. Future research can further delve into these underlying mechanisms to reveal more comprehensive influence pathways.

With the continuous development of digital technology and the accelerated pace of updates in digital tools and systems, future research should incorporate longitudinal data to examine the long-term dynamic impact of digital technical knowledge on administrative effectiveness, thereby avoiding the limitation of cross-sectional studies in failing to capture changes over time.

There are clear patterns and tendencies in the acceptance and adaptability of digital technology among different age groups. Future research can further explore the moderating effects of individual characteristics such as age, gender, and job functions. It should conduct in-depth analyses of how these factors influence the adoption of digital technical knowledge and the improvement of administrative effectiveness, to formulate more targeted digital management strategies for different groups.

Future research should integrate qualitative and quantitative methods and carry out cross-validation with multiple data sources to enhance the reliability and explanatory power of the research conclusions. This further enriches the theoretical framework of the

relationship between digital technical knowledge and administrative effectiveness, providing more comprehensive theoretical foundations and empirical support for the digital management of colleges and universities as well as broader organizations.



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APPENDIX A: Questionnaire

A DEVELOPMENT OF TRAINING STRATEGY ON DIGITAL TECHNOLOGY OF ADMINISTRATIVE EFFECTIVENESS FOR PRIVATE COLLEGES IN SHAN DONG PROVINCE

1. Gender Male Female
2. Age 30-39 40-49 50 and above
3. Education
- Bachelor's degree Master degree
- PhD
4. Position
- Assistant Lecturer Lecturer
- Senior Lecturer Others
5. Tenure in current position (year)
- Less than/or equal to3 Between 4-6
- Between 7-10 11 and over

Questionnaire: A DEVELOPMENT OF TRAINING STRATEGY ON DIGITAL TECHNOLOGY OF ADMINISTRATIVE EFFECTIVENESS FOR PRIVATE COLLEGES IN SHAN DONG PROVINCE						
Perceived Usefulness (PU)						
Question	Option					Answer
1. I think using digital technology can improve my work efficiency.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
2. I think using digital technology can improve my decision-making quality.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
3. I think digital technology can improve the overall performance of our department.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	

Perceived Ease of Use (PEOU)						
Question	Option					Answer
4. I find it easy to learn how to use new digital technology.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
5. I think operating digital technology systems is simple.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
6. I find using digital technology does not require much effort.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
Leadership Support (LS)						
Question	Option					Answer
7. I think the leadership provides sufficient support for digital technology training.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
8. My leader encourages us to participate in digital technology training.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
9. My leader provides the necessary resources and support when I need help.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
Digital Technical Knowledge						
Question	Option					Answer
10. I have sufficient basic digital technical knowledge of digital technology.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
11. I know how to use common digital	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	

technology tools and software.						
12. I am aware of the latest developments and trends in digital technology.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
13.I have the of ability in solving technical problems of digital technology devices.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
14.I have the of ability in installing digital technology devices.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
Behavioral Intention (BI)						
Question	Option					Answer
15. I am willing to use more digital technology in my work.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
16. If given the opportunity, I would participate in more digital technology training.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
17. I plan to rely more on digital technology in my future work.	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
Administrative Effectiveness (AE) - Quantified by Key Performance Indicators (KPI)						
Question	Option					Answer
18. Using digital technology has improved my work efficiency (WE).	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
19. My decision-making quality (DQ) has improved after	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	

using digital technology.						
20. Digital technology has improved my communication and collaboration (CAC) with colleagues .	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
21. I frequently use digital technology in my daily work (TUF).	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
22. My ability to apply digital technology has improved (TAC).	1.Strongly disagree	2.Disagree	3.Generally	4.Agree	5.Strongly agree	
<p>Conclusion</p> <p>Thank you for participating in this survey. Your opinions and suggestions are very important to our research. If you have any further comments or suggestions, please feel free to contact us. Once again, thank you for your valuable time and support!</p>						
<p>Note: This questionnaire is primarily adapted from Davis's Technology Acceptance Model (TAM) and other relevant literature, including Chen & Wang (2017) and Sun (2021).</p>						

山东省民办高校行政效能数字化技术培训策略的制定

1. 性别 男 女2. 年龄 30-39 40-49 50 岁及以上

3. 学历

 学士 硕士 博士学位

4. 职位

 助理讲师 讲师 高级讲师 其他

5. 现职任期 (年)

 小于/等于3 4-6 之间 7-10之间 11 年及以上

问卷调查：山东省民办高校行政效能数字化技术培训策略的制定						
认知有用性 (PU)						
问题	选项					答案
1. 我认为使用数字技术可以提高我的工作效率。	1. 非常不同意	2. 不同意	3. 一般	4. 同意	5. 非常同意	
2. 我认为使用数字技术可以提高我的决策质量。	1. 非常不同意	2. 不同意	3. 一般	4. 同意	5. 非常同意	
3. 我认为数字技术可以提高我们部门的整体绩效。	1. 非常不同意	2. 不同意	3. 一般	4. 同意	5. 非常同意	
感知易用性 (PEOU)						
问题	选项					答案
4. 我觉得学习如何使用新的数字技术很容易。	1. 非常不同意	2. 不同意	3. 一般	4. 同意	5. 非常同意	
5. 我认为操作数字技术系统很简单。	1. 非常不同意	2. 不同意	3. 一般	4. 同意	5. 非常同意	
6. 我发现使用数字技术并不需要花费太多精力。	1. 非常不同意	2. 不同意	3. 一般	4. 同意	5. 非常同意	
领导支持 (LS)						
问题	选项					答案

7.我认为领导层为数字技术培训提供了足够的支持。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
8.我的领导鼓励我们参加数字技术培训。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
9.当我需要帮助时，我的领导会提供必要的资源和支持。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
数字技术知识						
问题	选项					答案
10.我有足够的数字技术基础知识。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
11.我知道如何使用常用的数字技术工具和软件。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
12.我了解数字技术的最新发展和趋势。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
13.我有能力解决数字技术设备的技术问题。	1.非常不同意	2.不同意	3.一般	4.基本同意	5.非常同意	
14.我有能力安装数字技术设备。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
行为意向 (BI)						
问题	选项					答案
15.我愿意在工作中使用更多数字技术。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
16.如果有机会，我会参加更多的数字技术培训。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
17.我计划在今后的工作中更多地依赖数字技术。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
行政效能 (AE) - 通过关键绩效指标 (KPI) 量化						
问题	选项					答案
18.使用数字技术提高了我的工作效率 (WE)。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
19.使用数字技术后，我的决策质量 (DQ) 有所提高。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
20.数字技术改善了我与同事的沟通与协作 (CAC)。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	

21.我在日常工作中经常使用数字技术（TUF）。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
22.我应用数字技术的能力有所提高（TAC）。	1.非常不同意	2.不同意	3.一般	4.同意	5.非常同意	
结论 感谢您参与本次调查。您的意见和建议对我们的研究非常重要。如果您有任何进一步的意见或建议，请随时联系我们。再次感谢您的宝贵时间和支持！						
注：本问卷主要改编自戴维斯的技术接受模型（TAM）及其他相关文献，包括 Chen & Wang (2017) 和 Sun (2021)。						



APPENDIX B: Interview Outline

Opening Questions

1. Please briefly introduce yourself, including your position and your use of digital technology in your daily work.
2. Have you ever participated in digital technology training? If so, what was your impression?

Section One: Perceived Ease of Use (PEOU) of Digital Technology

3. Do you think the current digital technology training has made it easier for you to use related tools? What specific help have you received?
4. What are the biggest difficulties you encountered in learning and using digital technology? Did these difficulties affect your acceptance and use of the technology?
5. Do you find the training content clear and easy to understand? What areas need improvement?

Section Two: Perceived Usability (PU) of Digital Technology

6. How much do you think digital technology has helped improve the efficiency of administrative work (such as approval, communication, information management, etc.)?
7. In which work scenarios do you think digital technology is most effective? Are there any scenarios where you find it less practical?
8. If training could help you better apply digital technology, would you be more willing to participate?

Section Three: Leadership Support (LS)

9. In your opinion, how supportive is leadership in promoting digital technology training and application? What are some specific manifestations of this support (such as policies, resources, encouragement, etc.)?
10. If leadership provided stronger support and promotion for digital technology, would this enhance your willingness to learn and use the technology?

Section Four: Digital Technology Knowledge (DTK)

11. Do you think the current training has helped you improve your knowledge of digital technology? What aspects were most helpful?
12. What do you think is most needed to enhance the technical knowledge of administrative personnel (such as more basic courses, more practical application cases, etc.)?

Section Five: Behavioral Intention (BI, Mediating Role in Digital Technology Acceptance)

13. Do you have the intention to apply the digital technology knowledge you have learned to your daily administrative work? What factors are influencing your intention (such as technology, training effectiveness, actual demand)?
14. If there were not enough training or leadership support, would you actively learn digital technology? Why?

Section Six: Impact on Administrative Effectiveness (AE)

15. Do you think the use of digital technology has significantly improved efficiency in your administrative work? Can you provide an example?
16. In your opinion, what aspects of current digital technology acceptance and training limit the improvement of administrative effectiveness? How can these issues be addressed?

Summary and Suggestions

17. Overall, what do you think is the most critical factor affecting the effectiveness of digital technology training and application?
18. If you were to design a digital technology training program, what issues would you most like to address?
19. What other factors do you think may affect the improvement of administrative effectiveness but have not been paid enough attention to?

访谈提纲

开放的问题

- 1.请简要介绍你自己，包括你的职位和你在日常工作中对数字技术的使用情况。
- 2.你参加过数字技术培训吗？如果有，你的印象如何？

第一部分：数字技术的感知易用性（PEOU）

- 3.您认为目前的数字技术培训是否使您更容易使用相关工具？你得到了什么具体的帮助？
- 4.你在学习和使用数字技术时遇到的最大困难是什么？这些困难是否影响了你对这项技术的接受和使用？
- 5.您觉得培训内容清晰易懂吗？哪些方面需要改进？

第二部分：数字技术的感知可用性（PU）

- 6.您认为数字技术在多大程度上帮助提高了行政工作（如审批、通信、信息管理）的效率？
- 7.你认为数字技术在哪些工作场景下最有效？有没有什么情况下你觉得它不太实用？
- 8.如果培训可以帮助你更好地应用数字技术，你会更愿意参与吗？

第三节：领导支持（LS）

- 9.在您看来，领导力在促进数字技术培训和应用方面有多大的支持作用？这种支持的具体表现（如政策、资源、鼓励等）是什么？
- 10.如果领导对数字技术提供了更强的支持和促进，这是否会增强你学习和使用该技术的意愿？

第四部分：数字技术知识（DTK）

- 11.你认为目前的培训帮助你提高了数字技术的知识吗？哪些方面最有帮助？
- 12.您认为提高行政人员的技术知识最需要有什么（如更多的基础课程、更多的实际应用案例等）？

第五部分：行为意向（BI，数字技术接受的中介作用）

- 13.你是否打算将所学到的数字技术知识应用到日常行政工作中？什么因素影响你的意向（如技术、培训效果、实际需求）？
- 14.如果没有足够的培训或领导支持，你会积极学习数字技术吗？为什么？

第六节：对行政效率的影响

- 15.你认为数码科技的运用是否显著提高了你的行政工作效率？
你能举个例子吗？
- 16.在您看来，目前的数字技术接受和培训有哪些方面限制了行政效率的提高？
如何解决这些问题？

总结与建议

- 17.总体而言，您认为影响数字技术培训和应用有效性的最关键因素是什么？
- 18.如果你要设计一个数字技术培训项目，你最想解决的问题是什么？
- 19.您认为还有哪些因素可能影响行政效率的提高，但没有得到足够的重视？



Focus Group Interview



Focus Group

Title of Study: A Development of Training Strategy on Digital Technology of Administrative Effectiveness for Private Colleges in Shan Dong Province

Principal Investigator: Bi Chunhui

Institution: Graduate School of Educational Administration, Siam University, Thailand

Contact Information: 399768215@qq.com

Participation and Procedures (Modified to Chinese Research Context).

Given the relational and cultural sensitivities inherent in Chinese academic and professional settings, most participants declined audio recording. Therefore, instead of conventional recordings, semi-structured online interviews were conducted via Tencent Meeting and documented in real time through detailed note-taking by the researcher. Therefore, instead of conventional recordings, semi-structured online interviews were conducted via Tencent Meeting and documented in real time through detailed note-taking by the researcher. These interviews were a rapport-building stage, helping participants become familiar with the study's goals and fostering mutual trust. These interviews were a rapport-building stage, helping participants become familiar with the study's goals and fostering mutual trust.

Following the interview sessions, participants were invited to complete a follow-up open-ended questionnaire delivered via email. It respected participants' privacy and comfort while promoting deeper, more thoughtful engagement with the research topic. It respected participants' privacy and comfort while promoting deeper, more thoughtful engagement with the research topic. All responses were treated with strict confidentiality, and no personally identifiable information was used in the analysis or reporting process.

Participant's Name: _____

Participant's Signature: _____

Date: _____

If you have any questions or concerns, please contact Bi Chunhui.

Thank you for your valuable contribution to this research.

Sincerely, Siam University

Vice President of Qilu Medical College

- Age: 40
- Gender: Male
- Position: Vice Principal, in charge of teaching and informatization
- Characteristics:
 - More than 10 years of experience in higher education management, familiar with the characteristics of vocational education.
 - Leading the digital teaching reform of the school, promoting the construction of smart campus, and excelling in coordinating various departments to promote the application of information technology.
 - Have a deeper understanding of the ease of use and practicality of digital technology, and focus on how digital technology can help improve teaching and administrative effectiveness.

1. Self-introduction

Hello, I am the vice president of Qilu College of Medicine, mainly responsible for teaching and information technology construction. I have more than 10 years of management experience in the field of higher education, and I am more familiar with the characteristics and needs of vocational education. In recent years, I have led the promotion of the school's digital teaching reform, including the construction of a smart campus, the introduction of a digital teaching platform, and the improvement of the administrative information system, in an effort to enhance the efficiency of teaching and administrative management. Digital technology occupies a large proportion of my daily work, such as the use of teaching management system, data analysis to assist decision-making, and online collaborative work with various departments.

2. Whether I have participated in digital technology training and my impression

Yes, I have participated in a number of digital technology trainings, mainly covering the use of smart campus systems, interpretation of education informatization policies, and the application of emerging technologies in teaching management. The overall impression is that these trainings help to improve the practical operation ability, but some trainings favor technology demonstration and lack the combination of specific business scenarios, which leads to the lack of applicability and relevance in practice.

Part I: Perceived Ease of Use (PEOU) of Digital Technology

3. Did the digital technology training enhance the ease of use, and what was the specific help?

The training did enhance my ability to use digital technology tools, especially helping with data management and process automation. For example, the operation process of student grade management and course scheduling in the Academic Affairs System has been significantly improved through the training by mastering faster batch processing and information export functions.

4. Major difficulties in learning and using digital technologies and their impact on technology acceptance

The biggest difficulty lies in the complexity of the system and the inconsistency of the operating logic, especially when working together on multiple platforms, the data interface is not smooth and the phenomenon of information silos is prominent, resulting in the inability to effectively flow information. These technical barriers will reduce the motivation to use, especially in a high-intensity work environment, if the system is cumbersome to operate, it is easy to cause delays in work and affect the acceptance of new technology.

5. Is the training content clear and easy to understand, and what aspects need to be improved?

Most of the training content is highly practical, but the explanation of technical principles and system logic is insufficient, making it difficult for non-technical staff to understand the working mechanism behind the system. It is suggested that future training can be combined with simulation exercises of specific business scenarios to increase the number of practical cases, especially in complex data processing and cross-system operations need to be further strengthened.

Part II: Perceived usefulness of digital technologies (PU)

6. The role and specific performance of digital technology on the improvement of administrative work efficiency

The enhancement of administrative work efficiency by digital technology is very obvious, especially in the areas of electronic approval process, information sharing and data analysis, which have brought about significant improvements. For example, the digital approval platform has increased the speed of official document flow by more than 30%, and the data analysis tools have helped us grasp the quality of teaching and students' performance more quickly, providing strong support for decision-making.

7. The most effective and impractical work scenarios of digital technology

The most effective scenarios include data summarization and analysis, administrative approvals, and information sharing. These tasks rely on the automated processing of digital platforms, which greatly reduces the time spent on manual operations. However, when it comes to ad hoc decision-making and cross-departmental communication, digital technology is not flexible enough. Especially when dealing with complex issues, the system is more restrictive, which in turn increases coordination costs.

8. Would you be willing to participate actively in the training if it can enhance your ability to apply digital technology?

I am very willing to participate if the training can be closer to actual work needs, especially for high-frequency usage scenarios and new technology updates. In particular, training that can help us break down data silos and enhance system compatibility can actually improve the convenience and efficiency of our daily work.

Part III: Leadership Support (LS)

9. The extent of leadership support for digital technology training and application and its specific performance

I think that school leaders hold a positive and supportive attitude towards the application of digital technology, which is specifically manifested in the three aspects of policy guidance, resource input, and performance assessment. For example, the school has set up special funds to promote the construction of the smart campus, explicitly required each department to implement information technology goals, and encouraged key personnel to participate in external training and share their experiences.

10. Does the willingness to learn and use digital technology increase if leaders give stronger support?

Yes, leadership support has a direct impact on the promotion and willingness to use digital technologies. If there is increased piloting and promotion of cutting-edge technologies, and more flexible support in terms of resources and time, I would be more willing to learn more and promote the practical application of technology in administration and teaching management.

Part IV: Digital Technology Knowledge (DTK)

11. Has the current training improved knowledge of digital technologies, and in which areas has it been most helpful?

The training has improved my operational proficiency with digital platforms, and was most helpful in particular in the areas of data analysis, systems integration, and information security. Through the training, I was able to understand the logic of the new system more quickly and apply it for decision support and efficiency improvement.

12. What is most needed to enhance the technical knowledge of administrative staff?

What is most needed is hands-on training that is highly targeted and highly integrated with actual business, especially practical scenarios such as complex data analysis, system interoperability, and intelligent decision support. In addition, basic introductory courses should be covered to help personnel with different skill levels get started as soon as possible.

Part V: Behavioral Intentions (BI, mediating factors of digital technology acceptance)

13. Is there a willingness to apply the digital technologies learned in daily administrative work and what are the influencing factors?

I have a strong willingness to integrate digital technologies into my daily administrative work, especially those that can enhance efficiency and streamline processes. Influencing factors mainly include the practicality of the technology, the effectiveness of training, and the stability of the system. If these aspects can be guaranteed, I am willing to apply and promote them continuously.

14. If there is a lack of training or leadership support, will you take the initiative to learn digital technology? Why?

I will still take the initiative to learn because digital technology is an inevitable trend to improve work efficiency. As a manager, it is my responsibility to master and promote new technologies. Although the lack of support will increase the cost of

learning, I will keep the technology up-to-date through self-study and industry exchanges.

Part VI: Impact on Administrative Effectiveness (AE)

15. Whether digital technology has significantly enhanced administrative effectiveness, with examples

Yes, for example, through the online approval system, the cross-departmental approval process which used to take a week to complete now takes only two days, which has greatly enhanced efficiency.

16. Factors limiting the current acceptance of and training in digital technology to enhance administrative effectiveness and suggestions for improvement

The limiting factors mainly include:

- High system complexity and unfriendliness to non-technical staff.
- The phenomenon of data silos and insufficient data sharing between different platforms.
- Single form of training, lack of interaction and practicability.

It is recommended to strengthen system integration, simplify the operation interface, design scenario-based practical training, and enhance collaboration among departments.

Summary and Recommendations

17. Key factors affecting the effectiveness of digital technology training and application

Leadership support, training quality, and technology ease of use are the three most critical factors, especially policy promotion and resource guarantee have a direct impact on the effect of technology implementation.

18. If the training course is designed, the most desired problem is solved.

It is hoped that the training can be combined with practical business needs, address cross-system collaboration and data analysis capability enhancement, and design tiered training programs for different positions.

19. Other under-attended factors affecting administrative effectiveness

Cultural and cognitive differences are ignored, and different departments have different acceptance of digital technology. It is recommended to strengthen cultural construction and consensus formation, and enhance the digital awareness of all staff.

Director of Academic Affairs Office, Qingdao Binhai College

- Age: 35
- Gender: Female
- Position: Director of Academic Affairs, in charge of curriculum management and digital resource development
- Characteristics:

- With 8 years of experience in academic affairs management, good at integrating teaching resources and promoting the integration of online and offline teaching.

- Experienced in the application of digital technology in course management and student registration management, focusing on the convenience and promotion of technology.

- Focus on the impact of leadership support on the successful implementation of digital projects, and understand the needs and pain points of the grassroots executive level.

1. Self-introduction

Hello, I am the Director of Academic Affairs at Qingdao Binhai College, responsible for curriculum management and digital resource construction. I have 8 years of experience in academic affairs management, and my main work includes course scheduling, teaching resources integration, student registration management, and promoting the integration of online and offline teaching. In my daily work, I often use the Academic Affairs Management System, online learning platform and data analysis tools to optimize teaching management and improve administrative effectiveness.

2. Whether I have participated in digital technology training and impression

Yes, I have participated in several digital technology trainings related to the optimization of the academic management system and the use of the new online teaching platform. Overall, these trainings have helped me improve my ability to apply digital tools. However, some of the trainings are more macroscopic in content and lack case analysis for specific business scenarios, which makes it still necessary to grope for the actual operation.

Part I: Perceived Ease of Use (PEOU) of Digital Technology

3. Did the digital technology training enhance the ease of use, and what was the specific help?

The training did enhance my ability to use digital technology tools, especially in data processing and resource allocation in the Instructional Management System. For example, while course adjustment and scheduling used to be done manually, the system is now able to automatically match teachers' availability, which has significantly reduced the workload.

4. Major difficulties in learning and using digital technologies and their impact on technology acceptance

The biggest difficulty lies in the complexity of the system's functions and the fact that some of the operating procedures are not intuitive enough and require a long time to familiarize with. In addition, there is poor data compatibility between different platforms. For example, there are problems in the data docking between the teaching affairs system and the online teaching platform, which requires manual format conversion and affects work efficiency. These factors will reduce users' acceptance of the technology, especially for administrators with a weak technical foundation, which may be intimidating.

5. Is the training content clear and easy to understand, and what areas need improvement?

Overall, the training content is biased towards technical demonstrations, with fewer practical sessions, and sometimes lacks customized content for specific business needs. It is suggested that future training can increase the number of operation drills and case studies, and provide solutions to common problems so that users can get started faster.

Part II: Perceived Practicality of Digital Technology (PU)

6. The role and specific performance of digital technology on administrative work efficiency enhancement

The enhancement of digital technology to academic administration is very obvious, especially in data processing, course scheduling, and teaching quality analysis. For example, it used to take two days to manually count the students' academic warning situation, but now, through the data analysis system, a visualization report can be generated with one click, which greatly improves the work efficiency.

7. The most effective and impractical working scenarios of digital technology

The most effective scenarios include curriculum management, student registration management, and teaching evaluation, which require a lot of data processing can be automated through the system to improve accuracy and efficiency. However, the system is not flexible enough for ad-hoc teaching arrangement adjustments and complex cross-departmental communication, and manual intervention is still required, which reduces the experience of using the system.

8. Willing to actively participate in the training if it can enhance the ability to apply digital technology?

We are willing to do so, especially for training that improves practical skills and solves the problem of cross-platform data integration. I will participate more actively if the training can help us make better use of existing systems and improve the efficiency of cross-departmental collaboration.

Part III: Leadership Support (LS)

9. Extent and specific performance of leadership support for digital technology training and application

I think the leadership support for digital technology is strong, and the school has invested some financial and policy support to promote digital teaching management. For example, the school encourages teachers to use online teaching tools and provides technical support, but there are insufficient resources and training at the grassroots level of implementation, resulting in some limitations in implementation.

10. Does the willingness to learn and use digital technology increase if leaders give stronger support?

Yes, leadership support has a decisive impact on the diffusion of digital technologies. Administrators and teachers will be more willing to learn and apply digital technology if leaders provide more resource support, create incentives, and optimize training programs.

Part IV: Digital Technology Knowledge (DTK)

11. Has the current training improved digital technology knowledge, and what aspects have been most helpful?

The training has enhanced my technological knowledge, especially in the areas of data management and the application of online teaching and learning platforms. For example, I can now manage course resources more efficiently, analyze student learning, and optimize teaching schedules.

12. What are the most important needs for improving administrators' technical knowledge?

What is most needed is targeted and easy-to-understand hands-on training, especially on data management, system integration, and intelligent teaching and learning. In addition, it is recommended that ongoing online learning resources be made available for easy access by executives at any time.

Part V: Behavioral Intentions (BI, mediators of digital technology acceptance)

13. Is there a willingness to apply the digital technologies learned in daily administrative work and what are the influencing factors?

Yes, I am very willing to do so because digital technology can significantly improve efficiency and reduce repetitive tasks. The influencing factors include the ease of use of the system, the practicality of training, and the interoperability of data. If these issues can be optimized, I will apply digital technology more actively.

14. If there is a lack of training or leadership support, would one take the initiative to learn digital technologies? Why?

I will still take the initiative to learn because digital management is the future trend and I will fall behind if I don't learn. However, without training or support, self-learning is more costly and may lead to less efficient use.

Part VI: Impact on Administrative Effectiveness (AE)

15. Whether digital technology has significantly enhanced administrative effectiveness, with examples

Yes, for example, automated course scheduling through the Academic Affairs Management System (AAMS), which used to require manual adjustment of scheduling conflicts, the system can now automatically match the optimal solution, reducing the manual workload by more than 50%.

16. Factors Limiting Administrative Effectiveness Enhancement in Current Digital Technology Acceptance and Training and Suggestions for Improvement

Major constraints include:

- The training content is not targeted enough to accurately solve daily work problems.
- Difficulty in cross-system data integration, affecting information flow.
- Some systems are complicated to operate, with a high threshold for use, and unfriendly to non-technical personnel.

It is recommended to optimize the training method, strengthen case teaching and practical exercises, and at the same time improve the data compatibility between different systems and reduce manual conversion work.

Summary and Recommendations

17. Key factors affecting the effectiveness of digital technology training and application

The ease of use of the system, the relevance of training, and the strength of leadership support are key factors affecting the effectiveness of the application of digital technology. , especially hands-on training, determines whether users can really master the technology.

18. If the training course is designed, the most desired problem will be solved.

It is hoped that the training will be combined with practical business needs, focusing on issues such as cross-system data sharing, intelligent teaching management, and automation of complex tasks, as well as providing long-term technical support.

19. Other under-attended factors affecting administrative effectiveness

The adaptability and technology acceptance of personnel are often overlooked. Administrators of different ages and technical backgrounds have different levels of acceptance of digital technology, and there is a need to provide tiered training so that personnel at every level can find a learning style that suits them.

Director of Personnel Department, Weifang Institute of Science and Technology

- Age: 45

- Gender: Male

- Position: Director of Personnel Office, in charge of faculty and HRMIS construction

- Characteristics:

- More than 10 years of experience in human resource management, leading the reform of talent information management in schools.

- Focus on the improvement of personnel management efficiency by digital technology, familiar with the application and promotion of E-HR system.

- Comprehensive understanding of digital technology knowledge, emphasizing the importance of technical training and policy support.

1. Self-introduction

Hello, I am the Director of Personnel Department of Weifang Institute of Science and Technology (WIST), mainly responsible for the planning and implementation of faculty construction and human resource management information system (E-HR system). I have been engaged in human resource management for more than 10 years, and I have accumulated rich experience in talent recruitment, assessment and evaluation, title evaluation, etc. In recent years, I have led the reform of school talent information management. Currently, I am concerned about how digital technology can enhance the

efficiency of personnel management and promote the application of E-HR system in recruitment, performance, compensation, contract management and other aspects. I believe that systematic digital technology training and leadership policy support are crucial to promote the effective implementation of digital technology.

2. Whether I have participated in digital technology training and impression

Yes, I have participated in a number of trainings related to the E-HR system, digital records management, and so on. The overall impression is that the trainings are helpful for basic operation and understanding of system functions, especially in the areas of personnel information entry, administrator data statistics and automated appraisal to enhance work efficiency. However, there are also shortcomings, especially less training on in-depth application and cross-departmental collaboration, lack of systematic explanation on some complex processes such as multi-system data sharing and personalized report generation, and the actual operation still needs to rely on self-study and technical team support.

Part I: Perceived Ease of Use (PEOU) of Digital Technology

3. Did the digital technology training enhance the ease of use, and what was the specific help?

Yes, the digital technology training did enhance my proficiency in operating the E-HR system. For example, through the training, I mastered the batch import of personnel data, which shortened the processing time of administrator on-boarding information from 3 days to 1 day, improving efficiency. On the other hand, the automatic generation of performance report function also simplifies data statistics and reduces the manual operation burden of the personnel office. In addition, the training has helped us better understand data rights management and safeguard the security and standardization of personnel information.

4. Major difficulties in learning and using digital technologies and their impact on technology acceptance

The main difficulty lies in the complexity of the system and the difficulty of cross-departmental synergy. The E-HR system involves several modules, and many operational processes require cross-departmental data sharing, but the imperfect interfaces of various systems have led to a poor flow of information, which has increased the work of data checking and manual processing. In addition, the lack of flexibility in the design of some functions and the inability to fully meet individualized needs have affected the experience of use and the speed of promotion. To a certain extent, these difficulties have reduced the acceptance of new technologies by some administrators, especially older administrators who find it more difficult to adapt to complex system operations.

5. Is the training content clear and easy to understand, and what aspects need to be improved?

The training content is clear and easy to understand at the basic operational level, but needs to be upgraded in terms of advanced functions and problem solving. For example, there is a lack of special training for data docking, process customization, and analysis of complex information, especially how to achieve data sharing and automated approvals between the E-HR system and other administrative systems. It is

recommended to increase the number of hands-on operational exercises, provide more detailed solutions to common failures and data anomaly handling, and enhance the practicality and relevance of the training.

Part II: Perceived Practicality of Digital Technology (PU)

6. The role and specific performance of digital technology in improving administrative effectiveness

Digital technology has significantly enhanced the efficiency of personnel management, especially in information processing, data analysis and policy implementation. For example, previously, faculty and staff attendance accounting required manual recording, organizing and reviewing, which took at least five working days, but the automated attendance and payroll accounting through the E-HR system has shortened the cycle to one working day, and the error rate has been significantly reduced. In addition, digital technology has made personnel file management paperless and information access more convenient, greatly improving work efficiency.

7. The most effective and impractical working scenarios of digital technology

The most effective scenarios include large-scale data processing, information tracing and decision-making support, such as annual personnel data statistics, administrator performance appraisal, etc., all of which are automated by the E-HR system, which reduces repetitive labor and improves accuracy and speed.

However, in scenarios with strong flexibility needs, such as complex title evaluation and introduction of special talents, the digital system's adaptability is insufficient, and a lot of manual intervention is still required, which cannot fully automate the process, but increases the workload instead.

8. Are you willing to actively participate in the training if it can enhance the ability to apply digital technology?

I am very willing to actively participate in the training if it can address practical business needs, especially the difficulties of cross-system data synergy and complex process setup. In particular, training that can help us solve practical problems such as information sharing and system adaptation is crucial to personnel management work.

Part III: Leadership Support (LS)

9. The extent of leadership support for the training and application of digital technology and its specific performance

School leaders are very supportive of the promotion of digital technology, mainly in terms of resource input, policy guidance and assessment incentives. The school has set up special funds for digitalization, promoted the upgrading of the E-HR system, and encouraged the Personnel Office to explore digital reform. In addition, the leaders have incorporated the application of information technology into the assessment indicators of each department through system design to promote the full use of the system.

10. Does it enhance the willingness to learn and use digital technology if leaders give stronger support?

Yes, stronger policy support would significantly increase my willingness to learn and use. In particular, if leaders can provide special training funds, promote information

synergy among departments, and give time guarantees, I will more actively promote the application and deepening of digital technologies in all personnel work.

Part IV: Digital Technology Knowledge (DTK)

11. Has the current training upgraded digital technology knowledge, and what aspects have been most helpful?

The training has enhanced my knowledge in personnel data processing, automated assessment and information security management. In particular, the E-HR system's data modeling and data permission control have been most helpful in daily work, ensuring data accuracy and compliance.

12. What is most needed to upgrade the technical knowledge of administrative staff?

Targeted advanced training is most needed, including complex system operation, cross-platform data integration, data analysis and mining. In addition, it is recommended that a continuous learning mechanism be established, such as regularly updating the training content, to ensure that administrative staff remain in sync with technological developments.

Part V: Behavioral Intentions (BI, mediators of digital technology acceptance)

13. Is there a willingness to apply the digital technologies learned in daily administrative work, and what are the influencing factors?

There is a strong willingness, and the influencing factors mainly include the maturity of the technology, the effectiveness of the training, and the flexibility of the system. If the system is easier to operate and the training is close to the actual needs, the willingness to use will be stronger.

14. If there is a lack of training or leadership support, will there be initiative to learn digital technology? Why?

I would take the initiative to learn because digital technology is already an indispensable tool for personnel management, and mastering the relevant technology can help improve efficiency and the quality of decision-making. However, lack of training and support will make learning more difficult and affect the ability to solve complex problems.

Part VI: Impact on Administrative Effectiveness (AE)

15. Whether digital technology significantly enhances administrative effectiveness, with examples

Significantly enhanced. For example, the automated performance appraisal module of the E-HR system reduces data counting time by 50%, while improving the accuracy and transparency of appraisal results.

16. Factors Limiting Administrative Effectiveness Enhancement in Current Digital Technology Acceptance and Training and Suggestions for Improvement

Constraints include poor system compatibility and insufficiently targeted training. It is recommended that cross-system synergies be strengthened, and that hierarchical training be provided to improve practicality and flexibility.

Summary and Recommendations

17. Key factors: leadership support, system ease of use, training effectiveness.

18. Training design: Focus on cross-sectoral data sharing and complex process handling.

19. Other factors: Strengthening technical support and business needs.

Director of Information Center, Shandong Engineering Vocational and Technical University

- Age: 38 years' old

- Gender: Female

- Position: Director of the Information Center, in charge of the school's digital infrastructure and technical services

- Characteristics:

- 12 years of experience in education informatization management, responsible for the planning and implementation of school digital platform.

- Deep technical background and understanding of the practicalities and difficulties of promoting digital technologies.

- Focus on user experience, emphasizing the ease of use of digital technology and system interoperability.

1. Self-introduction

Hello, I am the Director of Information Center of Shandong Engineering Vocational and Technical University, mainly responsible for the school's digital infrastructure construction and technical services, including campus network, information system integration, data management and technical support work. I have 12 years of experience in the field of education informatization management, and I have led the planning and implementation of the school's digital platforms, such as the construction of the teaching management system, the OA office system and the smart campus platform. My work focuses on ensuring the match between technology and business needs, focusing on user experience, promoting the ease of use of digital technology and system interoperability, and providing an efficient and stable digital environment for all departments.

2. Whether I have participated in digital technology training and impressions

Yes, I have not only participated in several digital technology trainings, but I am also responsible for organizing and promoting digital competency enhancement trainings on campus. The overall impression is that the training helps to master the application of new technologies and the optimization of system operation, especially in information security management, system integration and data interoperability, and the training has helped me a lot in my daily work. However, the existing training still focuses on basic operations, with less coverage of complex issues (such as multi-system docking and data governance), and lacks in-depth guidance on the integration of technology and management, which still requires a lot of exploration and coordination in the actual landing process.

Part I: Perceived Ease of Use (PEOU) of Digital Technology

3. Has the digital technology training improved ease of use and how has it helped?

Yes, the training has enhanced my operational proficiency in various information systems, especially in system configuration and problem diagnosis. I mastered the design of multi-system data interfaces and improved my ability to share data and automate processes between different platforms. For example, in the past, teachers' information entry required multiple repetitive operations. Through the data interface technology and automatic synchronization function, one-click updating is now possible, shortening the data processing time by 40%.

4. Major difficulties in learning and using digital technologies and their impact on technology acceptance

The main difficulties lie in the lack of system compatibility and the complexity of individualized needs. The teaching affairs system, financial system and OA system used by the school come from different vendors, and the data standards are not standardized, leading to poor information flow and increasing the complexity of cross-system integration. In addition, some users do not have a good understanding of digital technology, and their needs are unclear or change frequently, posing challenges to system design and operation and maintenance. These difficulties did not reduce my acceptance of the technology, but they did make it more difficult to move the project forward.

5. Was the training content clear and easy to understand, and what areas need improvement?

The basic operation training is clear and easy to understand, but it needs to be strengthened in terms of deep system integration, problem troubleshooting and data governance. It is recommended to supplement the training on topics such as system linkage under complex business scenarios, data interface development and information security management, and adopt case teaching+ practical exercises to enhance practicality and problem solving capability.

Part II: Perceived Practicality of Digital Technology (PU)

6. The role and specific performance of digital technology in improving administrative work efficiency

Digital technologies have significantly improved the efficiency of information management, communication and collaboration, and data analysis. For example, the smart campus system implemented by the university has realized the centralized processing of student information, course scheduling, and school registration management, and the efficiency of information processing has been increased by more than 50%. In addition, the OA automatic approval process has shortened the processing time of affairs such as leave and reimbursement for faculty and staff from 5-7 days to 2 days, effectively improving administrative effectiveness.

7. The most effective and impractical working scenarios of digital technology

The most effective scenarios include centralized data management, automatic approval and information sharing. For example, the smart campus system makes

enrollment data analysis more intuitive and supports real-time decision-making by management.

However, in cross-departmental complex operations such as personnel, finance and academic affairs linkage, manual import is still required due to the incompatibility of data formats of various systems, which fails to fully automate, limiting the practicality of digital technology.

8. Are you willing to participate actively in the training if it can enhance your ability to apply digital technology?

I am very willing to actively participate, especially in training on system integration, data analysis, and cutting-edge technologies, which can help me better solve complex business needs and improve information management.

Part III: Leadership Support (LS)

9. Level of leadership support for digital technology training and application and specific performance

The school leaders attach great importance to digital technology, which is manifested in policy guidance, resource input and assessment incentives. For example, the school has set up a special fund for information technology to support the construction of the smart campus, and has included the utilization rate of digital technology in the assessment of each department. In addition, the leaders encourage the information center to join hands with various business departments to promote information sharing and collaboration, and to ensure that the system is effectively implemented.

10. Does it enhance the willingness to learn and use digital technology if leaders give stronger support?

Yes, stronger policy support, especially in the promotion of cross-departmental collaboration and system integration, can effectively promote digitalization. If the leaders can provide more flexible resource deployment and special training funds, I will be more active in learning new technologies and enhancing my capacity in system construction and maintenance.

Part IV: Digital Technology Knowledge (DTK)

11. Has the current training enhanced digital technical knowledge and which aspects have been most helpful?

The training has helped me enhance my knowledge of system operation, data management and information security, especially in the areas of multi-system data sharing and problem troubleshooting, which is most helpful to my daily work. For example, mastering API development and debugging has improved the efficiency of system interfacing.

12. What is most needed to enhance the technical knowledge of administrative staff?

More systematic and forward-looking training is needed, especially in data governance, system architecture, and information security. In addition, interdisciplinary exchanges are recommended to enable administrators to better understand the

integration of technology and business and to promote the overall digitalization of the university.

Part V: Behavioral Intentions (BI, mediators of digital technology acceptance)

13. Is there a willingness to apply the digital technologies learned in daily administrative work and what are the influencing factors?

I have a strong willingness to do so, which is mainly influenced by factors such as technology maturity, system compatibility, and leadership support. In particular, if more advanced technical solutions and continuous support can be provided, it will further enhance my willingness to use.

14. If there is a lack of training or leadership support, will you take the initiative to learn digital technologies? Why?

Will take the initiative to learn, because digital technology is the core of information technology construction, and mastering cutting-edge technology can help improve work efficiency and solve complex business needs, ensuring the continued advancement of the school's digital construction.

Part VI: Impact on Administrative Effectiveness (AE)

15 Whether digital technology significantly enhances administrative effectiveness, with examples

Significantly enhanced. For example, the Smart Campus system has improved the efficiency of student information management by 50%, and the OA automatic approval system has shortened the processing time of reimbursement and leave to less than 2 days, which has significantly enhanced work efficiency.

16. Factors Limiting Administrative Effectiveness Enhancement in Current Digital Technology Acceptance and Training and Suggestions for Improvement

Major constraints include poor system compatibility and cross-departmental collaboration. It is recommended that multi-system synergy and data standardization be strengthened and in-depth training for complex issues be provided to promote information technology upgrading.

Summary and Recommendations

17. Key factors: system compatibility, leadership support, depth of technical training.

18. Training design: focus on system integration, data governance, cross-departmental collaboration, and strengthen hands-on exercises.

19. Other factors: Enhance the communication mechanism between the technical team and business departments, and improve the technical response speed.

Director of Administrative Office, Qingdao Stellar Institute of Science and Technology

- Age: 50

- Gender: Male

- Position: Director of the Administrative Office, in charge of administrative affairs and the promotion of school information technology

- Characteristics:

- More than 15 years of administrative experience, familiar with education policies and digital management requirements.

- Focus on the role of digital technology for administrative process optimization and decision support, with an emphasis on leadership support to drive system adoption.

- Strong coordination and execution skills, familiar with multi-departmental collaboration and digital platform integration.

1. Self-introduction

Hello, I am the Director of Administrative Office of Qingdao Hengxing Science and Technology College, mainly responsible for the overall management of administrative affairs in the school as well as the construction and promotion of school affairs informationization. I have more than 15 years of administrative experience and a deeper understanding of educational policies and digital management requirements. In recent years, focusing on the school's digital transformation goals, I have led the upgrading of the administrative office system, the construction of the school affairs information platform, and promoted the integration of multi-departmental business processes and information sharing. I am very concerned about how digital technology can optimize administrative processes, enhance work efficiency and strengthen decision-making support, and I also believe that leadership support is a key factor in promoting the application and landing of digital technology.

2. Whether I have participated in digital technology training and my impression

Yes, I have participated in digital technology-related trainings on and off campus many times, such as smart campus system operation, e-government platform application, information security and data management. The overall impression is that these trainings are effective in improving system operation skills and helping us understand the application of new technologies in administration, but there are some shortcomings. For example, the training mostly focuses on the explanation of basic functions, and involves less in actual business scenarios such as cross-departmental data sharing, customization of personalized requirements, and automation of complex processes. In addition, some of the training content is on the theoretical side and lacks solutions for school management pain points, resulting in practical applications that still rely on departments to explore on their own.

Part I: Perceived Ease of Use (PEOU) of Digital Technology

3. Did the digital technology training enhance the ease of use and how did it help specifically?

Yes, the training has enhanced my understanding and ability to use the university system and e-government platform, and it has especially helped significantly in the optimization of administrative affairs. Previously, administrative approvals and official document circulation mainly relied on paper, and the process was complicated and time-consuming. Through the training, I mastered the automatic approval process setting of

the OA system, realized the paperless operation of online approval, file management and meeting arrangement, and shortened the processing time of administrative affairs by more than 40%. In addition, the training made me more familiar with data analysis tools, which provided strong support in information statistics and decision support.

4. Major difficulties in learning and using digital technologies and their impact on technology acceptance

The main difficulties are as follows:

The first is the complexity of system operation. Some cross-departmental business processes involve multiple system linkages, such as the docking of the personnel system with the administrative system, which lacks standardized interfaces, is cumbersome to operate, and data are prone to errors.

Second, the gap between user needs and technical realization, the use of digital systems by various departments has different needs, and the existing system is difficult to fully match individualized needs, resulting in some processes still needing manual intervention, which affects efficiency.

Third, the uneven acceptance of personnel, some older faculty and staff members are slower to accept digital technology, and there are difficulties in adapting to e-office, which increases the difficulty of advancing administrative affairs.

Although these difficulties have not affected my overall acceptance of the technology, they do pose challenges to the system's promotion and use by the entire staff, especially in terms of cross-departmental business integration and data sharing, where there is still much room for improvement.

5. Was the training content clear and easy to understand, and what areas need improvement?

The training content is generally clear and easy to understand, especially the detailed explanation of basic operations and general functions. However, the training on complex business scenarios and in-depth application of the system is insufficient, and suggestions for improvement include:

- Provide more hands-on training on complex business scenarios, such as multi-system interfacing and cross-departmental process design.

- Enhance case studies to provide targeted solutions in the context of actual school administrative affairs.

- Conduct layered training, providing two types of courses, basic skills and advanced applications, according to the needs of different positions, to enhance the relevance and practicality of training.

Part II: Perceived Practicality of Digital Technology (PU)

6. The role of digital technology in administrative effectiveness enhancement and its specific performance

The role of digital technology in administrative effectiveness enhancement is significant and is mainly reflected in the following aspects:

- Electronicization of administrative examination and approval process: through the OA system, administrative examination and approval has realized online processing and real-time tracking, and the examination and approval cycle has been shortened from the original 5-7 working days to 2-3 days.

- Official Document Management and Information Sharing: The construction of the electronic official document system has realized automatic filing and classification of documents, and the speed of information retrieval has been increased by 60%, which greatly improves the response speed of meetings and decision-making.

- Data statistics and decision-making support: The digital platform integrates data from various departments, generates dynamic analysis reports, provides data support for school personnel adjustment and budget planning, and improves the science and timeliness of management decisions.

7. The most effective and impractical working scenarios of digital technology

The most effective scenarios include:

- Automated processing of high-frequency affairs, such as request reports, meeting notices, file management, etc. The OA system can realize one-click generation and batch processing, which greatly improves efficiency.

- Information sharing and communication and collaboration, each department can synchronize data through the digital platform, avoiding multiple double entries and reducing the problem of data silos.

Impractical scenarios include:

- Complex cross-departmental collaboration involving data integration of the three major systems of finance, personnel and administration, which still requires manual docking due to incompatible interfaces, making it difficult to automate the process.

- Temporary and personalized needs, such as the lack of flexible system support for certain special tasks, resulting in the need to rely on traditional offline methods of processing, which cannot be fully digitized.

8. Will you be willing to actively participate in the training if it can enhance your ability to apply digital technology?

Yes, I am very willing to participate in the training if it can cover in-depth application of the system, complex problem solving, and so on. This will help enhance my ability to control the digital platform and further promote the intelligence and efficiency of school administration.

Part III: Leadership Support (LS)

9. Degree of leadership support for digital technology training and application and specific performance

School leaders attach great importance to the application of digital technology, and the specific performance includes:

- Policy guarantee: a digital campus construction plan has been formulated to clarify the responsibilities and objectives of each department.

- Resource input: special funds are set up to support system upgrading, equipment renewal, and personnel training.

- Assessment and incentives: The ability to apply digital technology is included in the performance appraisal to encourage departments to actively use digital tools to enhance work efficiency.

10. Would the willingness to learn and use digital technology be enhanced if leaders provided stronger support?

Yes, if leaders can provide stronger policy guidance, incline resources, and establish cross-departmental collaboration mechanisms, I will be more motivated to learn and promote digital technologies to promote intelligent upgrading of administration.

Part IV: Digital Technology Knowledge (DTK)

11. Has the current training upgraded digital technology knowledge, and in which areas has it been most helpful?

The training has upgraded my knowledge in system operation, data analysis and information sharing, and is particularly helpful in the application and management of e-government systems.

12. What is most needed to enhance the technological knowledge of administrative staff?

- In-depth training emphasizing system integration and data sharing.
- Increase hands-on exercises to help solve complex problems in actual work.
- Implement a continuous training mechanism to ensure that knowledge updates are synchronized with technology iterations.

Part V: Behavioral Intentions (BI, mediators of digital technology acceptance)

13. Is there a willingness to apply the digital technologies learned in daily administrative work, and what are the influencing factors?

There is a strong willingness to do so, and the influencing factors mainly include system compatibility, policy support from leaders, and effectiveness of training.

14. If there is a lack of training or leadership support, will there be initiative to learn digital technology? Why?

Yes, because digital technology has become a necessary means to enhance administrative effectiveness and strengthen decision-making support, and it is impossible to adapt to the management needs of the new era without learning.

Part VI: Impact on Administrative Effectiveness (AE)

15. Whether digital technology significantly improves administrative effectiveness, with examples

Significantly improve, such as OA system will shorten the time of approval by 60%, which significantly improves the speed of administrative affairs.

16. Factors limiting the current acceptance of and training in digital technology to enhance administrative effectiveness and suggestions for improvement

The main limiting factors include insufficient system compatibility and insufficient training depth. It is recommended that cross-departmental system integration training be enhanced to improve system synergy.

Deputy Director, Department of Textbook and Research, Yanshan College, Shandong University of Finance and Economics

- At the end of the year Age: 33

- Gender: Female

- Position: Deputy Director of Academic Research Division, in charge of research management and data system maintenance

- Characteristics:

- 7 years of experience in research management, promoting research informatization system construction and data sharing.

- Emphasize the supportive role of digital technology for research data analysis and research performance assessment.

- Sensitive to digital technology knowledge, good at accepting new technology and promoting its implementation.

1. Self-introduction

Hello, I am the deputy director of the Department of Textbook and Research at Yanshan College of Shandong University of Finance and Economics, mainly responsible for scientific research management and scientific research data system maintenance. I have 7 years of experience in scientific research management, and in recent years, I have actively promoted the construction of scientific research informatization system, realized the whole process management of scientific research projects and scientific research data sharing, and provided strong data support for scientific research performance assessment and scientific research decision support.

In my work, I am highly concerned about the application of digital technology in scientific research management, and believe that it can significantly improve the efficiency of data processing, the management of scientific research results and the scientificity of resource deployment. I am highly receptive to new technologies, and I am also committed to the effective application of digital tools in all aspects of research management to help the digital and intelligent transformation of the university's research work.

2. Whether I have participated in digital technology training and impression

Yes, I have participated in many internal and external digital technology trainings, mainly including the operation of research management system, data analysis and mining, and the use of research performance assessment platform. These trainings have helped me a lot in my daily work in research project management and data processing.

The overall impression is that the basic training can quickly help us master the basic operation and function use of the system, but the training does not cover enough

advanced applications such as data mining and complex scientific research data analysis, which still need to be learned and explored independently. Part of the training focuses too much on the system interface operation and ignores how to combine with the needs of scientific research management for practical problem solving, the practicality and relevance of which need to be strengthened.

Part I: Perceived Ease of Use (PEOU) of Digital Technology

3. Did the digital technology training improve the ease of use and what was the specific help?

The training did enhance my ease of use of the research management system, and the specific help is reflected in the following aspects:

- Improved efficiency of research project management: Through the training, I have mastered the research management system and realized the online management of the whole process of research projects from project initiation, process tracking to completion, avoiding the tedious operation of manual statistics and offline auditing in the past, and saving more than 40% of time.

- Data sharing and retrieval: The training has enabled me to master how to use the system for data classification, retrieval and export, and scientific research data has been shared among departments, which has improved the speed and accuracy of scientific research performance evaluation.

- Informational decision support: By learning data analysis tools, I was able to more accurately count research achievements and use of funds, which provided strong data support for the university to formulate research policies.

4. Major difficulties in learning and using digital technologies and their impact on technology acceptance

In the process of using digital technology, the main difficulties I encountered are as follows:

- System complexity: the research management system involves multiple modules and roles, such as project declaration, fund management and performance appraisal, with many operational steps, which requires repeated learning and a steep learning curve for initial use.

- Difficulty of data integration: There is a lack of effective integration of data between different research systems, especially the financial system is not docked with the research management system, resulting in the need to manually enter data, which increases the workload and affects efficiency.

- Personalized needs cannot be met. Individualized needs cannot be met: scientific research management involves a variety of disciplines and complex projects, while the existing system modules are relatively fixed and lack flexible customization functions, which makes it difficult to meet the diversified needs of various types of scientific research activities.

Despite these difficulties, my acceptance of digital technology remains high, mainly because I recognize that digitalization is an inevitable trend to enhance the efficiency and transparency of research management, and I am willing to keep learning

and adapting to new technologies to promote the modernization of research management.

5. Is the training content clear and easy to understand, and what aspects need to be improved?

The training content is generally clear, but there is room for improvement in the following areas:

- Enhancement of advanced application training: increase the teaching of data analysis, data mining and other in-depth operations to help us deal with complex tasks such as research performance evaluation.

- Case-driven teaching: Combine the training with the actual operation of scientific research projects, strengthen the application of specific scenarios such as scientific research declaration and fund accounting, and improve the practical operation ability.

- Continuous updating of training content: Digital technology is constantly updated, and it is recommended that a continuous learning mechanism be established to follow up on system upgrades and new functions in a timely manner, so as to ensure that the technology is upgraded in tandem with business needs.

Part II: Perceived Practicality of Digital Technology (PU)

6. The role and specific performance of digital technology in administrative work efficiency enhancement

The practicality of digital technology in research management is very significant, mainly reflected in the following aspects:

- Automation of scientific research data management: realizing the integrated management of scientific research projects, funds and achievements, avoiding the tediousness of manual statistics and greatly improving work efficiency.

- Accurate scientific research performance appraisal: The digital system is used to automatically summarize and analyze scientific research results, thesis publications, and patent applications, making the appraisal more transparent and objective and reducing human errors.

- Convenient information sharing: The scientific research system is docked with academic affairs, personnel and other departments, making data sharing more timely and reducing the time for cross-departmental communication and repeated entry of information.

7. The most effective and impractical working scenarios of digital technology

The most effective scenarios include:

- Statistics and analysis of scientific research results: automatic generation of reports on scientific research results improves the accuracy and timeliness of data analysis.

- Project declaration and review: online review and material submission are realized, reducing the flow of paper materials and simplifying the approval process.

Impractical scenarios include:

- Complex financial docking: Research fund management is not fully docked with the financial system, resulting in data still needing to be checked manually, increasing workload.

- Flexible research activity management: For certain interdisciplinary and multi-team collaboration projects, the system is difficult to set up flexibly and still needs to rely on traditional ways of management.

8. Will you be willing to actively participate in the training if it can enhance your ability to apply digital technology?

Yes, I am willing to actively participate, especially in training involving in-depth application of the system and cross-departmental data integration, which can effectively solve the pain points in actual work and promote the efficiency of research management.

Part III: Leadership Support (LS)

9. Degree of leadership support for digital technology training and application and specific performance

School leaders attach great importance to the promotion of digital technology, which is mainly manifested in:

- Policy guidance: introducing documents on scientific research informatization construction and clarifying the goals of digital technology application.

- Resource input: setting up special funds to support system construction and personnel training.

- Incentives: Incorporate the use of digital technology into the assessment and encourage administrators to improve their technology application ability.

10. Does the willingness to learn and use digital technology increase if leaders provide stronger support?

Yes, if leaders provide more resource protection and policy guidance, they will be more motivated to learn and apply digital technology to enhance the effectiveness of research management.

Part IV: Digital Technology Knowledge (DTK)

11. Has the current training enhanced digital technology knowledge, and which aspects are most helpful?

Yes, it has improved significantly especially in research data management and performance appraisal.

12. What is most needed to improve administrators' technical knowledge?

- Advanced system application training
- Cross-departmental data integration practices
- Continuous learning platform construction

Part V: Behavioral Intention (BI)

13 Is there an intent to apply the digital technologies learned and what are the influencing factors?

Yes, influenced by system utility, leadership support, and quality of training.

14. if there is a lack of training or leadership support, will there be initiative to learn digital technologies? Why?

Yes, because research informatization is the future trend, and it is necessary to continuously improve technical skills.

Part VI: Impact on Administrative Effectiveness (AE)

15. Whether digital technology significantly improves administrative effectiveness, with examples

Significantly improved, e.g., automation of research performance appraisal has shortened the appraisal time by 30%.

16. Factors limiting the current acceptance of and training in digital technology to improve administrative effectiveness and suggestions for improvement

- Insufficient system compatibility
- Lack of in-depth training
- Suggestions to strengthen system integration and hands-on training

Director of Student Affairs Office of Rizhao Maritime Engineering Vocational College

- Age: 42
- Gender: Male
- Position: Director of Student Affairs, in charge of student management and smart service platform construction
- Characteristics:
 - With 13 years of experience in student affairs management, familiar with student information management process.
 - Responsible for promoting the Smart Campus student services system, emphasizing technological convenience and data security.
 - Focus on the application of digital technology in enhancing the efficiency and information transparency of student services.

1. Self-introduction

Hello, I am the Director of Student Affairs Office of Rizhao Maritime Engineering Vocational College, mainly responsible for student management and the construction of smart service platform. I have 13 years of experience in the field of student affairs management, and I have long been responsible for the student information management process, including the management and service of student registration, rewards and punishments, financial aid, employment and other full life cycle data.

In recent years, I have taken the lead in promoting the construction of the Smart Campus student service system, striving to realize the digitization and intelligence of student affairs, improve service efficiency through online processing and data sharing, enhance the transparency of information, and reduce the burden of transactional work between students and administrators. I am particularly concerned about the convenience of digital technology, and I hope that the technology can truly serve teachers and students, and promote more efficient and accurate student management work, while taking into account data security and privacy protection.

2. Whether I have participated in digital technology training and my impression

Yes, I have participated in digital technology trainings inside and outside the university many times, mainly including trainings on system operation, data management and information security of the smart campus platform. These trainings have been very helpful to my daily work, especially in enhancing the efficiency of student affairs processing, optimizing information flow and data analysis. The trainings have enabled me to better understand and apply digital tools.

The overall impression is that the training contents are mostly based on system operation, combining theory and practice. However, there are some problems, such as some of the trainings are formal, with explanations favoring the basic functions of the system and ignoring applications in complex scenarios, such as the issue of multi-departmental data sharing and integration. In addition, some of the new systems are updated quickly, but the training fails to follow up in a timely manner, resulting in a certain lag in the use of new functions.

Part I: Perceived Ease of Use (PEOU) of Digital Technology

3. Has the training on digital technologies enhanced the ease of use, and how has it helped specifically?

The training has enhanced the ease of use of the smart service platform to a certain extent, and the specific help is reflected in the following aspects:

- Improved efficiency of student affairs processing: Through the training, we mastered the student information management system and realized online application and approval of leave, scholarship, change of registration and other affairs, which greatly reduced the flow of paper materials, improved administrative effectiveness and reduced students' offline processing time.

- More accurate data management: The training helped us to be skilled in using the data analysis and report generation functions of the system, which can quickly extract student behavior data and provide data support for decision-making such as academic early warning, psychological counseling, etc., and significantly improve the efficiency of data processing.

- Information sharing is smoother: Through the training, we have mastered the method of data docking of multiple departments, realized information interoperability with academic affairs, personnel, finance and other departments, avoided the phenomenon of data silos, and improved the efficiency of work synergy.

4. Major difficulties in learning and using digital technologies and their impact on technology acceptance

I mainly encountered the following difficulties in the process of using digital technology:

- Complexity of system operation: the system involves multi-module and multi-privilege management, and some of the operations need to be learned repeatedly, especially when dealing with unexpected affairs and special student situations, the fixed process of the system is difficult to meet the individualized needs, which increases the difficulty of management.

- Data Docking Difficulties Data docking difficulties: student management involves multiple departments, but there are imperfect data interfaces between the systems, making it difficult to synchronize information and leading to data inconsistency, especially in scenarios such as changes in student registration and scholarship issuance, which still require manual review and increase workload.

- Lagging technology update: The functions of the smart service platform are updated quickly, and there is often a lack of timely and systematic training after the iteration of the system, so some of the new functions cannot be fully utilized, which affects the promotion and use of the platform.

Despite the above difficulties, as I am well aware of the importance of digital technology in improving the efficiency of student affairs and enhancing the service experience, I still actively learn and use new technologies, and strive to continuously optimize the operation process and enhance the work efficiency in my daily work.

5. Is the training content clear and easy to understand, and what areas need improvement?

Overall, the training content is relatively clear, but there is still room for improvement in the following areas:

- Enhance in-depth training: the existing training focuses more on basic operations, and advanced system functions, such as data mining and predictive analytics, should be added to help us gain better insights into student behavior and improve decision-making capabilities.

- Personalized training needs: Increase problem-oriented training, and carry out practical exercises around the difficult points of student affairs (e.g. multi-departmental collaborative approvals, handling of emergencies, etc.) to enhance the practicality of the training.

- Ongoing training mechanism: Establish a regular training platform for system updates and technological upgrades, and conduct continuous follow-up to ensure that personnel master new technologies in a timely manner and can quickly apply them to their actual work.

Part II: Perceived Practicality of Digital Technology (PU)

6. The role and specific performance of digital technology in administrative work efficiency enhancement

Digital technology has played a significant role in efficiency enhancement in student administration, mainly in the following aspects:

- Online processing of affairs: through the smart campus system, students can realize one-stop online processing of affairs such as changes in student registration, applications for awards and subsidies, and approval of leave of absence, which improves the efficiency of administrative approval and reduces the number of offline round trips for teachers and students.

- Data Analysis and Early Warning: The digital system is utilized for real-time monitoring of academic performance, mental health, attendance and other data to detect abnormalities in a timely manner and provide data support for academic early warning, which improves the foresight and accuracy of student services.

- Information sharing and decision-making support: The system realizes data docking with academic affairs, personnel, finance and other departments, breaking data barriers, providing comprehensive and accurate information support for decision-making on student affairs, and enhancing the scientific nature of management decisions.

7. The most effective and impractical working scenarios of digital technology

Most effective work scenarios:

- Student affairs processing: such as leave applications, scholarships and grants have realized full online processing, which significantly reduces manual work and improves approval efficiency and service experience.

- Data monitoring and analysis: real-time tracking of key information such as student attendance and changes in student registration, providing strong data support for accurate management.

Impractical work scenarios:

- Special affairs processing: such as the management of emergencies, due to the fixed operation process of the system, it is difficult to flexibly respond to individualized needs, and still need to rely on offline manual intervention.

- Cross-system information docking: imperfect data interfaces with financial, personnel and other systems do not allow real-time data sharing, increasing the workload of data verification and review.

8. Will you be willing to actively participate in the training if it can enhance the ability to apply digital technology?

Yes, I am very willing to actively participate in the training if it can help to solve the system operation problems and enhance the data analysis capability, as it will help to improve the efficiency and accuracy of student affairs management.

A brief overview of Parts III-VI:

9-10 Impact of leadership support on digital technology diffusion

Leaders are very supportive, providing policy guidance and financial investment, and I would be more motivated to learn and use digital technology if they strengthened their in-depth involvement in system building.

11-12. Enhancement of digital technology knowledge and improvement needs

Enhanced knowledge, but need to increase training on cross-system data docking and higher-order data analysis to enhance practicality.

13-14. Behavioral Intentions and Independent Learning

Willing to learn on their own initiative, as digital technology is significantly helpful in improving administrative effectiveness and data transparency.

15-16. Impact on Administrative Effectiveness and Constraints

Significantly enhance efficiency, but data silos and lagging system training limit the effectiveness of the technology, and system connectivity and continuous training need to be enhanced.

Deputy Director of Finance, Shandong Foreign Language Vocational and Technical University (SFVTU)

- Age: 47

- Gender: Female

- Position: Deputy Director of Finance, in charge of financial informatization and digital reimbursement system management

- Features:

- 14 years of experience in financial management, leading the digital transformation of the university's financial system.

- Emphasizes the benefits of digital technology in improving financial efficiency, transparency and data integration.

- Focus on technical training and policy guidance to promote the full application of digital technology in financial management.

1. Self-introduction

Hello, I am the Deputy Director of Finance Office of Shandong Foreign Language Vocational and Technical University, mainly responsible for financial informatization construction and digital reimbursement system management. I have 14 years of experience in financial management, and in recent years, I mainly promote the digital transformation of the university's financial system, including the optimization of digital reimbursement, budget management, data analysis and other aspects.

I always believe that digital technology plays an important role in improving the efficiency and transparency of financial work as well as data integration. We have implemented an online reimbursement system, which greatly reduces manual operation and review time, improves approval efficiency and data accuracy, and realizes paperless and intelligent financial processes. In addition, I pay special attention to technical training and policy guidance to promote financial staff to master the use of the new system, to ensure that digital technology can be fully applied in financial management.

2. Whether I have participated in digital technology training and impressions

Yes, I have participated in digital technology training on and off-campus for many times, mainly focusing on topics such as financial information system operation, digital

reimbursement process, data security, and so on. The overall impression is that the training content is more practical, especially for the operation of the reimbursement system, budget execution monitoring, etc., which enables financial staff to use digital tools more skillfully and improves the efficiency of daily work. However, there are some shortcomings. Some of the training focused on basic operations and lacked relevance to complex financial situations (e.g. joint approval by multiple departments, monitoring of the use of special funds, etc.). In addition, the system has been updated and iterated rapidly, and the training content has not been followed up in a timely manner, resulting in the slow promotion of new functions, which affects the full application of the technology.

Part I: Perceived Ease of Use (PEOU) of Digital Technology

3. Has the digital technology training improved ease of use, and how has it specifically helped?

Yes, the training has effectively enhanced the ease of use of the financial information system, and the specific help includes the following:

- Streamlining the reimbursement process: the training mastered the digital reimbursement system, which realizes the integrated operation from application, approval to accounting, so that faculty and staff do not need to submit a large number of paper materials, reducing the time for review and improving efficiency.

- Enhance data management ability: the training helped us to familiarize with the budget execution monitoring platform, which can monitor the budget execution of each department in real time, discover anomalies in time, and ensure the accuracy and compliance of financial data.

- Enhance information transparency: The training enabled us to utilize financial data analysis tools to generate clear financial reports, which enhanced the transparency of financial information and provided strong support for financial decision-making by university leaders.

4. Major difficulties in learning and using digital technologies and their impact on technology acceptance

I encountered the following difficulties in using digital technologies:

- Complexity of system operation: the financial system involves a variety of business modules (e.g. budget management, project funds, salary accounting, etc.), and some of the operation processes are complicated, especially when dealing with the use of cross-departmental funds, which is cumbersome and prone to errors.

- Imperfect data interface: there are technical barriers to docking with personnel, asset management and other systems, making it difficult to automatically synchronize data, which still requires manual comparison, affecting the accuracy and timeliness of data flow.

- Insufficient in-depth training: Training mostly focuses on basic functions, while operational guidance for complex business scenarios (e.g., research funding, special fund management, etc.) is insufficient, which affects the digital advancement of some complex businesses.

Nevertheless, as I am aware of the significant role of digital technology in enhancing financial work efficiency and data transparency, I still actively use and promote the application of digital technology and expect to overcome these difficulties through continuous learning and improvement.

5. Is the training content clear and easy to understand, and what areas need improvement?

The training content is generally clear and easy to understand, but there is room for improvement in the following areas:

- Increase complex business training: In-depth training should be provided for complex business scenarios such as multi-dimensional data analysis, use of special funds, and cross-departmental collaboration, so as to enhance the adaptability of the technology in actual work.

- Strengthen case teaching: The application of digital technology in budget execution monitoring, performance appraisal, etc. should be explained through actual operation cases to enhance the practicality of the training.

- Enhance continuous training: Establish a regular training mechanism and follow up system updates regularly to ensure that finance staff can master new functions and apply them to their daily work.

Part II: Perceived Practicality of Digital Technology (PU)

6. The role and specific performance of digital technology on administrative work efficiency enhancement

The efficiency enhancement of financial management by digital technology is mainly reflected in the following aspects:

- Improvement of approval efficiency: the online reimbursement system realizes the automatic flow of multi-level approvals, reduces the transmission of paper materials and manual review, and shortens the average approval time by more than 30%.

- Accurate data analysis: Through the financial information system, we can quickly generate multi-dimensional financial statements, which help us analyze the budget implementation and fund usage accurately and provide data support for decision-making.

- Information Sharing and Transparency: The system realizes data sharing with academic affairs, assets, scientific research and other departments, which enhances the transparency of financial information, facilitates departments to understand the use of funds in a timely manner, and improves the efficiency of cross-departmental collaboration.

7. The most effective and impractical working scenarios of digital technology

The most effective scenarios:

- Routine reimbursement and budget monitoring: the system automatically completes the process of reimbursement application, approval, and accounting, which significantly improves the efficiency of transaction processing and reduces manual operations.

- Data analysis and report generation: It can automatically generate reports on budget execution and financial analysis, providing accurate data information for leadership decision-making.

Impractical scenarios:

- Complex special fund management: such as scientific research funds, university-enterprise cooperation projects, due to the complexity of the flow of funds, the system operation is not flexible enough and still requires a lot of manual intervention.

- Cross-system data integration: Inadequate data interfaces with asset and personnel systems result in information not being synchronized in real time, increasing the workload of data verification and correction.

8. Will you be willing to actively participate in the training if it enhances the ability to apply digital technology?

Of course. Mastering digital technology not only enhances work efficiency, but also plays a greater role in budget management, fund monitoring, data analysis, etc., helping to make financial management work more scientific and precise.

A brief overview of parts III to VI

9-10 Impact of leadership support on digital technology rollout

Leaders are highly supportive of digital transformation, providing policy and financial guarantees. If I increase special training and institutional protection, I will be more motivated to promote the in-depth application of digital technology.

11-12. Digital Technology Knowledge Enhancement and Improvement Needs

The training has improved the ability to operate financial systems and analyze data, but there is still a need to strengthen knowledge training in cross-departmental data integration and special fund management.

13-14. Behavioral intent and self-directed learning

I have a strong desire to apply digital technology to financial management because of its ability to improve efficiency and enhance decision support. Even in the absence of systematic training, I am self-directed in my learning to ensure the smooth running of my work.

15-16 Impact on administrative effectiveness and constraints

Digital technology has significantly improved the efficiency and transparency of financial work, but insufficient data interfacing between systems and poor support for complex scenarios have limited the in-depth application of the technology.

17-19. Key Influencing Factors and Suggestions for Improvement

The key factor is the depth and breadth of training on system operation. It is recommended that training on complex business processing and system synergies be strengthened, and that cross-departmental data interoperability be promoted to improve the overall effectiveness of the application of digital technology.

APPENDIX C: Invitation Letter for an Expert

List of Experts for IOC of Research Instrument

No.	Name	Degree	Title	Position	Institution	Field
1	Liu Yuan	PhD Candidate	Associate Professor	Vice Dean	Shandong Women's University	Education
2	Liu Bingyuan	PhD	Professor	Dean of School of Marxism	Shandong Youth University of Political Science	Education
3	Ji Biao	PhD	Professor	Faculty Member of the Department of Education	Shandong Normal University	Vocational Education
4	Niu Zhen	PhD	Professor	Deputy Secretary- General	Shandong Association of Senior Professors	Education

SU 0210.04/09



Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

January 2025

Dear Professor Niu Zhen, Ph.D.
Shandong Association of Senior Professors

Subject: Invitation to be an expert in the Request for Expert's Evaluation on Research Instrument

Since Ms. Bi Chunhui, student ID 6419000019, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Development of Training Strategy on Digital Technology of Administrative Effectiveness for Private Colleges in Shan Dong Province*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to provide your opinion in evaluation on research instrument.

The evaluation on research instrument is a significant process for assessing content validity. Ms. Bi Chunhui will subsequently coordinate with you and provide more detail on this matter.

We really appreciate your help.

Yours sincerely,

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(Professor Emeritus Dr. Chanita Rukspollmuang)
Dean of Graduate School of Education

SU 0210.04/31



Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

January 2025

Dear Professor Ji Biao, Ph.D.
Shandong Normal University

Subject: Invitation to be an expert in the Request for Expert's Evaluation on Research Instrument

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Dean of Graduate School of Education



SU 0210.04/31

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

January 2025

Dear Associate Professor Liu Yuan
Shandong Women's University

Subject: Invitation to be an expert in the Request for Expert's Evaluation on Research Instrument

Since Ms. Bi Chunhui, student ID 6419000019, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Development of Training Strategy on Digital Technology of Administrative Effectiveness for Private Colleges in Shan Dong Province*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to provide your opinion in evaluation on research instrument.

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SU 0210.04/31

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

January 2025

Dear Professor Liu Bingyuan, Ph.D.
Shandong Youth University of Political Science

Subject: Invitation to be an expert in the Request for Expert's Evaluation on Research Instrument

Since Ms. Bi Chunhui, student ID 6419000019, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Development of Training Strategy on Digital Technology of Administrative Effectiveness for Private Colleges in Shan Dong Province*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to provide your opinion in evaluation on research instrument.

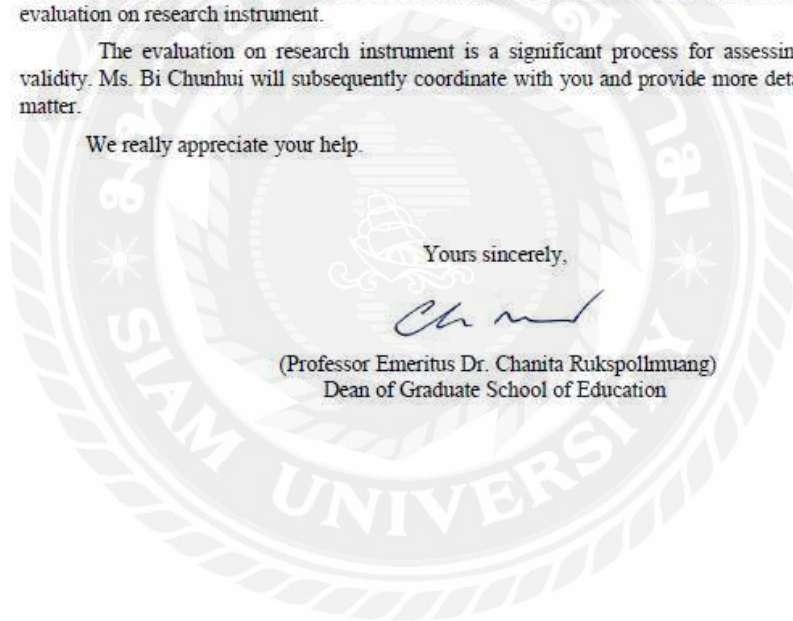
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Dean of Graduate School of Education



IOC Test

Items	Expert1	Expert2	Expert3	Expert4	IOC
1. I think using digital technology can improve my work efficiency.	1	1	1	1	1
2. I think using digital technology can improve my decision-making quality.	1	1	1	1	1
3. I think digital technology can improve the overall performance of our department.	1	1	1	1	1
4. I find it easy to learn how to use new digital technology.	1	1	1	1	1
5. I think operating digital technology systems is simple.	1	1	1	1	1
6. I find using digital technology does not require much effort.	1	1	1	1	1
7. I think the leadership provides sufficient support for digital technology training.	1	1	1	1	1
8. My leader encourages us to participate in digital technology training.	1	1	1	1	1
9. My leader provides the necessary resources and support when I need help.	1	1	1	1	1
10. I have sufficient basic digital technical knowledge of digital technology.	1	1	1	1	1
11. I know how to use common digital technology tools and software.	1	1	1	1	1
12. I am aware of the latest developments and trends in digital technology.	1	1	1	1	1
13. I have the of ability in solving technical problems of digital technology devices.	1	1	1	1	1
14. I have the of ability in installing digital technology devices.	1	1	1	1	1
15. I am willing to use more digital technology in my work.	1	1	1	1	1
16. If given the opportunity, I would participate in more digital technology training.	1	1	1	1	1
17. I plan to rely more on digital technology in my future work.	1	1	1	1	1
18. Using digital technology has improved my work efficiency (WE).	1	1	1	1	1
19. My decision-making quality (DQ) has improved after using digital technology.	1	1	1	1	1
20. Digital technology has improved my communication and collaboration (CAC) with colleagues .	1	1	1	1	1
21. I frequently use digital technology in my daily work (TUF).	1	1	1	1	1
22. My ability to apply digital technology has improved (TAC).	1	1	1	1	1

刘源、吉街、刘航

SU 0210.04/029



Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

3 July 2025

Dear Dr. Wang Zhuo
Professor of English Language and Literature at Shandong Normal University

Subject: Invitation to be an expert to verify the translation of the research questionnaires.

Since Ms. Bi Chunhui, student ID 6419000019, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Development of Training Strategy on Digital Technology of Administrative Effectiveness for Private Colleges in Shan Dong Province*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to verify the translation of the research questionnaires.

The research questionnaires are an essential tool for researchers to find answers. Ms. Bi Chunhui conducted this research in English, the instrument was designed in English. However, it must be applied to Chinese respondents. Your role as an expert in verifying the translation of the research questionnaire from English into Chinese is of utmost importance for the success of this research. Then, Ms. Bi Chunhui will contact and coordinate all details by herself.

We really appreciate your help.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Chanita Rukspollmuang'.

(Professor Emeritus Dr. Chanita Rukspollmuang)
Dean of Graduate School of Education

SU 0210.04/029



Graduate School of Education
 Siam University
 38 Phet Kasem Rd., Bang Wa,
 Phasi Charoen, Bangkok 10160

3 July 2025

Dear Dr. Zhang Yuan
 Professor of English Linguistics at Shandong Normal University

Subject: Invitation to be an expert to verify the translation of the research questionnaires.

Since Ms. Bi Chunhui, student ID 6419000019, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Development of Training Strategy on Digital Technology of Administrative Effectiveness for Private Colleges in Shan Dong Province*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to verify the translation of the research questionnaires.

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 Dean of Graduate School of Education

List of Experts for Evaluating the Research Results

No.	Name	Title	Institution	Position	Mode of Participation
E1	Kuang Yizhen	Professor	Qilu Medical College	President	Online
E2	Wang Nan	Lecturer	School of Finance and Economics, Qingdao Binhai University	Director of Teaching and Research Office	Online
E3	Ding Yingying	Professor	School of Economics and Management, Weifang University of Science and Technology	Dean	Online
E4	Ding Fuqiang	Associate Professor	Shandong Engineering Vocational and Technical University	Director of Network Center	Offline
E5	Zhang Zhenxing	Professor	Qingdao Hengxing University of Science and Technology	Director of Faculty Affairs Office	Online
E6	Cui Ping	Professor	Shandong Foreign Languages Vocational College	Director of Faculty Affairs Office	Offline
E7	Li Ling	-	Yanshan College, Shandong University of Finance and Economics	Finance Office Staff	Online
E8	Jin Liu	Lecturer	Shandong Engineering Vocational and Technical University	Director of Training Section	Offline
E9	Liu Yu	-	Rizhao Maritime Engineering Vocational College	Student Affairs Staff	Offline

SU 0210.04/31



Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

5 July 2025

Dear Associate Professor Kuang Yizhen
Qilu Medical College

Subject: Invitation to be an expert to evaluate the research results

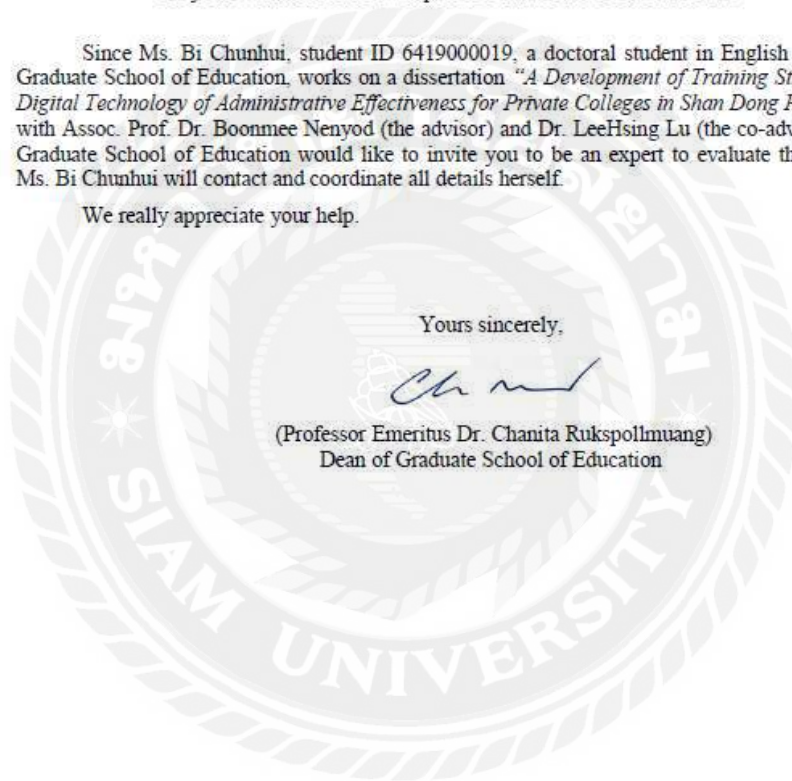
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Yours sincerely,

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SU 0210.04/31



Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

5 July 2025

Dear Associate Professor Wang Nan
President of School of Finance and Economics, Qingdao Binhai University
Subject: Invitation to be an expert to evaluate the research results

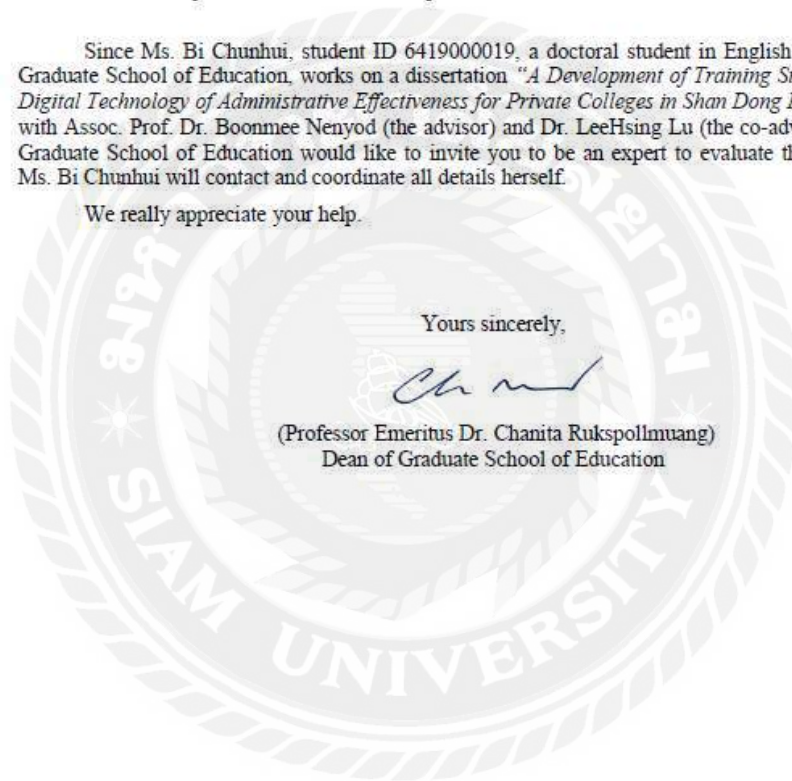
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SU 0210.04/31

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

5 July 2025

Dear Associate Professor Ding Yingying
School of Economics and Management, Weifang University of Science and Technology
Subject: Invitation to be an expert to evaluate the research results

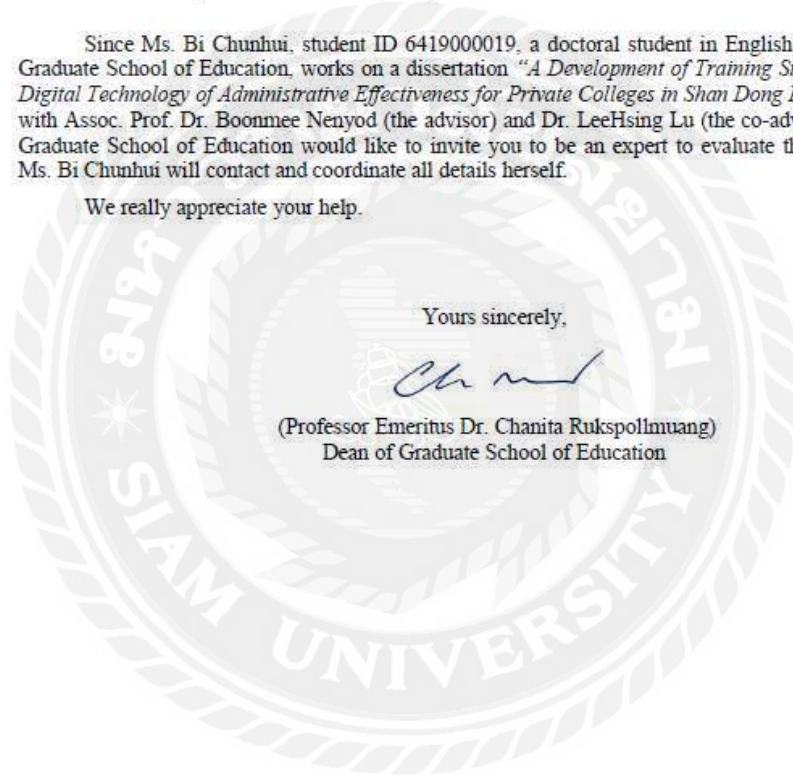
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Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

5 July 2025

Dear Associate Professor Ding Fuqiang
Shandong Engineering Vocational and Technical University

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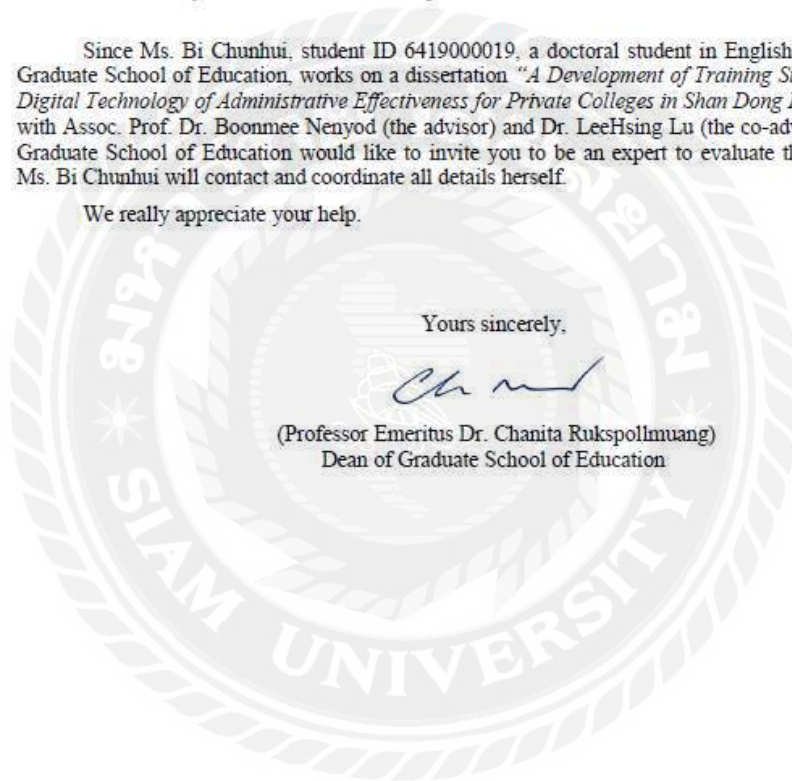
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Siam University
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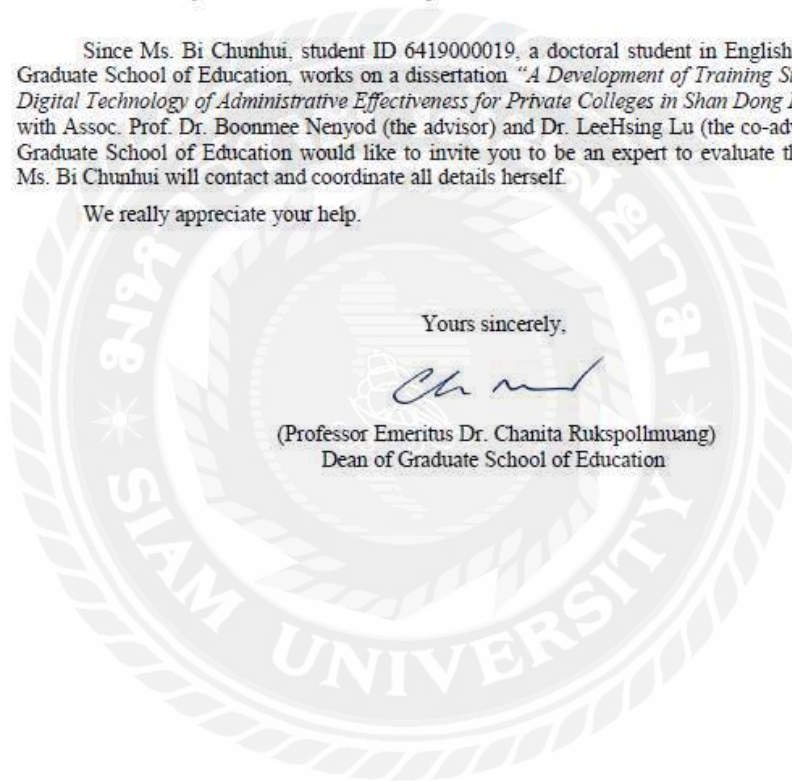
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Dean of Graduate School of Education



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Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

5 July 2025

Dear Associate Professor Cui Ping
Shandong Foreign Languages Vocational College

Subject: Invitation to be an expert to evaluate the research results

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SU 0210.04/31

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

5 July 2025

Dear Associate Professor Li Ling
Yanshan College, Shandong University of Finance and Economics
Subject: Invitation to be an expert to evaluate the research results

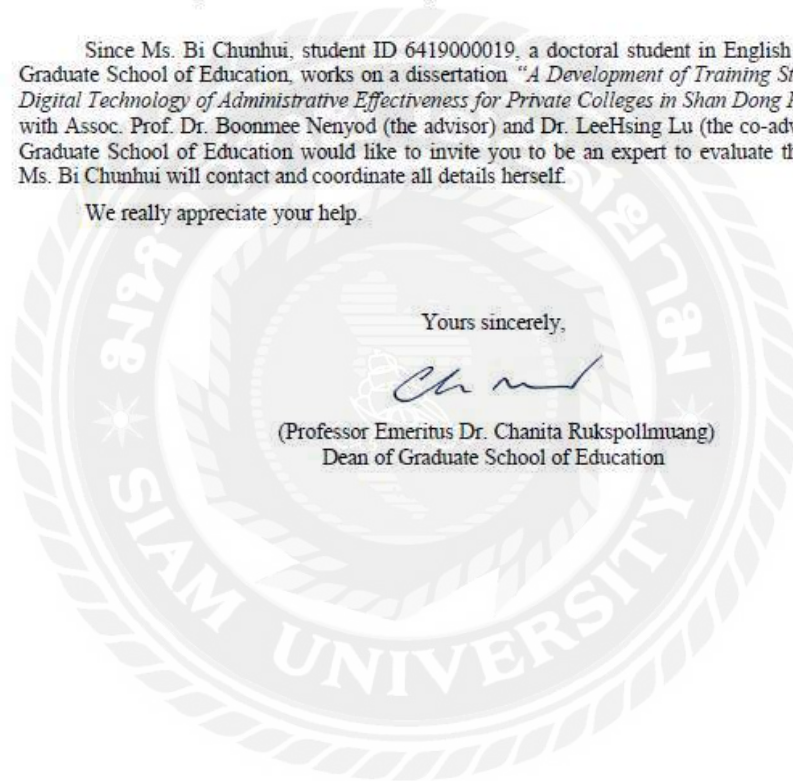
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Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

5 July 2025

Dear Associate Professor Jin Liu
Shandong Engineering Vocational and Technical University

Subject: Invitation to be an expert to evaluate the research results

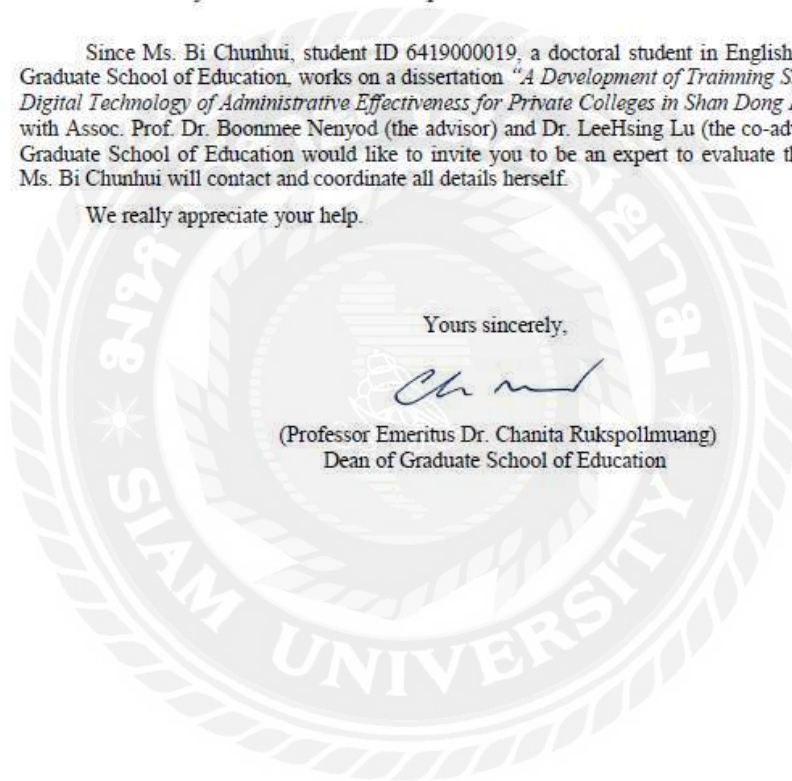
Since Ms. Bi Chunhui, student ID 6419000019, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Development of Training Strategy on Digital Technology of Administrative Effectiveness for Private Colleges in Shan Dong Province*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to evaluate the results. Ms. Bi Chunhui will contact and coordinate all details herself.

We really appreciate your help.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Chanita Rukspollmuang'.

(Professor Emeritus Dr. Chanita Rukspollmuang)
Dean of Graduate School of Education





SU 0210.04/31

Graduate School of Education
Siam University
38 Phet Kasem Rd., Bang Wa,
Phasi Charoen, Bangkok 10160

5 July 2025

Dear Associate Professor Liu Yu
Rizhao Maritime Engineering Vocation College

Subject: Invitation to be an expert to evaluate the research results

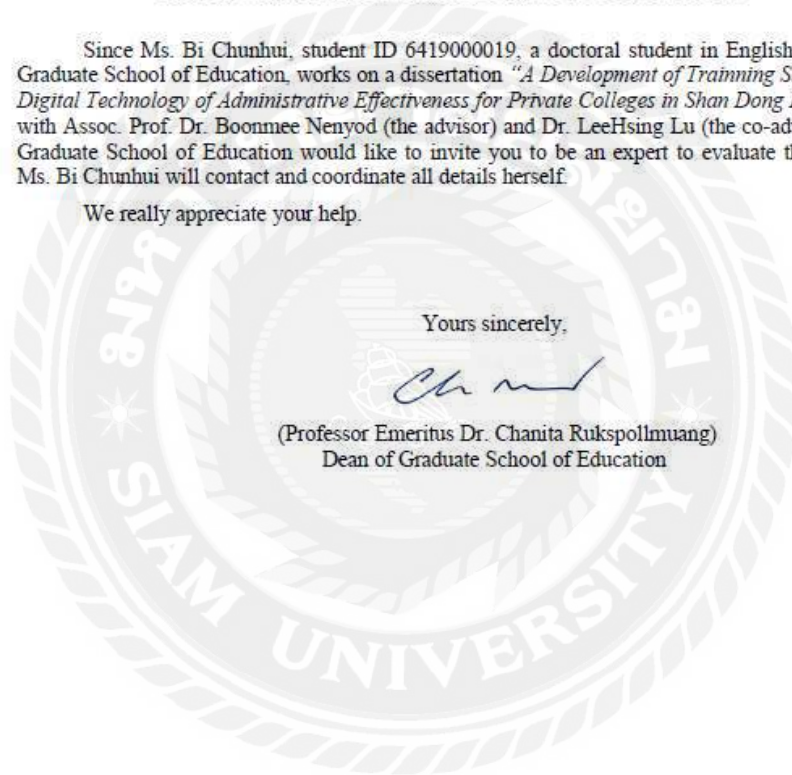
Since Ms. Bi Chunhui, student ID 6419000019, a doctoral student in English program, Graduate School of Education, works on a dissertation "*A Development of Training Strategy on Digital Technology of Administrative Effectiveness for Private Colleges in Shan Dong Province*" with Assoc. Prof. Dr. Boonmee Nenyod (the advisor) and Dr. LeeHsing Lu (the co-advisor), the Graduate School of Education would like to invite you to be an expert to evaluate the results. Ms. Bi Chunhui will contact and coordinate all details herself.

We really appreciate your help.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Chanita'.

(Professor Emeritus Dr. Chanita Rukspollmuang)
Dean of Graduate School of Education





研究成果专家评估邀请函

尊敬的教授：

您好！

我是毕春晖，泰国暹罗大学教育学的一名在读博士。目前，我已基本完成了我的博士研究论文，题目为“山东省民办高校行政效能数字化技术培训策略的制定”。现诚挚地邀请您作为该领域的专家对我的研究发现和成果进行评估。

按照学校的要求，我想请您通过适当性、可行性和效用性三个维度对我的研究发现和成果进行评估，其中每个维度都有五个观测点，请您对表中的每一维度中的每一个观测点进行打分，对我的这项研究的价值做出客观、公正、全面的评价，以利于我今后更加深入地研究。

请您针对打分表中每个观测点依据你的认可程度进行打分，使用以下评分标准对打分表中的项目进行评分

- 5: 完全认同
- 4: 比较认同
- 3: 基本认同
- 2: 基本不认同
- 1: 完全不认同

我将为您提供详细的评估表，您只需根据您的认定结果在评估表中的对应栏打“√”即可，标注“*”为核心指标，请您重点关注。

我会将评估表通过电子邮件发送给您，您可以在审阅后将填写的评估表以电子邮件形式发回。您的评估对我今后进一步地深入研究此类课题具有重要意义。

整个评估过程预计需要 30 分钟，我们非常感谢您在百忙之中抽出时间参与此次评估。

您的专业评估将帮助我对此研究的价值有明确的认识并对今后的深入研究帮助巨大。我会在最终报告中感谢您的贡献。

再次感谢您的宝贵时间与支持！

此致！

敬礼！

毕春晖

暹罗大学 Ph. D.

399768215@qq.com

2025. 07. 05

APPENDIX D: PIM



ใบรับรองจริยธรรมการวิจัยในมนุษย์
สถาบันการจัดการปัญญาภิวัฒน์

หมายเลขใบรับรอง: PIM-REC 070/2567

ข้อเสนอการวิจัยนี้ และเอกสารประกอบของข้อเสนอการวิจัยตามรายการแสดงด้านล่าง ได้รับการพิจารณาจากคณะกรรมการจริยธรรมการวิจัยในมนุษย์ สถาบันการจัดการปัญญาภิวัฒน์แล้ว คณะกรรมการฯ มีความเห็นว่าข้อเสนอการวิจัยที่จะดำเนินการมีความสอดคล้องกับหลักจริยธรรมสากล ตลอดจนกฎหมาย ข้อบังคับและข้อกำหนดภายในประเทศ จึงเห็นสมควรให้ดำเนินการตามข้อเสนอการวิจัยนี้ได้

ชื่อข้อเสนอโครงการ: A Development of Training Strategy on Digital Technology of Administrative Effectiveness for Private Colleges in Shan Dong Province

รหัสข้อเสนอการวิจัย (ถ้ามี): (ไม่มี)

หน่วยงาน: Siam University

ผู้วิจัยหลัก: BI CHUNHUI

ลงนาม

(อาจารย์ ดร.พิเชษฐ์ มุสิกะโปดก)

ประธานคณะกรรมการจริยธรรมการวิจัยในมนุษย์
สถาบันการจัดการปัญญาภิวัฒน์

วันที่รับรอง: 27 มกราคม 2568

วันหมดอายุ: 27 มกราคม 2569

เอกสารที่คณะกรรมการรับรอง

1. โครงร่างการวิจัย
2. ข้อมูลสำหรับแจ้งกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย และ ใบแสดงความยินยอมจากกลุ่มประชากรหรือผู้มีส่วนร่วมในการวิจัย
3. เครื่องมือที่ใช้ในการวิจัย/กิจกรรมวิจัย เช่น แบบสอบถาม แบบสัมภาษณ์ ประเด็นในการสนทนากลุ่ม เป็นต้น

เงื่อนไขการรับรอง

1. นักวิจัยดำเนินการวิจัยตามที่ระบุไว้ในโครงร่างการวิจัยอย่างเคร่งครัด
2. นักวิจัยรายงานเหตุการณ์ไม่พึงประสงค์ที่ร้ายแรงที่เกิดขึ้นหรือเปลี่ยนแปลงกิจกรรมวิจัยใดๆ ต่อคณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ภายในกำหนด
3. นักวิจัยส่งรายงานความก้าวหน้าต่อคณะกรรมการพิจารณาจริยธรรมการวิจัยในมนุษย์ตามเวลาที่กำหนดหรือเมื่อได้รับการร้องขอจากคณะกรรมการ
4. หากการวิจัยไม่สามารถดำเนินการเสร็จสิ้นภายในกำหนด ผู้วิจัยต้องยื่นขอผู้ให้ทุนก่อนอย่างน้อย 3 เดือน
5. หากการวิจัยเสร็จสมบูรณ์ ผู้วิจัยต้องแจ้งปิดโครงการตามแบบฟอร์มที่กำหนด

APPENDIX E: Validation of Research Outcomes

This appendix presents the expert validation of the research outcomes referred to in Chapter 5. The purpose of the validation was to enhance the credibility, applicability, and practical relevance of the proposed strategy without introducing additional empirical analysis.

List of Experts for Evaluating the Research Results

No.	Name	Title	Institution	Position	Mode of Participation
E1	Kuang Yizhen	Professor	Qilu Medical College	President	Online
E2	Wang Nan	Lecturer	School of Finance and Economics, Qingdao Binhai University	Director of Teaching and Research Office	Online
E3	Ding Yingying	Professor	School of Economics and Management, Weifang University of Science and Technology	Dean	Online
E4	Ding Fuqiang	Associate Professor	Shandong Engineering Vocational and Technical University	Director of Network Center	Offline
E5	Zhang Zhenxing	Professor	Qingdao Hengxing University of Science and Technology	Director of Faculty Affairs Office	Online
E6	Cui Ping	Professor	Shandong Foreign Languages Vocational College	Director of Faculty Affairs Office	Offline
E7	Li Ling	-	Yanshan College, Shandong University of Finance and Economics	Finance Office Staff	Online
E8	Jin Liu	Lecturer	Shandong Engineering Vocational and Technical University	Director of Training Section	Offline
E9	Liu Yu	-	Rizhao Maritime Engineering Vocational College	Student Affairs Staff	Offline

E1: Kuang Yizhen

Dimension	No.	Evaluation Indicator	1=Strongly Disagree, 5=Strongly Agree				
			5	4	3	2	1
Propriety 0.3	P1*	Alignment with the transformation needs of private universities	√				
	P2*	Logical consistency between theoretical frameworks and empirical analysis		√			
	P3*	Applicability of research methods to Double-Qualified teacher cultivation	√				
	P4	Operational feasibility of policy recommendations		√			
	P5	Consideration of cultural differences in incentive strategy design			√		
Feasibility 0.4	F1*	Cost control capability of incentive programs		√			
	F2	Accessibility of industry-academia cooperation resources		√			
	F3	Implementation challenges of Double-Qualified teacher certification systems			√		
	F4	Compatibility of digital training platforms across disciplines		√			
	F5	Sustainability of dynamic evaluation mechanisms		√			
Utility 0.3	U1*	Enhancement effects on teachers' self-efficacy	√				
	U2	Improvement outcomes for students' vocational skills		√			
	U3	Increase in corporate satisfaction with talent cultivation		√			
	U4	Conversion efficiency of social capital into educational resources		√			
	U5	Effectiveness of long-term career development support systems		√			



Kuang Yizhen

E2. Wang Nan

Dimension	No.	Evaluation Indicator	1=Strongly Disagree, 5=Strongly Agree				
			5	4	3	2	1
Propriety 0.3	P1*	Alignment with the transformation needs of private universities		√			
	P2*	Logical consistency between theoretical frameworks and empirical analysis	√				
	P3*	Applicability of research methods to Double-Qualified teacher cultivation	√				
	P4	Operational feasibility of policy recommendations		√			
	P5	Consideration of cultural differences in incentive strategy design		√			
Feasibility 0.4	F1*	Cost control capability of incentive programs	√				
	F2	Accessibility of industry-academia cooperation resources	√				
	F3	Implementation challenges of Double-Qualified teacher certification systems		√			
	F4	Compatibility of digital training platforms across disciplines	√				
	F5	Sustainability of dynamic evaluation mechanisms		√			
Utility 0.3	U1*	Enhancement effects on teachers' self-efficacy	√				
	U2	Improvement outcomes for students' vocational skills	√				
	U3	Increase in corporate satisfaction with talent cultivation		√			
	U4	Conversion efficiency of social capital into educational resources		√			
	U5	Effectiveness of long-term career development support systems	√				

王楠
Wang Nan

E3. Ding Yingying

Dimension	No.	Evaluation Indicator	1=Strongly Disagree, 5=Strongly Agree				
			5	4	3	2	1
Propriety 0.3	P1*	Alignment with the transformation needs of private universities	√				
	P2*	Logical consistency between theoretical frameworks and empirical analysis		√			
	P3*	Applicability of research methods to Double-Qualified teacher cultivation		√			
	P4	Operational feasibility of policy recommendations	√				
	P5	Consideration of cultural differences in incentive strategy design		√			
Feasibility 0.4	F1*	Cost control capability of incentive programs		√			
	F2	Accessibility of industry-academia cooperation resources		√			
	F3	Implementation challenges of Double-Qualified teacher certification systems		√			
	F4	Compatibility of digital training platforms across disciplines	√				
	F5	Sustainability of dynamic evaluation mechanisms	√				
Utility 0.3	U1*	Enhancement effects on teachers' self-efficacy	√				
	U2	Improvement outcomes for students' vocational skills		√			
	U3	Increase in corporate satisfaction with talent cultivation	√				
	U4	Conversion efficiency of social capital into educational resources		√			
	U5	Effectiveness of long-term career development support systems	√				

丁莹莹
Ding Yingying

E4. Ding Fuqiang

Dimension	No.	Evaluation Indicator	1=Strongly Disagree, 5=Strongly Agree				
			5	4	3	2	1
Propriety 0.3	P1*	Alignment with the transformation needs of private universities	√				
	P2*	Logical consistency between theoretical frameworks and empirical analysis	√				
	P3*	Applicability of research methods to Double-Qualified teacher cultivation	√				
	P4	Operational feasibility of policy recommendations		√			
	P5	Consideration of cultural differences in incentive strategy design		√			
Feasibility 0.4	F1*	Cost control capability of incentive programs	√				
	F2	Accessibility of industry-academia cooperation resources		√			
	F3	Implementation challenges of Double-Qualified teacher certification systems		√			
	F4	Compatibility of digital training platforms across disciplines	√				
	F5	Sustainability of dynamic evaluation mechanisms	√				
Utility 0.3	U1*	Enhancement effects on teachers' self-efficacy	√				
	U2	Improvement outcomes for students' vocational skills	√				
	U3	Increase in corporate satisfaction with talent cultivation		√			
	U4	Conversion efficiency of social capital into educational resources			√		
	U5	Effectiveness of long-term career development support systems		√			

丁福强
Ding Fu qiang

E5. Zhang Zhenxing

Dimension	No.	Evaluation Indicator	1=Strongly Disagree, 5=Strongly Agree				
			5	4	3	2	1
Propriety 0.3	P1*	Alignment with the transformation needs of private universities	√				
	P2*	Logical consistency between theoretical frameworks and empirical analysis	√				
	P3*	Applicability of research methods to Double-Qualified teacher cultivation		√			
	P4	Operational feasibility of policy recommendations		√			
	P5	Consideration of cultural differences in incentive strategy design			√		
Feasibility 0.4	F1*	Cost control capability of incentive programs		√			
	F2	Accessibility of industry-academia cooperation resources		√			
	F3	Implementation challenges of Double-Qualified teacher certification systems		√			
	F4	Compatibility of digital training platforms across disciplines		√			
	F5	Sustainability of dynamic evaluation mechanisms		√			
Utility 0.3	U1*	Enhancement effects on teachers' self-efficacy	√				
	U2	Improvement outcomes for students' vocational skills		√			
	U3	Increase in corporate satisfaction with talent cultivation	√				
	U4	Conversion efficiency of social capital into educational resources			√		
	U5	Effectiveness of long-term career development support systems		√			

张震兴
Zhang Zhen xing

E6. Cui Ping

Dimension	No.	Evaluation Indicator	1=Strongly Disagree, 5=Strongly Agree				
			5	4	3	2	1
Propriety 0.3	P1*	Alignment with the transformation needs of private universities	√				
	P2*	Logical consistency between theoretical frameworks and empirical analysis		√			
	P3*	Applicability of research methods to Double-Qualified teacher cultivation	√				
	P4	Operational feasibility of policy recommendations	√				
	P5	Consideration of cultural differences in incentive strategy design		√			
Feasibility 0.4	F1*	Cost control capability of incentive programs		√			
	F2	Accessibility of industry-academia cooperation resources	√				
	F3	Implementation challenges of Double-Qualified teacher certification systems		√			
	F4	Compatibility of digital training platforms across disciplines	√				
	F5	Sustainability of dynamic evaluation mechanisms		√			
Utility 0.3	U1*	Enhancement effects on teachers' self-efficacy	√				
	U2	Improvement outcomes for students' vocational skills	√				
	U3	Increase in corporate satisfaction with talent cultivation		√			
	U4	Conversion efficiency of social capital into educational resources		√			
	U5	Effectiveness of long-term career development support systems	√				

崔萍
Cui Ping

E7. Li Ling

Dimension	No.	Evaluation Indicator	1=Strongly Disagree, 5=Strongly Agree				
			5	4	3	2	1
Propriety 0.3	P1*	Alignment with the transformation needs of private universities	√				
	P2*	Logical consistency between theoretical frameworks and empirical analysis		√			
	P3*	Applicability of research methods to Double-Qualified teacher cultivation	√				
	P4	Operational feasibility of policy recommendations	√				
	P5	Consideration of cultural differences in incentive strategy design		√			
Feasibility 0.4	F1*	Cost control capability of incentive programs	√				
	F2	Accessibility of industry-academia cooperation resources	√				
	F3	Implementation challenges of Double-Qualified teacher certification systems		√			
	F4	Compatibility of digital training platforms across disciplines		√			
	F5	Sustainability of dynamic evaluation mechanisms		√			
Utility 0.3	U1*	Enhancement effects on teachers' self-efficacy	√				
	U2	Improvement outcomes for students' vocational skills	√				
	U3	Increase in corporate satisfaction with talent cultivation	√				
	U4	Conversion efficiency of social capital into educational resources		√			
	U5	Effectiveness of long-term career development support systems	√				

李玲
Li Ling

E8. Jin Liu

Dimension	No.	Evaluation Indicator	1=Strongly Disagree, 5=Strongly Agree				
			5	4	3	2	1
Propriety 0.3	P1*	Alignment with the transformation needs of private universities	√				
	P2*	Logical consistency between theoretical frameworks and empirical analysis	√				
	P3*	Applicability of research methods to Double-Qualified teacher cultivation	√				
	P4	Operational feasibility of policy recommendations		√			
	P5	Consideration of cultural differences in incentive strategy design		√			
Feasibility 0.4	F1*	Cost control capability of incentive programs	√				
	F2	Accessibility of industry-academia cooperation resources	√				
	F3	Implementation challenges of Double-Qualified teacher certification systems		√			
	F4	Compatibility of digital training platforms across disciplines		√			
	F5	Sustainability of dynamic evaluation mechanisms		√			
Utility 0.3	U1*	Enhancement effects on teachers' self-efficacy	√				
	U2	Improvement outcomes for students' vocational skills		√			
	U3	Increase in corporate satisfaction with talent cultivation		√			
	U4	Conversion efficiency of social capital into educational resources		√			
	U5	Effectiveness of long-term career development support systems	√				


 Jin Liu

E9. Liu Yu

Dimension	No.	Evaluation Indicator	1=Strongly Disagree, 5=Strongly Agree				
			5	4	3	2	1
Propriety 0.3	P1*	Alignment with the transformation needs of private universities		√			
	P2*	Logical consistency between theoretical frameworks and empirical analysis	√				
	P3*	Applicability of research methods to Double-Qualified teacher cultivation	√				
	P4	Operational feasibility of policy recommendations		√			
	P5	Consideration of cultural differences in incentive strategy design		√			
Feasibility 0.4	F1*	Cost control capability of incentive programs	√				
	F2	Accessibility of industry-academia cooperation resources		√			
	F3	Implementation challenges of Double-Qualified teacher certification systems		√			
	F4	Compatibility of digital training platforms across disciplines	√				
	F5	Sustainability of dynamic evaluation mechanisms		√			
Utility 0.3	U1*	Enhancement effects on teachers' self-efficacy	√				
	U2	Improvement outcomes for students' vocational skills	√				
	U3	Increase in corporate satisfaction with talent cultivation		√			
	U4	Conversion efficiency of social capital into educational resources		√			
	U5	Effectiveness of long-term career development support systems	√				


 LIU YU

Expert Evaluation Criteria and Scores

Dimension	No	Evaluation Indicator	Expert									Avg. Score
			E 1	E 2	E 3	E 4	E 5	E 6	E 7	E 8	E 9	
Propriety 0.3	P1	Alignment with the transformation needs of private universities	5	4	5	4	5	5	5	5	4	4.7
	P2	Logical consistency between theoretical frameworks and empirical analysis	4	5	4	5	5	4	4	5	5	4.5
	P3	Applicability of research methods to Double-Qualified teacher cultivation	5	5	5	4	4	5	5	5	5	4.8
	P4	Operational feasibility of policy recommendations	4	4	5	4	4	5	5	4	4	4.3
	P5	Consideration of cultural	5	5	5	4	3	5	4	4	4	4.3

Dimension	No	Evaluation Indicator	Expert									
			E 1	E 2	E 3	E 4	E 5	E 6	E 7	E 8	E 9	Avg. Score
Feasibility 0.4	F1 *	differences in incentive strategy design										
		Cost control capability of incentive programs	4	5	4	5	4	4	5	5	5	4.6
		Accessibility of industry-academia cooperation resources	4	5	4	4	4	5	5	5	4	4.4
		Implementation challenges of Double-Qualified teacher certification systems	3	4	4	4	4	4	5	4	4	4.0
		Compatibility of digital training platforms across disciplines	5	5	5	5	4	5	5	4	5	4.8
F5	Sustainability of dynamic evaluation mechanisms	4	4	5	5	5	4	4	4	4	4.3	

Dimension	No	Evaluation Indicator	Expert									Avg. Score
			E 1	E 2	E 3	E 4	E 5	E 6	E 7	E 8	E 9	
Utility 0.3	U1	Enhancement * effects on teachers' self- efficacy	5	5	5	5	5	5	5	5	5	5.0
	U2	Improvement outcomes for students' vocational skills	4	5	4	5	4	4	4	4	5	4.3
	U3	Increase in corporate satisfaction with talent cultivation	4	4	4	4	5	4	5	4	4	4.2
	U4	Conversion efficiency of social capital into educational resources	4	5	4	3	3	4	5	4	5	4.1
	U5	Effectiveness of long-term career development support systems	4	5	5	4	4	5	5	5	5	4.7

Scoring Guidelines:

- Rate each indicator on a 5-point scale (1=Strongly Disagree, 5=Strongly Agree)
- Items marked with "*" are core indicators

Validation Summary of Expert Evaluation

Dimension	Total Score Range	Avg. Score	Std. Deviation	Conclusion
Propriety	15—75	4.3	0.3	Highly Appropriate
Feasibility	20—100	4.5	0.4	Fully Feasible
Utility	15—75	4.4	0.3	Significant Utility

Summary of Experts' Qualitative Feedback

The following qualitative feedback was collected from experts (E1–E9) to supplement the quantitative validation results and to further assess the rationality, feasibility, and applicability of the research outcomes.

E1. The expert noted that the proposed model aligns well with the strategic transformation objectives of private higher education institutions, particularly in contexts requiring systematic digital governance reform.

E2. The expert emphasized that the training model provides practical and actionable pathways for improving administrators' digital competencies, especially in institutions with strong management and financial characteristics.

E3. According to the expert, the framework effectively integrates management theory with practical application, enhancing its adaptability for administrative capacity building in diverse institutional settings.

E4. The expert highlighted that the model is technically sound and can be effectively integrated with existing digital platforms used in vocational institutions, supporting smooth implementation.

E5. The expert pointed out that the model adopts a structured and scalable approach to digital transformation, which is conducive to improving administrative effectiveness and organizational coordination.

E6. The expert indicated that the model reflects a comprehensive understanding of professional development needs within private higher education administration, particularly under conditions of digital transformation.

E7. The expert noted that the proposed strategy outlines feasible and cost-conscious measures that are suitable for financial planning and resource allocation in administrative reform.

E8. The expert remarked that the model demonstrates clarity in operational design and is applicable to practical administrative training and management processes.

E9. The expert suggested that the framework provides a realistic approach to enhancing administrative support systems, thereby contributing to improved institutional services and management efficiency.

The validation results indicate that the strategy is generally feasible to implement under existing institutional conditions and compatible with current administrative and digital training systems. Although certain aspects were identified as requiring careful consideration during implementation, these issues were viewed as directions for further refinement rather than fundamental limitations.

In summary, the expert validation supports the credibility and practical value of the research outcomes and reinforces the potential of the proposed strategy to enhance administrative effectiveness through digital technology integration.



Evaluation Opinions on Research Results

Title: A Development of Training Strategy on Digital Technology of Administrative Effectiveness for Private Colleges in Shan Dong Province

This research presents a timely and relevant framework for enhancing administrative effectiveness in private colleges through digital technology. The alignment with national educational reforms, especially the emphasis on informatization and smart campus development, reflects strong policy awareness. While the study's methodology is sound, incorporating case studies from different institutional types could enrich contextual understanding.

The quantitative analysis is well-executed, with appropriate use of factor analysis and reliability testing. Nonetheless, a clearer justification for the selection of core indicators would strengthen the evaluation framework.

From a practical standpoint, the digital training strategy proposed is actionable and well-structured. For greater effectiveness, future iterations could consider modular training designs and adaptive learning technologies based on faculty digital literacy levels.

Title: A Development of Training Strategy on Digital Technology of Administrative Effectiveness for Private Colleges in Shan Dong Province

The study offers a comprehensive approach to addressing administrative challenges in private higher education institutions by leveraging digital tools. It fills a critical gap in the literature by focusing on administrative personnel rather than teaching staff alone. The theoretical foundation, based on organizational effectiveness and educational change theories, is robust.

Statistically, the multi-group analysis and use of validation scoring from experts enhance the reliability of conclusions. However, greater transparency in coding qualitative data would improve methodological clarity.

The proposed strategies—especially in terms of digital platform integration and continuous assessment—are valuable. For future application, the model could be strengthened by including stakeholder feedback loops and institutional benchmarking tools.

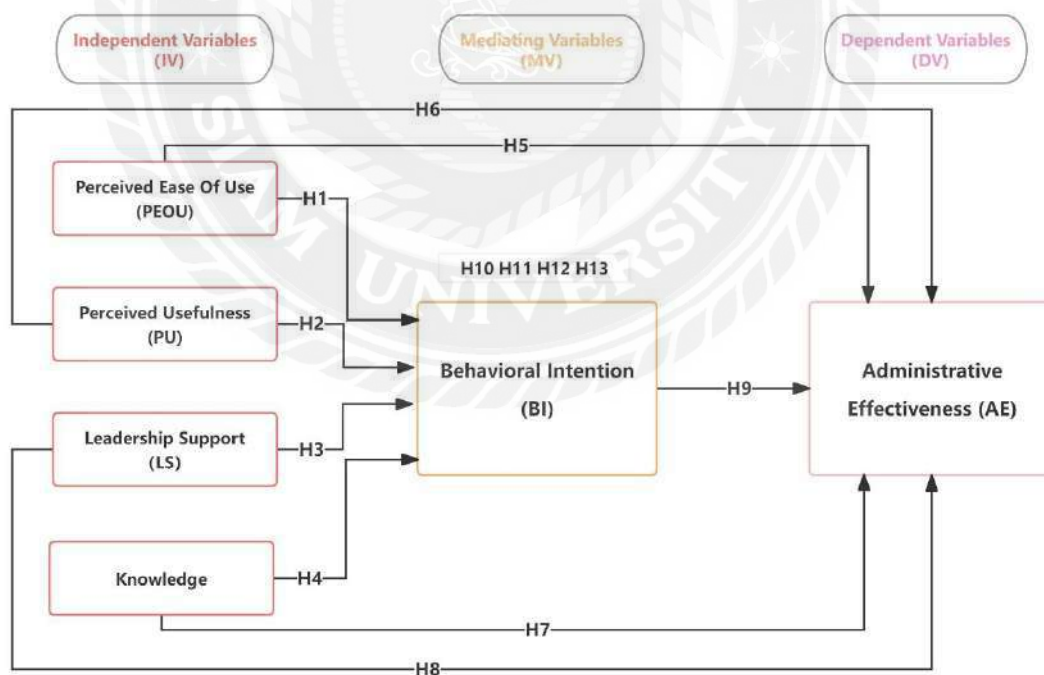
Title: A Development of Training Strategy on Digital Technology of Administrative Effectiveness for Private Colleges in Shan Dong Province

This study demonstrates a strong understanding of the evolving role of administration in private colleges, particularly in the digital era. It is commendable that the research incorporates both macro-level policy perspectives and micro-level institutional realities. The mixed-methods approach increases the credibility of the findings.

The use of expert validation adds rigor to the model, although the study might benefit from a follow-up survey to test implementation effectiveness. The sample of nine expert reviewers is appropriate, yet expanding to include voices from industry or local government would provide additional practical insight.

In terms of application, the framework provides clear and realistic recommendations. To further strengthen its utility, implementation toolkits or templates for training program design could be developed in future studies.

Conceptual Framework



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I have authored three textbooks in the areas of finance, providing students with comprehensive learning resources. Additionally, I have published six academic papers, which have allowed me to share my research findings and insights with my peers. Furthermore, I have led several projects to promote the coordinated of industry, university and research in education. In addition, one of my notable achievements was to chair the educational reform project of the Provincial Education Department.