



**THE EFFECTS OF INFORMATION TECHNOLOGY
KNOWLEDGE TO HIGHER EDUCATIONAL INFORMATION
MANAGEMENT IN NANJING UNIVERSITIES**



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**AN INDEPENDENT STUDY SUBMITTED IN PARTIAL FULFILLMENT OF
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**To
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This Independent Study has been Approved as a Partial Fulfillment of the
Requirement of International Master of Business Administration in International
Business Management


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Abstract

Today, the goal of information management can be achieved through Big data. Building a complete information management framework based on information technology has significantly improved the efficiency and quality of university education management. The objectives of this study were 1) to explore the effects of information technology knowledge to higher educational information management in Nanjing Universities; and 2) to propose practical and feasible informatization construction strategies in Nanjing Universities and provide corresponding reference for the informatization of university education management.

This study adopts quantitative research methods. The research subjects of this study selected network managers, academic administrators, and full-time teachers from universities in Nanjing, 246 questionnaires were distributed to universities in Nanjing.

The study found that: 1) there are four factors have a significant impact and interdependence on the effectiveness of higher education institutions in Nanjing Universities, which are higher education data mining systems, security support systems, resource meanings, and higher education information systems and 2) construction strategies in Nanjing Universities can be done with five aspects, firstly strengthen the cognition of education management informatization; secondly, improve the professional quality of school education management personnel; thirdly, create a network information platform; fourthly optimize the informatization mode of college education management; finally, strengthen the construction of information infrastructure in colleges and universities.

Keywords: Educational data; College education; Informatization system; Educational management Strategy.

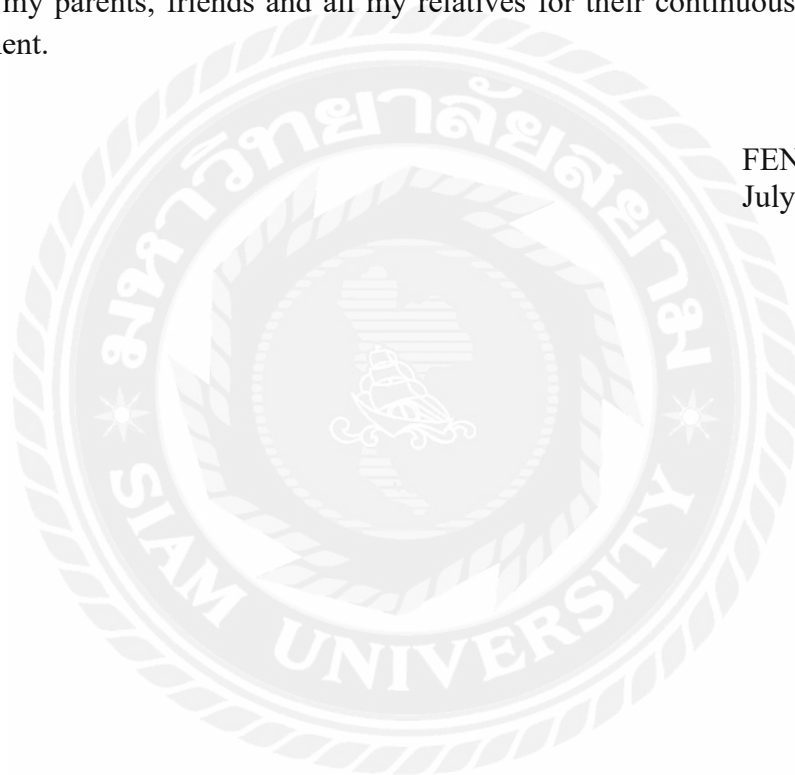
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FENG JING
July 20,2023



Declaration

I FENG JING, hereby certify that the work embodied in this independent study entitled “*The Effects of Information Technology Knowledge to Higher Educational Information Management in Nanjing Universities*” is result of original research and has not been submitted for a higher degree to any other university or institution.



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July 20, 2023

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Chapter 1 Introduction

1.1 Research Background

With the rapid development of big data, countries have attached great importance to it, accelerated its layout in education, and successively released national strategic plans. In March 2012, the United States officially launched the "Big Data Research and Development" program (Martirosyan, L., 2015). In April 2012, the Office of Educational Technology of the U.S. Department of Education released the report "Promoting Teaching and Learning Through Educational Data Mining and Learning Analysis (Public Comment Draft)", marking the official entry of big data into the field of education. In May 2014, the UK released "Seize the Data Opportunity: The UK Data Capability Strategy" (Arputhamary, B., & Arockiam, L., 2015). In September 2014, Japan published "Talent Cultivation in the Era of Big Data". In August 2015, the Chinese government issued the "Action Outline for Promoting the Development of Big Data", clearly proposing the implementation of educational and cultural big data projects (Kozlov, O. A., & Polyakov, V. P., 2018).

University education informatization is an important content of education informatization construction. In 2001, the Ministry of Education of China put forward the strategy of "driving the modernization of education and promoting the leapfrog development of education by means of educational informatization" (Likeriy, D., 2018). University education management informatization is an indispensable part of university education informatization construction. In 2010, the "National Medium and Long-term Educational Reform and Development Plan (2010-2020)" issued by the Chinese government clearly stated that it is necessary to strengthen the construction of educational informatization, develop educational management information systems, formulate school basic information management requirements, and accelerate school management. Informatization process (Wang, N., & Wang, J., 2018).

At present, many universities have implemented informatization in student management work, but the completed work systems lack efficient system integration, resulting in a low degree of systematization. The exchange of information still relies on third-party mobile communication or communication software, and the data mainly relies on email or communication software attachments during the transmission process, resulting in low transmission efficiency. At present, the management of college students involves multiple departments, and the system barriers between departments make the data application process cumbersome. In the process of data transmission, counselors play the role of system relays. Due to the large volume of data requests and

the relatively complex types of information, the efficiency of data transmission is reduced, and it is likely to miss out on data request tasks that need to be processed in a timely manner. This not only increases the workload of counselors, but also significantly reduces the timeliness of information transmission. (Shan Yaojun , 2014)

With the continuous development of science and technology, the speed of information circulation has been accelerated, which has changed people's lifestyle and made communication between people closer and closer. On the variety of society are deeply affected by it in many term of big data environment. The Internet is the product of the new era. The information based on many sources in globalization trend. Traditional data cannot contain massive information, and it is difficult to ensure the effectiveness of college education management. However, the application of big data management mode is conducive to the comprehensive development of college education management informatization, plays a greater role in improving the school management level and deepening the reform effect of teaching methods, which is extremely conducive to achieving the long-term development goal of the school (Smith, B. S., & Squires, V. 2016).

Using data mining technology can improve the speed at which users access information resources and retrieve their information in the shortest possible time. Ensure the optimization of information resources in higher education institutions, provide reference services for the construction of information resources in higher education institutions, and accelerate personalized services for the construction of information resources in higher education institutions.

A comprehensive security support system aims to protect the confidentiality, integrity, and availability of information, systems, and assets, reducing the likelihood and impact of security vulnerabilities or events.

Resource implication plays a crucial role in the informationization of higher education by enhancing learning experience, achieving personalized learning, promoting collaboration, promoting accessibility, and promoting continuous improvement. By recognizing and utilizing the importance and value of educational resources in the digital age, higher education institutions can unleash new possibilities for effective and transformative teaching (Rennie, F., & Morrison, T. 2013).

The information system in higher education contributes to the fair development of higher education, the development and improvement of higher education theory, and the modernization of higher education goals.

1.2 Research Problems

At present, the problems existing in the informatization of education management in colleges and universities based on the Big data environment mainly include three aspects as following:

Firstly, colleges and universities have a low level of understanding of the informatization of education management. At present, there are many problems in the implementation of teaching management in Chinese universities. For example, some universities have not included information management in school management, resulting in superficial information management in schools. At the same time, some schools have a bias in their understanding of information management, thinking that school information management is just promoting campus networks or building campus all-in-one cards, while ignoring the extensive application of Big data technology.

Secondly, managers have low information management literacy. In the data age, some universities focus on the use of hardware equipment and neglect the systematic improvement of professional quality and ability in education management, resulting in a shortage of talent and low management level in the education management team of universities. Due to the lack of professional education management personnel in universities, it is impossible to ensure the informationization development of university education management.

Finally, the Big data management information system is outdated. Currently, the informationization construction of universities in China is facing many problems. In daily teaching management work, how to implement this system is a difficult and key point in the reform of the education management system in universities. In the field of university management and teaching, the existing education management system has already taken shape, but with the widespread application of information technology, the traditional management system will inevitably be affected. If we do not focus on the integration of the new system and the original system, it will increase the difficulty of the implementation of university education management informatization, leading to the lag of the construction process of university Big data management system.

1.3 Objective of the study

The research is based on an extensive analysis of a large number of data sets collected from Nanjing University. However, it reveals a worrying gap in current information management practices due to insufficient security systems and limited skills in effectively identifying reliable sources and extracting meaningful knowledge. The existing information systems of higher education institutions in Nanjing seem unable to meet the growing demands of the digital age. This study mainly explores the profound impact of data mining, security assurance systems, resource interpretation,

and information systems on information management in the field of higher education. By examining these key aspects, this study aims to identify key areas that need to be optimized and propose effective solutions to improve the overall efficiency and security of information management in Nanjing academic institutions.

The research objectives of this paper are as following:

1. To explore the effects of information technology knowledge to higher educational information management in Nanjing Universities.
2. To propose practical and feasible informatization construction strategies in Nanjing Universities and provide corresponding reference for the informatization of university education management.

1.4 Scope of the Study

This paper takes Nanjing universities as the research object. University education informatization refers to the use of information technology to improve the efficiency of various businesses in the practical activities of education and teaching (scientific research, teaching, management, etc.) The whole teaching process realizes informationization. The research objects are university network administrators, educational administrators and some full-time teachers. A total of 246 questionnaires were distributed, 246 were recovered, and 246 were valid, with an effective rate of 100%.

1.5 Research Significance

The research significance of this paper is to effectively enrich the theoretical experience in college education management, explore the direction and effective strategies of college education management informatization in combination with the background of big data environment, provide some reference for other researchers, and further promote the reform of college education management.

Based on the fact that most of the current educational informatization evaluation index systems are relatively simple and mainly rely on result data, this study analyzed relevant literature and policy documents, drew on existing index systems at home and abroad, and integrated the concept of big data (Liu, Q.,2020). The informatization of university education management builds an index system of the level of university education management informatization under the background of big data, which provides theoretical guidance and support for the evaluation of university education management informatization. Research provides some reference (Yang, X.,2020).

Based on the proposed evaluation indicators and integrated with big data technology, this study develops a data-driven university education management

informatization evaluation system, which can provide powerful tool support for the university management informatization evaluation practice. In addition, this study uses indicators and systems to carry out the evaluation practice of the level of education management informatization in colleges and universities, and provides guidance and suggestions for the development of education management informatization in colleges and universities through the evaluation practice, and provides decision support for the informatization of education management in colleges and universities(Gong, L.,2020); it also provides a basis for data-driven the evaluation practice of educational management informatization in colleges and universities provides a demonstration case and promotes the research and development of educational management informatization in colleges and universities.

1.6 Theoretical framework

Information Technology Knowledge

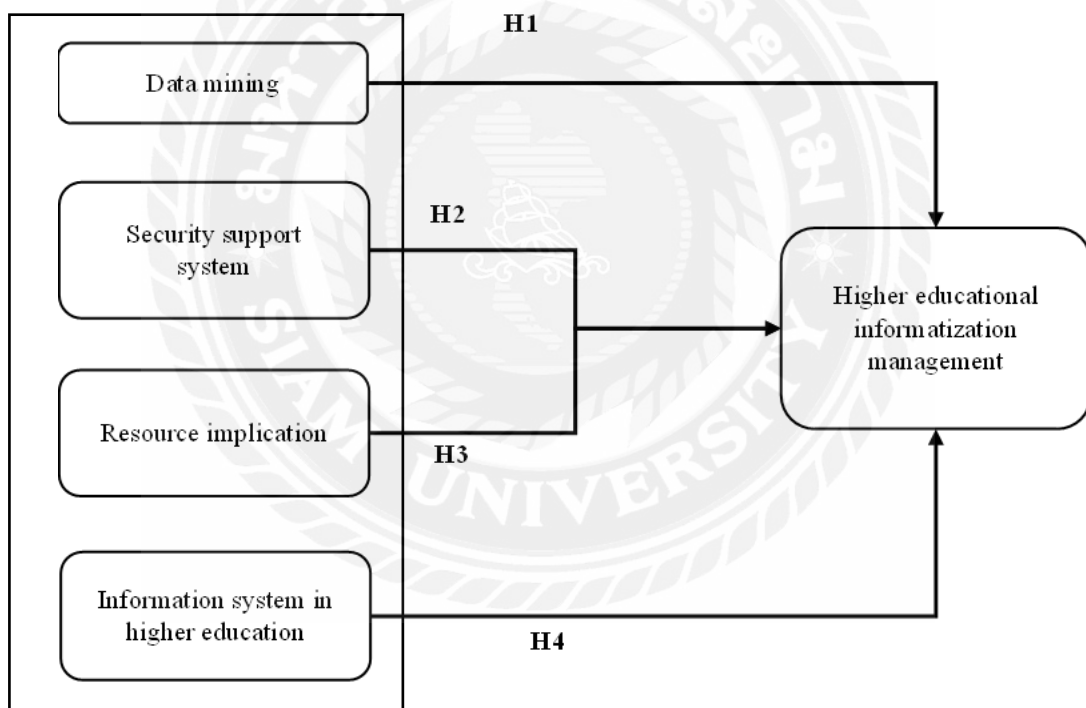


Figure 1 Conceptual framework

1.7 Hypotheses

This paper believes that information management is very important for college education management in the big data environment. Information construction relies on advanced information technology, which can process many educational information more quickly. The overall management efficiency has been significantly improved. In

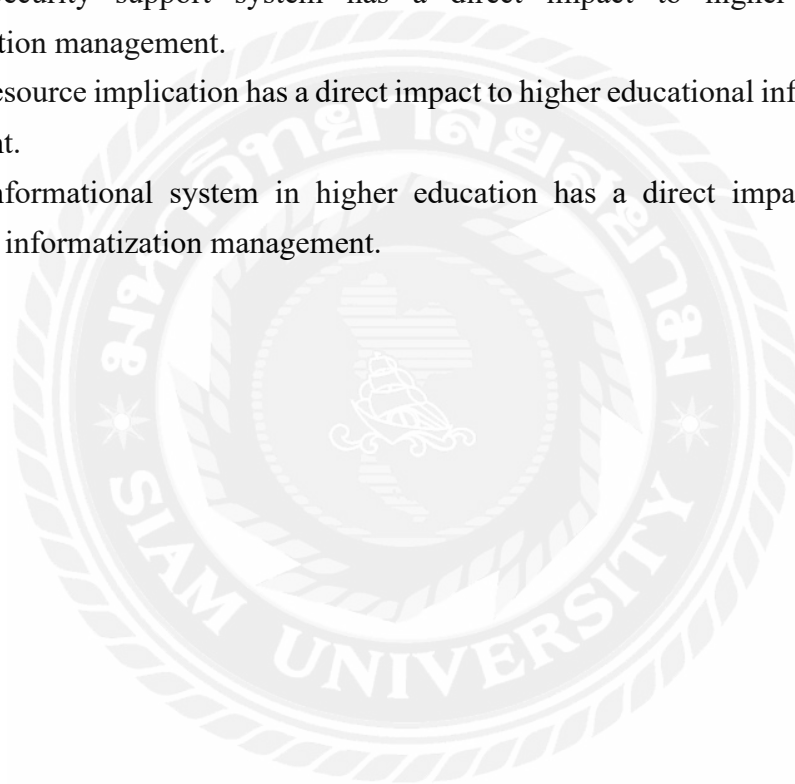
addition, because of the timeliness and effectiveness of management, the management quality is relatively high. Based on literature reviewing and strategy in informational management, this article response for the value of data in informatization strategy for evaluation. The background of study has four perspectives in of infrastructure of data mining, security support system, resource implication and informational system in higher education, and higher educational informatization management with the important role for each level in university's syllabus. The literature and relevant studies conclude as four hypotheses:

H1: Data mining has a direct impact to higher educational informatization management

H2: Security support system has a direct impact to higher educational informatization management.

H3: Resource implication has a direct impact to higher educational informatization management.

H4: Informational system in higher education has a direct impact to higher educational informatization management.



Chapter 2 Literatures Reviews

This chapter elaborates on the purpose, conceptual explanation, theoretical basis, and literature review of this study. Mainly studying digital mining, security assurance systems, resource meanings, and the impact of information systems in higher education on information management in higher education. Finally, this chapter provides a literature review, identifying theoretical gaps through previous research results, and identifying the theoretical contributions and research objectives of this article.

2.1 Information Technology Knowledge

"Information Technology Knowledge" refers to a broad understanding and proficiency in various areas of information technology (IT). This knowledge encompasses concepts, principles, tools, and techniques related to computers, software, networks, and digital systems. Individuals with information technology knowledge are capable of effectively utilizing technology to solve problems, optimize processes, and enhance business operations. Here are some key areas within information technology knowledge:

Computer Hardware and Software: Understanding the components of computers, how they work together, and the software that runs on them (Patterson, D. A., & Hennessy, J. L. 2016).

Operating Systems: Proficiency in using and managing different operating systems, such as Windows, macOS, and Linux.

Networking: Knowledge of network types, protocols, routing, and configurations to establish and manage data communication between devices.

Cybersecurity: Awareness of threats, vulnerabilities, and techniques to secure systems and data from unauthorized access and attacks.

Programming and Development: Skill in programming languages, software development methodologies, and tools to create applications and software solutions.

Databases: Understanding of database design, management, and querying for effective storage and retrieval of data.

Cloud Computing: Familiarity with cloud services, virtualization, and cloud providers to deploy and manage applications and resources.

Artificial Intelligence (AI) and Data Science: Knowledge of AI concepts, machine learning algorithms, and data analysis techniques.

Internet of Things (IoT): Understanding of IoT devices, sensors, and connectivity to enable data exchange and automation (Mouha, R. A. 2021).

Software Testing and Quality Assurance: Skills in testing software for functionality, reliability, and performance.

User Experience (UX) Design: Awareness of designing intuitive and user-friendly interfaces for software and applications.

Project Management: Proficiency in managing IT projects, including planning, execution, monitoring, and completion.

Ethical Hacking and Security: Understanding of ethical hacking techniques to identify vulnerabilities and improve system security. (Vishnuram, G., Tripathi, K., & Tyagi, A. K. 2022, January)

Data Privacy and Compliance: Knowledge of data protection laws and regulations to ensure privacy and compliance.

Emerging Technologies: Awareness of new and emerging technologies, such as blockchain, quantum computing, and augmented reality.

Troubleshooting and Problem Solving: Ability to diagnose and resolve technical issues that may arise in IT systems.

Communication and Collaboration: Effective communication and collaboration skills to work with cross-functional teams and convey technical information to non-technical stakeholders. (Saarani, C. R. B., & Bakri, N. 2012)

Continuous Learning: Willingness to stay updated with evolving technologies and trends in the IT field.

2.2 Data Mining

Data mining is a process of extracting knowledge and information. Specifically, it is the process of extracting information and data that is hidden internally and unknown to people from a large amount of incomplete, noisy, fuzzy, and random data applied in practice. (Yao, D., Yang, J., & Zhan, X. 2013).

The process of data mining includes the following aspects: data preprocessing, data mining, and result analysis and application. Firstly, the data is preprocessed to remove noisy data through data cleaning, ensuring consistency. Then, multiple files or files in multiple databases are merged and compressed to form an effective dataset, which facilitates data mining, shortens mining time, and improves mining quality. Next, we will mine the data and select different algorithms based on the different types and characteristics of the data, such as using classification, neural networks, genetic algorithms, and other technologies. Finally, analyze the results of the obtained data to ensure that they can be accepted and understood by users, and then apply the results to practical activities.

With the rapid development of the information society, the types and quantities of

data that people come into contact with and obtain are constantly increasing. At this time, traditional data analysis methods cannot help people solve problems more quickly and effectively. This requires us to use data mining as a means of work. In the context of educational information, university management is also developing towards information and networking (Bienkowski, M., Feng, M., & Means, B. 2012). In the process of education and teaching, a large amount of teaching data will inevitably be accumulated, but we can only conduct simple statistics and analysis on it, and cannot understand the deep content of the data. Teaching staff often draw conclusions based on simple empirical analysis, which often has many loopholes. This requires data mining to provide us with a deeper understanding of the information and content hidden in data, enabling managers to make scientific decisions, timely identify problems that students encounter during the learning process, develop effective teaching methods, make correct and objective analysis and evaluation, and improve the quality and level of education and teaching. It can be seen that data mining has important significance and necessity.

2.3 Security support system

A security support system refers to a set of technologies, processes, and practices designed to enhance the security and protection of an organization's information, systems, and assets. It encompasses various components and measures aimed at preventing, detecting, and responding to security threats. Here are some key elements of a security support system:

1. Access controls are mechanisms that restrict and control access to information and resources based on user identities and privileges. This includes user authentication (e.g., passwords, biometrics), authorization (defining user permissions), and user management (adding, modifying, or removing user accounts).

2. Firewalls are network security devices that monitor and control incoming and outgoing network traffic based on predefined security policies. They act as a barrier between trusted internal networks and untrusted external networks, preventing unauthorized access and protecting against network-based attacks. (Wack, J., Cutler, K., & Pole, J. 2002)

3. Intrusion Detection and Prevention Systems (IDPS) are security technologies that monitor network traffic or system activities to identify and respond to potential security incidents. They detect and alert administrators about suspicious activities, such as intrusion attempts or malicious behavior, and can also take automated actions to prevent or mitigate attacks.

4. Security Information and Event Management (SIEM) systems collect and

analyze log data from various sources across the network, such as firewalls, servers, and intrusion detection systems. They correlate and analyze these events in real-time, providing visibility into security incidents and enabling proactive incident response and threat management. (Eswaran, S., Srinivasan, A., & Honnavalli, P. 2021)

5. Antivirus and Antimalware Solutions refers to these software applications detect, prevent, and remove malicious software, such as viruses, worms, and Trojans. They scan files, emails, and system processes to identify and eliminate threats, protecting the organization's systems and data from malware-based attacks.

6. Data Encryption is the process of converting data into a coded form that can only be accessed with the appropriate decryption key. Data encryption is used to protect sensitive information, both in transit (e.g., using secure communication protocols like SSL/TLS) and at rest (e.g., encrypting files stored on disk or databases).

7. Security Awareness and Training which are the security support system includes efforts to educate and train employees on security best practices, policies, and procedures. Security awareness programs aim to promote a culture of security, raising awareness about potential threats, social engineering attacks, and the importance of following security guidelines. (Gundu, T. 2013).

8. Incident Response and Disaster Recovery refer to the well-defined incident response plan outlines the procedures and actions to be taken in the event of a security incident or breach. It includes steps for containment, eradication, and recovery. Disaster recovery plans outline processes and resources to restore systems and operations in the event of a major disruption, such as a natural disaster or a large-scale cyberattack.

9. Continuous Monitoring and Auditing which are the ongoing monitoring and auditing of systems, networks, and security controls are essential components of a security support system. Regular assessments and audits help identify vulnerabilities, non-compliant activities, or suspicious behavior, enabling timely remediation and ensuring compliance with security policies and regulations.

10. Security policies and procedures provide a framework for implementing and enforcing security measures within an organization. They define acceptable use policies, password requirements, incident reporting procedures, and other guidelines to ensure consistent security practices. (Landoll, D. J. 2017)

A comprehensive security support system combines these elements and aligns them with the organization's security goals and risk management strategy. It aims to protect the confidentiality, integrity, and availability of information, systems, and assets, reducing the likelihood and impact of security breaches or incidents (Syalim, A., Hori, Y., & Sakurai, K. 2009, March) .

2.4 Resource implication

The integration of teaching resources is an advanced teaching concept that meets the requirements of rapid development in modern society and continuous innovation in information technology, as well as the goals and requirements of education reform in the new era. However, most higher education institutions lack awareness of integrating teaching resources, relevant personnel lack awareness of keeping up with the times, or some universities lack the ability to integrate teaching resources and develop corresponding sharing platforms due to the need to invest more funds in teaching resource integration. At present, the methods of obtaining information in universities are relatively single, mainly through searching for relevant books in the library or searching for relevant theories on journal websites. Resources are relatively limited, and there are significant differences in the ability of different schools to obtain information. For example, some magazines require payment and are expensive, making it difficult for ordinary schools to bear the expensive costs (Ou Zhiliang 2017). With the development of internet technology, some students have realized that they can access teaching resources through the internet, but they lack corresponding theoretical knowledge and means, and are in a aimless state in the process of searching for resources.

The integration of teaching resources in the context of big data is actually the collection and organization of high-quality teaching resources, which are then disseminated through shared platforms, making it convenient for teachers and students to download and obtain high-quality resources. Through the Internet, these high-quality teaching resources can be disseminated on a larger scale, without being limited by space and time. By collecting teaching resources, students can choose the resources they are interested in to learn and improve their active learning ability. (Lin, Y., & Mao, K. 2022).

2.5 Informational system in Higher Education

Information systems in higher education refer to the integration of technology, processes, and data to support the management and delivery of educational programs and services within academic institutions. These systems encompass a wide range of applications and tools that facilitate the collection, storage, processing, and dissemination of information related to student records, academic programs, administrative processes, research, and more. Here are some key aspects of information systems in higher education:

1. Student Information Systems (SIS): Student information systems are the backbone of information systems in higher education. They manage student records,

including admissions, enrollment, registration, grades, attendance, and academic progress. SIS platforms provide a centralized database that supports various administrative functions, communication with students, reporting, and analysis of student data. (Zulu, C. D., Bigirimana, S., & Jagero, N. 2016).

2. Learning Management Systems (LMS) are software applications that enable the management, delivery, and tracking of educational courses and content. LMS platforms facilitate online learning, course enrollment, content sharing, assignment submission, grading, and communication between instructors and students. They often include features such as discussion forums, multimedia integration, and assessment tools. (Subramanian, P., Zainuddin, N., Alatawi, S., Javabdeh, T., & Hussin, A. 2014)

3. Administrative systems support various non-academic functions within higher education institutions. These systems include finance and accounting systems, human resources management systems, facilities management systems, and procurement systems. They streamline administrative processes, automate tasks, and support decision-making by providing accurate and timely information.

4. Research information systems assist in the management and tracking of research activities, grants, publications, and collaborations within the institution. These systems facilitate proposal submission, grant management, compliance tracking, intellectual property management, and reporting on research outputs and outcomes.

5. Institutional Reporting and Analytics which refer to the information systems in higher education include tools for generating reports and conducting analytics on various aspects of institutional operations. These systems collect and analyze data from different sources, enabling administrators to gain insights into student enrollment, retention, graduation rates, resource utilization, financial performance, and other key performance indicators. Reporting and analytics support evidence-based decision-making and planning. (Pentland, B. T. 2013)

6. Online Portals and Self-Service Systems which refer to the information systems provide online portals and self-service systems for students, faculty, and staff. These portals allow users to access personalized information, perform administrative tasks, access course materials, communicate with peers and instructors, and engage in various activities related to their roles within the institution. Online portals enhance user convenience, efficiency, and engagement.

7. Integration and Interoperability refer to the information systems in higher education require integration and interoperability to ensure smooth data flow and sharing between different systems. Integration enables the exchange of information across systems, avoiding data duplication and ensuring data consistency. Interoperability allows different systems to communicate and work together

seamlessly, enabling efficient information flow and process automation. (Panetto, H., & Molina, A. 2008)

8.Data Security and Privacy consisted the information systems in higher education handle sensitive data such as student records, financial information, and research data. Ensuring data security and privacy is of utmost importance. Institutions implement measures such as access controls, encryption, data backups, and compliance with privacy regulations to protect sensitive information and maintain data integrity.

9.Mobile and Online Learning: With the increasing use of mobile devices and online learning, information systems in higher education are adapting to support mobile learning experiences. Institutions provide mobile applications and responsive web platforms that allow students to access course materials, participate in discussions, submit assignments, and interact with faculty and peers using their smartphones or tablets.

Information systems in higher education play a vital role in streamlining administrative processes, supporting teaching and learning, facilitating research activities, and enabling evidence-based decision-making. The effective implementation and management of information systems contribute to enhanced operational efficiency, improved student experiences, and overall institutional effectiveness. (Hollands, F., & Escueta, M. 2020)

2.6 Higher educational informatization management

Information management of higher education refers to the combination of information technology and digital tools in the management and management of higher education institutions, and their effective utilization. Information management aims to strengthen various aspects of higher education, including teaching, learning, research, administrative processes, and communication, through the strategic application of information and communication technology. The informatization management of higher education utilizes the power of information technology to improve the overall efficiency, accessibility, and quality of higher education institutions. By integrating digital solutions and optimizing various processes, universities can adapt to the needs of the digital age, provide students with a more effective and attractive learning environment, and provide streamlined management systems for faculty and staff.

Nowadays, there are relatively many research achievements on the informatization strategy of college education management in the big data environment, which are mostly concentrated in two directions:

Necessity of informatization construction of university education management in big data environment. Difei (2022) believed in research that by strengthening the

application of big data and information technology, colleges and universities can establish a professional university education management platform on the Internet. Managers can understand the effectiveness of teaching programs and management system application through this platform and develop scientific and reasonable management programs according to the changes of the times and students' needs, breaking the shackles of traditional management programs and systems, so as to strengthen the overall efficiency and quality of college education management.

Peifen (2022) believed in the research that colleges and universities should use the network platform to further strengthen the communication and cooperation between various departments in colleges and universities, strengthen the effect of information and data sharing, so as to further improve the internal control ability of the school and promote the healthy development of modern college education management.

Informatization construction strategy of university education management in big data environment. Diaojiang (2021) believed in his research that, for student management, colleges and universities can use big data technology to prevent unnecessary data from occupying school resources. Colleges and universities should increase funding, and establish a larger data processing platform, so that it can be better applied to college education information management. Ma Yue (2021) believed in the research that universities should optimize education management software, establish various information organization structures, and store and integrate relevant information data of various organizations. In this process, colleges and universities should develop targeted and applicable teaching management software according to their own actual needs and specific development conditions, to ensure the authenticity and accuracy of relevant data, and comprehensively improve the effectiveness of the informatization of college education management.

Chapter 3 Research Methodology

3.1 Introduction

In the research process, “big data”, “college education”, “management informatization” and other key words are used to retrieve relevant literature, to comprehensively understand the research status and relevant research theories. The application of literature research method lays a good theoretical foundation for this study. The study applied quantitative research method by using the measurement as research tool, this study uses the SPSS program for analyst primary data from survey and calculate the statistical to create result from questionnaire, including reliability value as construct validity before confidential statistic in term of correlation analysis and regression analysis to determine data mining system for higher education, security support system, resource implication, information system in higher education, and higher educational informational management. All these variables must guarantee that the reliability value reaches standardized criteria. The relationship between the four dimensions to higher educational informational management.

3.2 Sampling

This questionnaire is targeted at specific groups within Nanjing universities, including network management personnel, academic management personnel, and selected full-time teachers. The population size of this study is from an unknown population, so this formula can be used. With a confidence interval of 95%, a margin error of 5%, and a maximum proportion of population variance of 20%, the minimum sample size is calculated, denoted as n_0 . The sample estimation process is as follows:

$$n_0 = \frac{E_a^2 \pi (1 - \pi)}{E^2} = \frac{1.96^2 \times 0.5 \times (1 - 0.2)}{0.05^2} \approx 246$$

3.3 Questionnaire design

This study selects the suitable maturity scale which receives the basis knowledge in informatization issue for the design of the questionnaire survey. The educational measurement is classified for the research hypotheses, including data mining system for higher education, security support system, resource implication, information system in higher education, and higher educational informatization management as five-level Likert scale. In thus paper, Questionnaire survey method is applied to conduct a practical survey on the current situation of college education management

informatization under the big data environment. Based on the questionnaire survey data, further analyze the existing problems, and finally formulate the corresponding informatization strategy for the problems.

3.4 Data analysis

In this study, the data collected from the questionnaire survey was analyzed using SPSS software. The selected aspects for analysis included data mining attitude, security support system, resource meaning, information system, and higher education information management. The objective was to gain insights into the current status and the impact of higher education information management.

By examining these specific aspects, the study aimed to identify areas for improvement that would contribute to the sustainable development of informationization in education management within Chinese universities. Enhancing these four areas can have far-reaching benefits for higher education institutions, promoting efficient data mining practices, ensuring robust security support systems, optimizing resource allocation and utilization, and strengthening the overall information system infrastructure.

The findings of this study provide valuable insights into the current landscape of higher education information management and highlight the significance of focusing on these four areas for future development. By addressing the identified areas for improvement, universities can make significant progress in their journey towards effective informationization in education management, ultimately fostering sustainable growth and advancement in the field of higher education in China.

3.5 Reliability analysis

Reliability testing is bringing the informant data for each component to verify the reliability value which pass to good criteria. The best value for reliability is higher than 0.6 or 0.7 value. The Cronbach's Alpha coefficient in scale shown for data mining at 0.701, security support system at 0.727, resource implication at 0.619, informational system in higher education at 0.636, and the performance of higher educational informatization management at 0.623 that is more than 0.6, conclude as the items have high reliability for higher education measurement scale.

The total standardized value in reliability coefficient has range of five latent variables between 0.6 to 0.7 which closed value of hundred percentage, it has more reliability to use for target groups. The outcomes presented the variable value to qualify the construct reliability values.

Table 1: The reliability in construct testing.

variables	N	Cronbach Alpha Value
Data mining attitude	4	0.701
<ul style="list-style-type: none"> - I update my records when there is the need to do so - I care about the accuracy of the information on my file - I'm interested in the completeness of the information on my file - Overall, the data mining attitude is good for your institute 		
Security support system	4	0.727
<ul style="list-style-type: none"> -The security support for Information on personal files are kept confidential -The security support for Information on personal files are protected from theft - The security support for personnel records is prevented from misuse - Overall, the security can protect your data 		
Resource implication	4	0.619
<ul style="list-style-type: none"> - The information is based on Promotions are based on human resource records - The data can inform your benefit (example: pension entitlements are determined by records on personal Files) - The personal data records feed into the organization's payroll system - Overall data fulfill your requirement 		
Informational system	4	0.636
<ul style="list-style-type: none"> - The system had adequate interaction with your requirement - The system had adequate information with your demand - The system had adequate data provide for your work - Overall, the system make you felt a part of a learning community 		
Higher educational informatization management	4	0.623
<ul style="list-style-type: none"> - The higher educational informatization management is what you expected - The course site was well organized and easy to navigate - The content of the course presentations contributed to your learning - The course informatization evaluations were fair and supported the learning experience. 		

KMO test and Bartlett sphericity test were applied for evaluate data from questionnaire. The KMO value contributed for data mining at 0.710, security support system at 0.749, resource implication at 0.606, informational system in higher education at 0.699, and the performance of higher educational informatization management at 0.671, indicating that the validity test is high level with the significance value at 0.001, which standardization in each factor more than 0.5.

		KMO & Bartlett's test				
Variable		data mining	security support system	resource implication	informational system	informatization management
KMO		.710	.749	.606	.699	.671
Bartlett's test	Approx. Chi-square	197.325	185.943	128.391	118.334	123.017
	Degree of freedom	6	6	6	6	6
	Significant value	.000	.000	.000	.000	.000

Table2 Validity for influencing factors to higher education informatization.

Chapter 4 Finding

This paper reviewed literature on five independent variables, including data mining, security assurance systems, resource meanings, information systems in higher education, and information management in higher education to meet the research objectives. This paper adopted quantitative research methodology and analysis by SPSS.

4.1 Correlation analysis

The survey subjects of this study were 246 network management personnel, academic management personnel, and selected full-time teachers in Nanjing Universities, which there are 50% male and 50% female, with 30% aged between 25 and 35, 40% aged between 35 and 45, and 30% aged between 45 and 55. The school's network management personnel account for 50%, academic management personnel account for 25%, and full-time teachers account for 25%.

The table shows the obvious linkages between data mining system for higher education, security support system, resource implication, information system in higher education, and higher educational informatization management. All of constructs fit with 99% significant value. The coefficients of data mining, security support system, resource implication, informational system in higher education, and the performance of higher educational informatization management were 0.500, 0.393, 0.450, and 0.581, respectively, and the correlation coefficients are all have significant less than 0.01.

The Pearson Correlation analysis of data mining, security support system, resource implication, informational system in higher education, and the performance of higher educational informatization management have effect at 0.01. The linkage between data mining and university management at .500 with positively relationship (accepted main hypothesis H1). The relationship between security support system and higher education informatization at .393 with direct relationship (accepted main H2). The relationship from security support system and higher education informatization at .450 with positively relationship (accepted main hypothesis H3). The relationship between informational system in higher education and higher education informatization at .581 with positively relationship (accepted main hypothesis H4).

Therefore, the finding explains the influence of the higher education informatization strategy which has relation to other factors involve with necessary data for Nanjing universities. Nanjing Universities' management may link with four dimensions of data mining, security support system, resource implication, informational system in higher education.

Table 3 Correlation coefficient for higher educational informatization management.

	Data	Security	Resource	Infor.	Higher.
Data mining	1				
Security support system	.618**	1			
Resource implication	.448**	.424**	1		
Informational system	.519**	.485**	.551**	1	
Higher educational informatization management	.500**	.393**	.450**	.581**	1

** . Correlation is significant at the 0.01 level (2-tailed).

4.2 Multiple Regression analysis

The linear regression analysis among data mining, security support system, resource implication, informational system in higher education, and the performance of higher educational informatization management, have significant value at 0.01. The statistical analysis can evaluate the hypotheses and explore the relation between variable in models. The effect between data mining and higher education informatization at 22.9 percent (accepted null hypothesis H1). The relationship between informational system and higher education informatization at 38.8 percent (accepted main hypothesis H4). The outcome predicted the results in term of statistic.

Table 4 Multiple regression result.

	B	Std.	Beta	t	sig
(Constant)	1.033	.256		4.035	.000
data mining	.229	.062	.242	3.677	.000**
security support system	.003	.060	.003	.042	.967
resource implication	.131	.061	.129	2.144	.033
informational system in higher education	.388	.064	.383	6.037	.000**

Significant present at 0.01**

The statistic result from table 4 presents the variable of data mining, security support system, resource implication, informational system in higher education, and the performance of higher educational informatization management with significant level at 0.01. The result presented higher education management strategy based on

independent factors have influences on higher education informatization management. The outcome shown R2 is .403, that means all of direct effect in the result influence on informational system in higher education at 40.3 percent. These mean factors could affect dependent variables which accept hypothesis H1 and H4.

By $Y =$ the performance of higher educational informatisations management

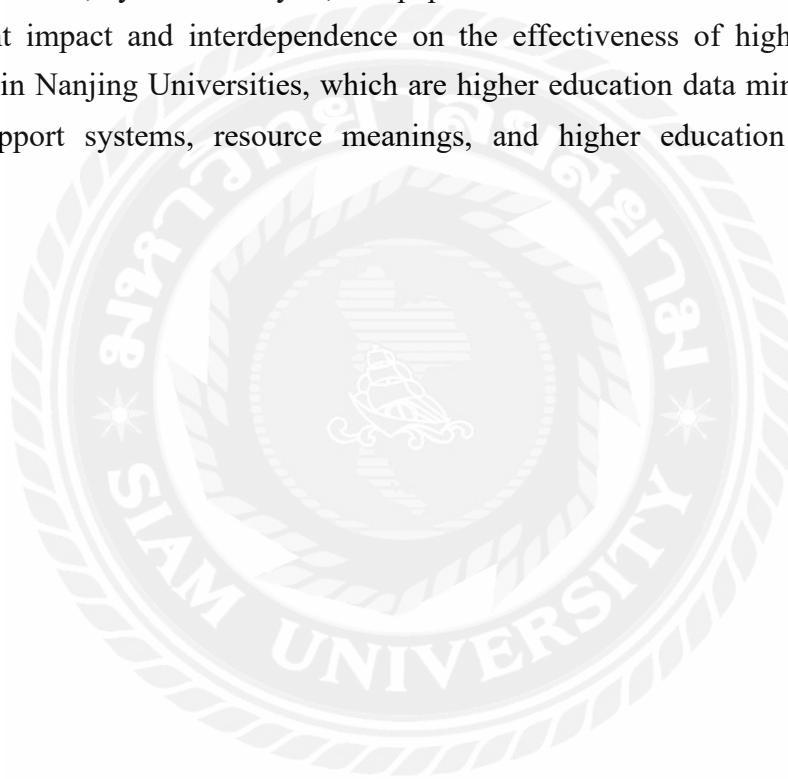
β = Régression Coefficient Value

X1 = data mining

X4 = informational system in higher education

Outcome: $Y = 1.033 + .229X1 + .388X4$

In conclusion, by SPSS analysis, this paper found that there are four factors have a significant impact and interdependence on the effectiveness of higher education institutions in Nanjing Universities, which are higher education data mining systems, security support systems, resource meanings, and higher education information systems.



Chapter 5 Conclusion and Recommendations

5.1 Conclusions

This study aims to achieve two main goals. Firstly, explore the impact of information management in higher education in Nanjing on information technology knowledge. Secondly, propose practical and feasible strategies for the informationization construction of Nanjing universities, providing corresponding references for the informationization of university education management.

In order to achieve these goals, a survey was conducted on 246 people from universities in Nanjing. The analysis of the collected data using SPSS shows that the correlation between higher education information management and four factors: higher education data mining systems, security support systems, resource meanings, and higher education information systems indicates that these factors have a significant impact and interdependence on the effectiveness of higher education institutions. It emphasizes the connection between information management and the aforementioned factors, emphasizing their impact on the overall efficiency and success of higher education institutions.

5.1.1 The effects of information technology knowledge to higher educational information management in Nanjing Universities.

From Pearson Correlation analysis of data mining, security support system, resource implication, informational system in higher education, and the performance of higher educational informational management have effect at 0.01. The linkage between data mining and university management at .500 with positively relationship (accepted main hypothesis H1). The relationship between security support system and higher education informatization at .393 with direct relationship (accepted main H2). The relationship from security support system and higher education informatization at .450 with positively relationship (accepted main hypothesis H3). The relationship between informational system in higher education and higher education informatization at .581 with positively relationship (accepted main hypothesis H4).

Therefore, the finding explains the influence of the higher education informatization strategy which has relation to other factors involve with necessary data for Nanjing universities. Nanjing Universities' management may link with four dimensions of data mining, security support system, resource implication, informational system in higher education.

Based on the comprehensive analysis conducted, it has been determined that the

four factors, namely digital mining, security guarantee system, resource meaning, and higher education information system, have a direct and significant impact on higher education information management. These factors play crucial roles in shaping the effectiveness and efficiency of information management in the higher education sector.

The digital mining aspect involves the extraction and analysis of valuable insights from vast amounts of data within the higher education context. By utilizing advanced data mining techniques, universities can uncover patterns, trends, and correlations in student performance, learning outcomes, and other relevant metrics. This enables informed decision-making, personalized interventions, and the optimization of educational processes. The security guarantee system is of paramount importance in safeguarding sensitive information within higher education institutions. With the increasing digitization of data, ensuring the confidentiality, integrity, and availability of information becomes imperative. By implementing robust security measures, such as access controls, encryption, and intrusion detection systems, universities can protect their data from unauthorized access, data breaches, and other security threats. Resource meaning refers to the effective utilization and interpretation of available resources within the higher education environment. This includes optimizing the allocation of financial resources, faculty expertise, research facilities, and technological infrastructure to enhance the overall quality of education and research. By aligning resource allocation with strategic goals, universities can maximize their impact and create a conducive learning environment for students and faculty members. The higher education information system encompasses the integration and management of various information systems within the university setting. This includes student information systems, learning management systems, research databases, and administrative systems. By adopting robust information systems, universities can streamline processes, enhance communication and collaboration, and improve administrative efficiency. These systems serve as central repositories for critical information, facilitating data-driven decision-making and fostering effective information management practices.

The identified factors of digital mining, security guarantee system, resource meaning, and higher education information system collectively contribute to the advancement of higher education information management. Understanding their significance and implementing appropriate strategies in these areas can lead to enhanced data utilization, improved security measures, efficient resource allocation, and streamlined information systems. These efforts ultimately contribute to the overall effectiveness, competitiveness, and success of higher education institutions in Nanjing.

5.1.2 Propose practical and feasible informational construction strategies in Nanjing Universities and provide corresponding reference for the information of university education management

1. Strengthen the cognition of education management informatization. If colleges and universities want to strengthen the information construction of education management, they must clarify its specific meaning, pay more attention to the education management work, and update the education management ideas. Strengthening the attention to this work is a necessary condition to ensure the modernization of various work in colleges and universities, and an important way to promote the educational reform in the new era. Before the construction of university informatization, we must comprehensively investigate the current situation of university information construction and grasp the educational development trend in the information age through beneficial analysis of the relevant market environment. At the same time, in order to enhance the importance of colleges and universities on education informatization, colleges and universities should maintain the overall awareness during the management and construction of education informatization, organically combine informatization with various work of the school, and prevent education management informatization from becoming a mere formality. In addition, school administrators should also pay attention to improving traditional educational management ideas, deeply study the latest data technology, and apply modern information technology to various important aspects such as discipline research, logistics management and educational equipment management.

2. Improve the professional quality of school education management personnel. Colleges and universities should hold professional and technical seminars to improve the enthusiasm of scientific research workers. In the information application system, data developers and managers play an important role. At the same time, colleges and universities can use advanced technology platforms to play a leading role in technical personnel. Meanwhile, we should regularly hold expert education management information learning and training activities to promote the synchronous development of college information software and hardware infrastructure, further improve the pace of modernization in the field of college education management and ensure that college education information management can achieve innovative development goals in the background of the big data era.

3. Create a network information platform. Colleges and universities should vigorously support the construction of the network information platform. By taking advantage of big data, they can not only achieve the goal of unified data management, but also easily process various data. At the same time, in the big data environment,

colleges and universities should keep pace with the times and conduct comprehensive research on big data, so as to achieve more ideal results in the informatization of college teaching management and improve the efficiency of education management.

4. Optimize the informatization mode of college education management. Education management information covers all relevant information of students in the process of learning and employment, and education information management is the core content of school education management. Colleges and universities must carry out teaching management from the perspective of development and optimize the informatization model of college education management. In order to realize the standardized and flexible development goal of education informatization, colleges and universities can introduce artificial intelligence technology, such as the application of face recognition technology in the dormitory area, to strengthen the management effect of the dormitory area. At the same time, it can also be used to detect students' attendance in class and strengthen the standardization level of teaching information. For another example, using big data technology to query library information can not only facilitate readers' reading, but also improve library management.

5. Strengthen the construction of information infrastructure in colleges and universities. Colleges and universities should strengthen the information management of schools, increase the investment in teaching equipment, expand the sources of school funds, optimize the distribution of teaching resources, and provide information infrastructure for school teaching management. In addition, colleges and universities should establish a sound teaching management information system and introduce a variety of information management software to facilitate the effective sharing of teaching management information of various schools at all levels. In addition, the competent department of information technology education should investigate, analyze, and deal with the operation of the information management system, give full play to its functions, and timely adjust and improve it, so as to ensure the smooth implementation of the information work of university education management.

5.2 Recommendation

For the problems analyzed, this paper puts forward corresponding suggestions, mainly including six aspects:

1. Develop a Clear Informationization Strategy: Create a well-defined and forward-thinking strategy that aligns with the institution's long-term goals. Involve stakeholders, including faculty, staff, students, and administrators, in the development of the strategy to ensure buy-in and support.

2. Embrace E-Learning and Blended Learning: Expand the use of e-learning

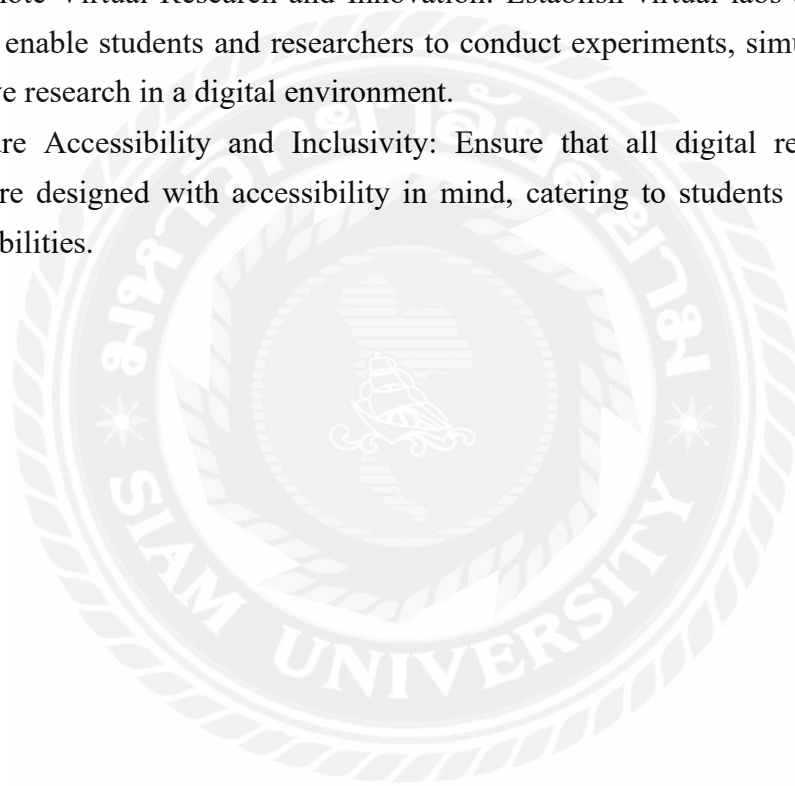
platforms and blended learning approaches to offer flexible and accessible education. Provide resources and training to faculty to design engaging and interactive online courses.

3. Implement Learning Analytics: Utilize learning analytics to gather data on student performance, engagement, and progress. Analyze this data to identify areas of improvement and personalize learning experiences for students.

4. Foster Collaboration and Networking: Facilitate collaboration among higher education institutions through virtual conferences, research partnerships, and knowledge-sharing initiatives. Encourage faculty and students to participate in collaborative projects.

5. Promote Virtual Research and Innovation: Establish virtual labs and research facilities to enable students and researchers to conduct experiments, simulations, and collaborative research in a digital environment.

6. Ensure Accessibility and Inclusivity: Ensure that all digital resources and platforms are designed with accessibility in mind, catering to students with diverse needs and abilities.

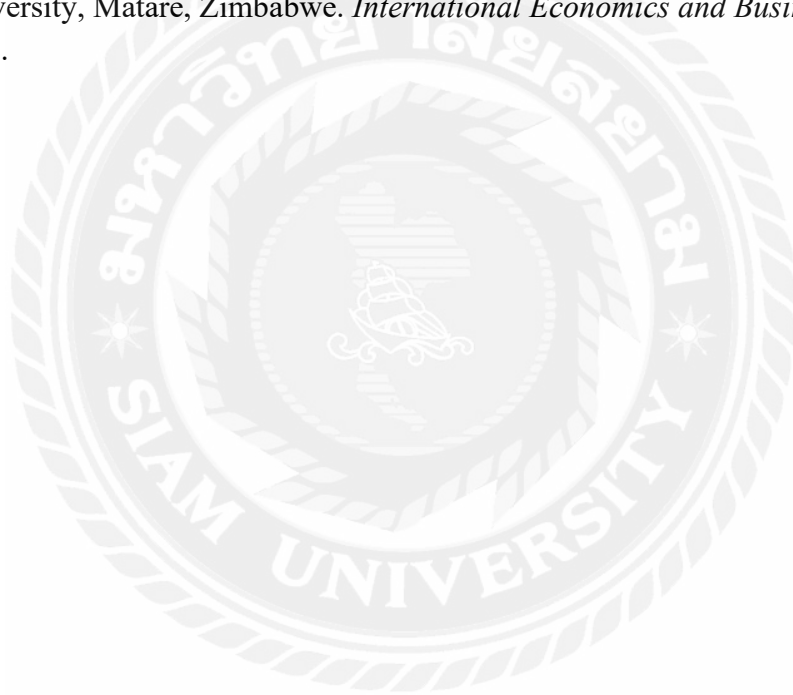


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Appendix

Part 1 Demographic information

Remark: Please choose by using $\sqrt{\quad}$ in or fill information in the blank.

1. Gender

Male

Female

2. Age

25-35

35-45

45-55

3. Research object

University Network Management Personnel

Academic management personnel

Full time teacher

Part 2 Relational factors

The questionnaire used Likert scale, ranging from 1 to 5 in which 1=Strongly disagree/3=neutral/ 5=Strongly agree

Item		Alternative Answer				
		1	2	3	4	5
Data mining attitude						
1	I update my records when there is the need to do so					
2	I care about the accuracy of the information on my file					
3	I'm interested in the completeness of the information on my file					
4	Overall, the data mining attitude is good for your institute					
Security support system						

1	The security support for Information on personal files are kept confidential					
2	The security support for Information on personal files are protected from theft					
3	The security support for personnel records is prevented from misuse					
4	Overall, the security can protect your data					
Resource implication						
1	The information is based on Promotions are based on human resource records					
2	The data can inform your benefit (example: pension entitlements are determined by records on personal Files)					
3	The personal data records feed into the organization's payroll system					
4	Overall data fulfill your requirement					
Informational system						
1	The system had adequate interaction with your requirement					
2	The system had adequate information with your demand					
3	The system had adequate data provide for your work					
4	Overall, the system make you felt a part of a learning community					
Higher educational informatization management						
1	The higher educational informatization management is what you expected					
2	The course site was well organized and easy to navigate					
3	The content of the course presentations contributed to your learning					
4	The course informatization evaluations were fair and supported the learning experience					