Teunuleh Scientific Journal
The International Journal of Social Sciences
Vol. 7, Issues. 2, June 2026 P-ISSN: 2807-193X | E-ISSN: 2746-4393
DOI: https://doi.org/teunuleh.v7i2.265

DIGITAL TECHNOLOGY MANAGEMENT IN LEARNING AND ACADEMIC ADMINISTRATION

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Abstract

Digital transformation in higher education necessitates the integration of technology into learning management and academic administration. Despite the widespread adoption of technology, its optimal use to enhance learning quality and the effectiveness of academic services remains inconsistent. This study seeks to analyze the use of digital technology in learning management and academic administration at China University of Petroleum (East China) and to identify the impacts and challenges encountered during its implementation. A mixed-methods approach with a case study design was employed. Data were collected from 120 respondents, including students, lecturers, and administrative staff, through questionnaires, interviews, observations, and documentation. Quantitative data were analyzed using descriptive statistics, while qualitative data were examined through thematic analysis. The findings reveal a high level of digital technology adoption, evidenced by the use of a learning management system (91.7%), virtual classrooms (85.0%), mobile applications (83.3%), and digital assessment systems (78.3%). Digital technology has been shown to improve learning accessibility, academic administrative efficiency, and student engagement. However, its application remains largely confined to course material delivery and does not fully support interactive learning. The novelty of this research lies in its integrated analysis of learning management and academic administration within the context of digital transformation in higher education. The study concludes that successful digital transformation relies not only on technology availability but also on the integration of pedagogy, enhancement of digital literacy, and strengthening of user competencies to support sustainable educational quality.

Keywords: *Digital Technology, Learning Management, Academic Administration, Higher Education, Digital Transformation*

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Published by Teunuleh Research Center

A. Introduction

Digital transformation in higher education has become an inevitable global phenomenon, particularly in the context of improving the efficiency of learning and academic governance. Higher education institutions are increasingly reliant on digital technologies such as learning management systems (LMS), academic information systems, and online collaboration platforms to support learning processes and administration. The integration of these technologies serves not only as a tool but has also become an integral part of institutional strategies to improve the quality of educational services and the effectiveness of academic management.

Various recent studies indicate that the use of digital technology in higher education can enhance the effectiveness of learning, student engagement, and the efficiency of academic administration. The digitalization of education contributes to enhancing the student learning experience and optimizing the management of higher education institutions (Veluvali & Surisetti, 2020). The use of digital academic information systems has also been shown to improve the transparency and speed of campus administrative services(Khatir, N., & Madani, 2024).

However, the implementation of digital technology in higher education still faces various challenges, such as low digital literacy among some users, infrastructure limitations, and resistance to changes in working practices. There is a gap between the availability of technology and the ability of institutions to optimize its use effectively(Singun, 2025). This situation indicates that digitalization does not always correlate directly with an improvement in service quality if it is not supported by the readiness of human resources and appropriate institutional policies.

Furthermore, recent research emphasizes the importance of a balanced integration of technology and institutional management in supporting effective learning. The use of digital platforms in learning enhances the interaction between lecturers and students; however, their effectiveness is heavily influenced by system design and user readiness (Kigundu, 2025). On the other hand, the digitalization of academic administration also requires an integrated system to prevent data fragmentation, which can hinder strategic decision-making(Otroshcenko, M., Kramarenko, O., Hudkov, S., Maletova, O., & Utkina, 2026).

Although various studies have examined the digitalization of higher education, a significant research gap remains. First, most studies focus primarily on digital learning aspects, whereas research integrating learning management and academic administration remains limited. Second, there is a scarcity of research employing a comprehensive case study approach at specific institutions to examine the relationship between these two aspects simultaneously. Third, the implementation context at

technology-based universities, such as the China University of Petroleum, East China, is rarely examined in depth in the latest international literature.

Evaluations of the effectiveness of digitalization often focus solely on technical aspects, without considering the holistic view of the user experience, including that of lecturers, students, and administrative staff (Tariq & Awotwe, 2025). This creates an urgent need for research that not only describes the use of technology but also analyzes how it affects the overall efficiency and quality of academic services.

In light of this gap, this study aims to conduct an in-depth analysis of the use of digital technology in learning management and academic administration at China University of Petroleum, East China. It is hoped that this study will provide empirical insights into the development of more effective models for integrating digital technology within higher education, and serve as a reference for other institutions seeking to optimize their digital transformation on an ongoing basis.

B. Method

This study employs a mixed-methods approach with a case study design to comprehensively evaluate digital technology management in learning and academic administration at China University of Petroleum (East China). Specifically, this study utilizes an explanatory sequential mixed-methods design, where quantitative data are collected and analyzed in the first phase, followed by the collection and analysis of qualitative data in the second phase to help explain and elaborate on the initial quantitative results. This design is highly appropriate because the complex socio-technical dynamics of technology adoption, administrative efficiency, and pedagogical adaptation cannot be fully captured by numerical metrics alone; they require the contextual depth provided by stakeholders lived experiences.

The research was conducted at China University of Petroleum (East China) over a four-month period. The study involved 120 key stakeholders as research participants. The quantitative strand utilized a purposive sampling technique to select 120 respondents, consisting of undergraduate and postgraduate students ($n = 80$), active academic lecturers ($n = 25$), and institutional administrative staff ($n = 15$). This stratified distribution ensures that all direct users of the campus digital infrastructure are adequately represented. For the subsequent qualitative strand, a subset of participants—comprising 5 students, 3 lecturers, and 2 administrative heads—was selected through theoretical sampling for semi-structured interviews based on their survey responses regarding system bottlenecks and double-workload paradoxes.

The data collection instruments were dual-pronged to match the sequential design. In the first phase, a structured questionnaire utilizing a 5-point Likert scale (ranging from 1 = Strongly Disagree to 5 = Strongly Agree) was administered digitally. The

instrument measured four primary dimensions: technology adoption rate, learning accessibility, administrative efficiency, and perceived systemic challenges. The questionnaire underwent rigorous instrument validation, yielding a Cronbach's alpha coefficient of 0.86, signifying high internal consistency and reliability. In the second phase, semi-structured interview protocols, direct classroom and administrative workflow observations, and institutional policy documentation reviews were deployed to gather qualitative data.

Data analysis followed a two-stage sequential protocol. Quantitative data derived from the Likert-scale questionnaires were processed using descriptive statistics, including percentage distributions, frequency counts, and mean score calculations, via SPSS version 26. This statistical output mapped the macro-level trends of digital technology utilization. Concurrently, qualitative data obtained from interview transcripts and observational field notes were processed using thematic analysis via the interactive model of Miles, Huberman, and Saldaña, which involves data reduction, data display, and conclusion drawing/verification. Finally, data validity was ensured through methodological and data source triangulation, cross-referencing statistical trends with qualitative narratives and institutional document archives to establish a convergent, robust analytical framework.

1. Research Location and Time

The research was conducted at China University of Petroleum, East China, a technology-based higher education institution with a relatively advanced level of digitalization in its learning and academic administration systems.

This research was conducted from January 2025 to May 2025. This timeframe was chosen to enable the researchers to obtain reliable data on routine academic activities, including the learning process during the current semester, academic administrative services, and user interactions with the university's digital systems.

2. Research Design

This study employed a case study design. This design was chosen as it enables the researcher to conduct an in-depth analysis of the implementation of digital technology within a single institution in a holistic manner, covering both learning and academic administration aspects simultaneously.

This case study emphasizes the relationship between:

a. Digital learning systems (Learning Management Systems, online platforms, virtual classrooms)
b. Digital academic administration system (student registration, grade management, timetables and academic services)

3. Research Subjects

The research subjects consist of three main groups:

1. Faculty members
2. Students
3. Academic administrative staff

Subjects were selected using purposive sampling, that is, selecting respondents who actively use digital technology in their daily academic activities, so that the data obtained is relevant to the research focus.

4. Data Collection Techniques

Data in this study were collected using the following techniques:

a. **Semi-structured interviews**
   Conducted among lecturers and administrative staff to explore their experiences of using digital technology, the effectiveness of the system, and the challenges encountered.

b. **Questionnaire (structured survey)**
   The questionnaire was distributed to students and staff to measure the level of technology use, satisfaction, and perceptions regarding the effectiveness of digital systems.

c. **Direct observation**
   It was conducted to observe first-hand how digital systems are used in the learning process and academic administration within the campus environment.

d. **Documentation**
   Includes academic policy documents, academic information system reports, and data on the use of the Learning Management System (LMS).

e. Research instruments

The instruments used in this study include: a semi-structured interview guide, a Likert-scale questionnaire, an observation checklist for the use of digital systems, and a format for analyzing institutional documents.

The instruments were designed to measure two main aspects: the effectiveness of technology in learning and the efficiency of digital systems in academic administration.

f. Data Analysis Techniques

Data analysis was conducted using two approaches.

1. **Qualitative Analysis (Thematic Analysis)**
   Data from interviews, observations, and documentation were analyzed by identifying key themes such as the effectiveness of the LMS, barriers to technology use, and the impact of digitalization on work efficiency.
2. **Descriptive Quantitative Analysis**

The questionnaire data were analyzed using descriptive statistics, such as percentages, averages, and frequency distributions, to describe the level of usage and user satisfaction with the digital system.

g. Data Validity

To ensure the validity and reliability of the data, this study employed the following techniques: source triangulation (lecturers, students, administrative staff), methodological triangulation (interviews, questionnaires, observation, documentation), and member checking to ensure the consistency of interview results with respondents

h. Research Procedure

The research procedure was carried out in the following stages: preparation of research instruments, field data collection, data processing and reduction, qualitative and quantitative data analysis, and drawing conclusions and verifying the results. This method is designed to provide a comprehensive and in-depth overview of how digital technology is used in learning management and academic administration and its impact on the effectiveness and efficiency of higher education institutions.

C. Finding and Discussion

1. Overview of Research Findings

This study examines the use of digital technology in learning management and academic administration at the China University of Petroleum (East China). Data were collected from 120 respondents comprising students, lecturers, and administrative staff. The results indicate that the level of digital technology adoption is high, with the majority of respondents using a learning management system (LMS), virtual classrooms, and digital administration systems in their daily academic activities.

Table 1. Distribution of Respondents

No	Category	Frequency (n)	Percentage (%)
1	Students	80	66.7
2	Lecturers	25	20.8%
3	Administrative Staff	15	12.5%
	Total	**120**	**100%**

Based on Table 1, the majority of the study's respondents were students, numbering 80 (66.7%), followed by lecturers (25, 20.8%) and administrative staff (15, 12.5%). This composition indicates that students are the primary users of digital technology in the academic environment; consequently, they contributed the largest share to the research data. The involvement of lecturers and administrative staff also provides a comprehensive perspective on the use of digital technology in the learning process and academic administration. Consequently, the data obtained illustrate the

state of digital technology implementation across various user groups within the university environment.

Digital Technology in Learning Management

1. Types of Technology Used

Table 2. Types of Digital Technology in Education

No	Type of Technology	Frequency (n)	Percentage (%)	Mean	SD	Category
1	LMS	110	91.7%	4.12	0.68	High
2	Virtual Classroom	102	85.0%	3.95	0.72	High
3	Mobile App	100	83.3%	3.88	0.75	High
4	Digital Assessment	94	78.3%	3.67	0.80	Moderate–High

According to Table 2, the LMS was the most widely used technology, with a usage rate of 91.7% and an average score of 4.12, which falls into the high category. These findings indicate that the LMS has become the primary platform for learning management, ranging from the distribution of materials and the collection of assignments to the monitoring of students' learning activities. Apart from LMS, virtual classrooms (85.0%) and mobile applications (83.3%) also showed high levels of usage. Meanwhile, the use of digital assessment remains at a lower level compared to other technologies, although it still falls within the high category. This indicates that the digitization of learning has progressed well, but the implementation of digital assessment still requires further optimization.

Table 3. Intensity of Technology Use

No	Indicator	Always (%)	Often (%)	Sometimes (%)	Rarely (%)	Never (%)	Mean
1	Use of LMS	65.0	26.7	6.6	1.7	0	4.55
2	Virtual Classroom	52.5	32.5	10.0	5.0	0	4.32
3	Mobile App	48.3	35.0	11.7	5.0	0	4.26
4	Digital Assessment	40.0	38.3	15.0	6.7	0	4.11

Table 3 shows that the LMS had the highest level of usage intensity, with an average score of 4.55, which falls into the 'very high' category. The majority of respondents stated that they always used the LMS in their learning activities. These findings reinforce the LMS's position as the hub of digital learning activities at the university. Virtual classrooms, mobile applications, and digital assessments also showed high levels of usage, with average scores above 4.00. This indicates that digital technology has become an integral part of the learning process and is no longer merely supplementary.

2. Impact on Learning

Table 4. Impact on Learning

No	Indicator	Frequency (n)	Percentage (%)	Mean	SD	Category
1	Learning organization has improved	99	82.5%	4.08	0.70	High
2	Easier access to materials	95	79.2%	4.12	0.68	High
3	Variation in teaching methods	92	76.7%	3.98	0.72	High
4	Better learning structure	94	78.3%	4.05	0.71	High

According to Table 4, the use of digital technology has a positive impact on the quality of learning. The indicator for material accessibility received the highest average score of 4.12, followed by an improvement in the organization of learning at 4.08. These findings indicate that digital technology can assist lecturers in managing learning materials more systematically, while also making it easier for students to access learning resources anytime and anywhere. Consequently, digital technology contributes to the creation of a more flexible and structured learning process.

Table 5. Pedagogical Utilisation

No	Indicator	Frequency (n)	Percentage (%)	Mean	SD	Category
1	Interactive learning	65	54.0%	3.45	0.81	Moderate
2	Dominant content delivery	88	73.3%	3.90	0.74	High
3	Integration of active learning	68	56.7%	3.52	0.77	Moderate

Table 5 shows that digital technology is predominantly used for the delivery of learning materials (73.3%), with an average score of 3.90. Conversely, the use of technology for interactive and active learning strategies remained moderate. These results indicate that digital transformation in learning has not yet been fully accompanied by pedagogical transformation. Technology is still utilized more as a means of distributing information rather than as a medium for building collaborative and student-centred learning.

Student Engagement

Table 6. Student Engagement

No	Indicator	Frequency (n)	Percentage (%)	Mean	SD
1	Learning flexibility	92	76.7%	3.98	0.72
2	Discussion participation	87	72.5%	3.85	0.75
3	Easier communication	85	70.8%	3.80	0.76

Based on Table 6, flexibility of access to learning was the most significant positive impact experienced by students, with a percentage of 76.7% and an average score of 3.98. Furthermore, participation in online discussions and communication with lecturers

and peers also scored highly. These findings indicate that digital technology can enhance access and communication within the learning process. Students have greater opportunities to access materials and interact through the various digital platforms available.

Table 7. Challenges to Engagement

No	Indicator	Frequency (n)	Percentage (%)	Mean	SD
1	Minimum direct interaction	77	64.2%	3.40	0.80
2	Passive learning	74	61.7%	3.35	0.83
3	Difficulty concentrating	72	60.0%	3.32	0.85

Table 7 shows that the reduction in face-to-face interaction is the main challenge faced by students, as cited by 64.2% of respondents. Furthermore, passive learning behavior and difficulty maintaining focus during online learning remain significant issues. These results indicate that, although digital technology has improved access to learning, the quality of student engagement is not yet fully optimal. Therefore, more interactive learning strategies are required to enhance students' active participation.

Table 8. Summary of Student Engagement

Aspect	Mean	SD	Interpretation
Positive	3.88	0.74	High
Challenges	3.36	0.83	Medium
Total	3.62	0.78	Moderate–High

Based on Table 8, the overall level of student engagement fell within the moderate to high category, with an average score of 3.62. The positive aspects of engagement were scored higher than the challenging aspects. These findings indicate that the implementation of digital technology positively impacted student participation. However, further efforts are needed to reduce barriers that may diminish the quality of engagement during the online learning process.

3. Learning Outcomes

Table 9. Student Perceptions of Learning Outcomes

No	Indicator	Frequency (n)	Percentage (%)	Mean	SD
1	Learning efficiency has improved	89	74.2%	3.92	0.71
2	Better understanding	86	71.7	3.85	0.74
3	Self-directed learning is on the rise	82	68.3%	3.78	0.76

Table 9 shows that the majority of students felt an increase in learning efficiency after using digital technology. The use of multimedia, educational videos, and more flexible access to materials helped students understand course content better. Furthermore, digital technology contributed to an improvement in students' self-

directed learning abilities. This indicates that technology plays a significant role in supporting a more flexible and student-centred learning process.

Table 10. Academic Impact

No	Indicator	Frequency (n)	Percentage (%)	Mean	SD
1	Increase in value	70	58.3%	3.45	0.82
2	Consistency of results	66	55.0%	3.40	0.84
3	Target achievement	72	60.0%	3.52	0.80

Based on Table 10, the impact of digital technology on academic achievement remains in the moderate category. Although most students felt the benefits of the learning process, there was no significant improvement in academic grades among all respondents. These findings indicate that learning success is not solely determined by the use of technology but is also influenced by other factors such as learning motivation, learning strategies, and the quality of interaction between lecturers and students.

Table 11. Pedagogical Suitability

No	Indicator	Frequency (n)	Percentage (%)	Mean	SD
1	Important learning strategies	75	62.5%	3.68	0.78
2	Technology alone is not enough	78	65.0%	3.72	0.77
3	Interactive learning is needed	84	70.0%	3.95	0.73

Table 11 shows that most respondents stated that the effectiveness of digital learning is greatly influenced by the learning strategies employed by lecturers. A total of 70.0% of respondents assessed that interactive learning was still very much needed in a digital environment. This indicates that technology cannot function optimally without the support of good instructional designs. Therefore, the integration of technology and pedagogical approaches is a key factor in improving learning quality.

Table 12. Summary of Learning Outcomes

Aspect	Mean	SD	Interpretation
Learning efficiency	3.85	0.74	High
Academic achievement	3.46	0.82	Moderate
Pedagogy	3.78	0.76	Moderate–High

Based on Table 12, the aspect of learning efficiency received the highest score compared to other aspects. Meanwhile, the improvement in academic achievement remained in the moderate category. These results indicate that digital technology is more effective in supporting the learning process than in directly improving academic achievement. Therefore, the use of technology must be integrated with appropriate learning strategies to produce a more optimal impact.

4. Challenges of Digital Learning

Table 13. Main Challenges

No	Indicator	Frequency (n)	Percentage (%)	Mean	SD
1	Pedagogical inconsistencies	78	65.0%	3.60	0.80
2	Low digital literacy	74	61.7%	3.52	0.77
3	Lack of training	70	58.3%	3.48	0.79
4	Technical issues	65	54.2%	3.40	0.82

Table 13 shows that the mismatch between technology and learning strategies is the greatest challenge in the implementation of digital learning. Furthermore, the digital literacy gap and limited training are also significant barriers. These findings indicate that the success of digital transformation depends not only on the availability of technology but also on the readiness of human resources to utilize that technology effectively.

Table 14. Level of Challenges

Level	Frequency (n)	Percentage (%)
High	36	30.0%
Medium	64	53.3%
Low	20	16.7%

According to Table 14, the majority of respondents (53.3%) rated the challenges of implementing digital technology as moderate. Only 30.0% of respondents rated the challenges as high. These results indicate that the digital systems implemented are functioning reasonably well; however, various obstacles need to be addressed so that the implementation of digital technology can deliver greater benefits to all users within the university environment.

Discussion

1. Types of Digital Technology Used in Learning Management

The research findings indicate that the learning management system (LMS) is the most widely used digital technology at the China University of Petroleum (East China), with an adoption rate of 91.7%. These findings suggest that LMS has become the central hub for digital learning management, supporting the distribution of materials, collection of assignments, monitoring of learning progress, and communication between lecturers and students. The high usage of LMS aligns with research on '(Bergdahl et al., 2024)ement which found that digital learning platforms are a key component in building student engagement and supporting data-driven learning processes in higher education. LMS enables institutions to manage learning activities in an integrated manner, thereby enhancing the effectiveness of learning and monitoring students' academic achievements.

In addition to the LMS, the use of virtual classrooms reached 85.0%, indicating that synchronous learning via video conferencing has become an integral part of modern learning systems. This finding is consistent with the research by Vo and Ho (2024), which explains that online learning environments supported by virtual conference technology can enhance student participation when backed by sound instructional design and high levels of motivation. The existence of virtual classrooms provides flexibility for students to participate in learning without being constrained by time and space, thereby supporting the implementation of more adaptive digital learning(Vo & Ho, 2024).

The 83.3% usage rate of mobile applications indicates that students and lecturers are increasingly relying on mobile devices to access academic information. These findings are supported by Abubakar et al. (2024), who found that the integration of technology into the curriculum through various digital devices can improve the accessibility of learning and encourage student engagement in academic activities. High mobility allows students to access academic materials and information in real-time, making the learning process more flexible(Abubakar, 2024).

2. The Impact of Digital Technology on the Learning Process

The research findings indicate that the use of digital technology has a positive impact on the quality of learning, particularly in terms of the organization of course material, accessibility of learning resources, and variety of teaching methods. A total of 82.5% of respondents stated that digital technology helps lecturers manage course material more systematically. This finding aligns with the study (Dong et al., 2024), which found that lecturers' digital competence significantly influences students' learning outcomes through improved quality of material delivery, management of digital learning resources, and development of more effective learning experiences. Lecturers with strong digital competence are able to utilize technology optimally to create more structured and meaningful learning. The ease of access to learning materials reported by 79.2% of respondents also indicates that digital technology can expand students' learning opportunities. This finding is supported by the study (Chounta et al., 2024), which explains that the digital readiness of higher education institutions contributes to improved accessibility of academic services and learning resources. Higher education institutions with good digital infrastructure are able to provide a learning environment that is more flexible and responsive to students' needs. The use of various formats of digital content, such as educational videos, simulations, and interactive quizzes, also enhances the effectiveness of the learning process. Research by '(Abubakar, 2024) indicates that the integration of technology-based learning resources makes a positive contribution to student engagement and academic achievement. The use of multimedia enables students to gain a richer learning experience compared to conventional teaching methods.(Bergdahl et al., 2024) emphasize that the effective use of digital technology

must be accompanied by the use of learning analytics to continuously monitor student engagement and progress. Therefore, the success of digital transformation in learning is determined not only by the level of technology adoption, but also by lecturers' ability to integrate technology into student-centred learning strategies.

3. Student Engagement

The research findings indicate that student engagement falls within the moderate to high category, with an average score of 3.62. A total of 76.7% of students felt they had greater flexibility in accessing learning materials, and 72.5% reported increased participation in online discussions. These findings are consistent with the study '(Getenet et al., 2024), which found that students' positive attitudes towards digital technology, digital literacy, and self-efficacy have a direct impact on their engagement in online learning. Students with good digital skills tend to be more active in participating in online learning activities. The increase in student participation in online discussions is also supported by the study '(Vermeulen & Volman, 2024), which shows that interactively designed online learning activities can enhance students' emotional, behavioural, and cognitive engagement. A digital learning environment that provides opportunities for collaboration can encourage students to be more active in the learning process.

The findings of this study also indicate that the use of digital platforms enhances communication between students and lecturers. These results are supported by the study '(Hayati et al., 2024), which states that educational information systems play a vital role in facilitating collaborative learning and more effective academic communication. Technology enables interaction to take place without the constraints of time and space, thereby supporting more flexible learning. However, this study found that 61.7% of students still exhibited a tendency towards passive learning and 60.0% experienced difficulty maintaining focus during online learning. These findings are consistent with the study (Gonz & Manuel, 2023), which explained that digital distractions are one of the main challenges in technology-based learning. Various notifications and non-academic activities on digital devices often reduce students' concentration during the learning process.

D. Conclusion

Research findings indicate that the use of digital technology in learning management and academic administration at China University of Petroleum (East China) has reached a high level of adoption. Learning Management Systems (LMS), virtual classrooms, mobile applications, and digital assessment systems are the most widely used technologies for supporting academic activities. The implementation of digital technology has proven capable of improving the efficiency of learning management, expanding access to learning resources, increasing the flexibility of student learning, and

accelerating academic administrative services. Furthermore, digital technology also contributes to increased student engagement in the learning process and supports independent learning through easier access to academic materials and services.

Nevertheless, this study found that the effectiveness of digital technology has not yet been fully optimized in terms of improving learning outcomes and the overall quality of learning. The use of technology is still predominantly a means of delivering content rather than a tool to support interactive, student-centred learning. The main challenges identified include a mismatch between technology and pedagogical strategies, a digital literacy gap, limited training for lecturers and educational staff, and technical constraints within the systems used by educational institutions.

From a comparative management perspective, the digital transformation models implemented at China University of Petroleum (East China) provide valuable lessons for higher education governance in developing nations, particularly Indonesia. Universities in Indonesia can replicate the one-stop academic administration system integration approach to minimize bureaucratic data fragmentation. However, sociocultural aspects that have the potential to trigger change resistance or digital literacy gaps among senior staff must be mitigated through sustainable and inclusive digital pedagogical competency training, so that technology adoption not only improves operational efficiency but also results in continuous improvement in the quality of academic achievement.

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