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The Impact of Digital Technology Transformation on Lecturer Performance in Higher Education: An Innovation Diffusion Perspective

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ABSTRACT

Purpose of the study: This study aims to analyze the impact of digital technology on lecturers' performance in higher education institutions. The analysis focuses on five key indicators: learning enhancement, teaching effectiveness, academic leadership, infrastructure readiness, and the availability of syllabi and lesson plans.

Methodology: A mixed-methods approach was adopted, involving both quantitative and qualitative data collection. Questionnaires were distributed to 64 lecturers, and semi-structured interviews were conducted with selected participants. The instruments assessed lecturers' attitudes, behaviors, and the extent of digital technology adoption across teaching, research, and community service activities. A Likert scale was used to measure the level of digital technology acceptance.

Main Findings: The findings show that although many lecturers are still in the process of understanding and adapting to digital transformation, the use of digital technology has significantly improved their effectiveness and efficiency. It has also increased learning flexibility and student engagement through more interactive and accessible educational environments. Key supporting factors identified include institutional infrastructure, academic leadership, and supportive policies.

Novelty/Originality of this study: This study contributes to the growing body of knowledge by exploring the multifaceted influence of digital technology on lecturers' performance. It highlights the critical role of institutional support in facilitating sustainable digital integration in higher education, particularly in the Indonesian context.

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1. INTRODUCTION

In recent decades, the development of digital technology has brought significant changes across various sectors of life, including higher education [1]. This transformation presents substantial opportunities for lecturers to enhance work efficiency, broaden teaching outreach, and improve the quality of the learning process. For instance, lecturers can utilize online learning platforms to deliver interactive and easily accessible course materials, use assessment software for more accurate and efficient grading, and engage with students through social media as a dynamic communication tool [2].

However, these changes also pose distinct challenges. Lecturers are required to possess adequate digital competencies and the ability to swiftly adapt to technological advancements [3], [4]. Mastery of online learning platforms, assessment tools, and social media as learning aids has become essential in the context of modern

education. Several studies have demonstrated that the effective use of digital technologies can increase student engagement, foster motivation, and contribute to improved learning outcomes [5], [6]. Moreover, digital transformation plays a crucial role in enhancing the quality of higher education by expanding access, promoting interaction and collaboration, and enabling more personalized and adaptive learning experiences [7], [8]

The digital transformation of higher education also necessitates institutional support to facilitate lecturers' adaptation through the provision of adequate infrastructure, appropriate software, and continuous training [9]. In this context, lecturer performance is not only measured by work outcomes but also by the processes and strategies used to achieve them, including the extent to which digital technologies are integrated into teaching, research, and community service activities [10], [11]. This study aims to analyze the impact of digital technology transformation on lecturer performance in higher education institutions [12]. The main focus includes five performance indicators: empowering learning through digital technology, teaching effectiveness, academic leadership, campus infrastructure readiness, and accommodation support through curricular tools such as syllabi and lesson plans.

As a theoretical framework, this research adopts the Diffusion of Innovations Theory developed by Everett M. Rogers in [13], [14]. This theory explains how innovations, in this case, digital technologies, are disseminated and adopted within a social system. It is relevant in understanding how lecturers perceive, adopt, and implement digital technologies in their professional practices [15], [16]. The theory examines innovation attributes such as relative advantage, compatibility, and complexity to identify the key factors influencing lecturers' decisions to adopt new technologies [17]. By applying this framework, the study is expected to contribute both theoretically and practically to the promotion of digital transformation readiness in higher education environments.

It also seeks to support sustainable improvements in lecturer performance, ultimately contributing to the enhancement of educational quality [18]. In addition, the study underscores the importance of fostering a culture of continuous professional development and institutional investment in technological infrastructure [19]. It advocates for a holistic approach that integrates the strategic use of digital tools in the teaching process, making the learning environment more dynamic, interactive, and responsive to the evolving needs of students. By exploring the intersection of digital technology and lecturer performance, this research seeks to provide valuable insights for policymakers, educators, and institutional leaders looking to foster a more inclusive and effective learning ecosystem.

2. RESEARCH METHOD

This study employs a mixed-methods approach to analyze the impact of digital technology transformation on lecturers' performance [20].

Quantitative Data

Quantitative data was collected through a Likert scale questionnaire, which was distributed to 64 lecturers [21]. The questionnaire assessed multiple dimensions, including the lecturers' attitudes toward digital technology, their behavior in utilizing technology for teaching, research, and community service, as well as the perceived impact of digital technology on their work effectiveness and the extent to which they have adopted such technologies [22], [23]. The Likert scale used for this study offered four response options: "Strongly Disagree," "Disagree," "Agree," and "Strongly Agree." This format allowed for a systematic and measurable understanding of lecturers' perspectives on digital technology [24]. The quantitative data were analyzed using descriptive statistics to identify trends and patterns in the lecturers' responses. The statistical analysis provided insights into the overall relationship between digital technology use and lecturers' performance, as well as any potential factors influencing the adoption and integration of digital technologies in the teaching process [25].

Qualitative Data

To complement the quantitative data, qualitative data were gathered through semi-structured interviews with five lecturers [26], [27]. These interviews allowed for an in-depth exploration of the lecturers' personal experiences and perceptions regarding the use of digital technology in their teaching practices. The qualitative data provided rich insights into the challenges and benefits lecturers encounter when integrating digital technology into their work [28].

The qualitative data were analyzed using thematic analysis. This involved identifying key themes and patterns that emerged from the interview responses [29]. By analyzing the lecturers' narratives, the study was able to capture a more nuanced understanding of how digital technology transformation impacts teaching practices, leadership, and lecturer performance.

Table 1 Impact of Digital Transformation on Lecturers' Performance

Dimension
Attitude toward digital technology
Behavior in using digital technology
Impact of digital technology on work effectiveness
Level of digital technology adoption
Influence of digital technology in teaching

3. RESULTS AND DICUSSION

This section presents the results of the study based on the questionnaire data, including the frequency analysis and the percentage values concerning lecturer performance in teaching and learning. The findings indicate that digital technology transformation has a significant impact on lecturer performance. The data was processed using SPSS Version 20.

Table 2 Research process

Indicators	Correlation								
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	
Indicator 1	0.858	0.866	0.944	0.788	- 0.421	0.664	0.881	0.897	0.766
Indicator 2	0.665	0.745	0.699	0.677	0.299	- 0.438	0.683	0.315	0.545
Indicator 3	0.882	0.877	0.650	0.861	0.813	0.821	0.422		0.780
Indicator 4	0.675	0.511	0.540	0.597	0.496	0.415			0.780
Indicator 5	0.331	0.785	0.708	0.775	0.768	0.407	0.437		0.708

The data revealed a Cronbach's Alpha reliability of 0.766, indicating that the questionnaire is reliable. The study also found that the "engaging and empowering learning" variables significantly impacted lecturer performance. Notably, Question 5 (Q5) showed a negative value, likely due to other influencing factors. Despite this, the overall impact of engaging and empowering learning was found to be positive.

Digital technology has empowered lecturers to achieve new levels of teaching and learning. The integration of digital tools has facilitated teaching by providing resources, enhancing productivity, and encouraging innovative teaching methods [30]. The incorporation of the Internet into classrooms has revolutionized learning by making essential resources more accessible [31]. Lecturers who effectively use digital tools, such as the internet, social media, and PowerPoint, demonstrate improved performance in managing the learning process [32], [33].

Variable relations between teaching using digital technology and lecturer performance.

A relationship was identified between teaching with digital technology and lecturer performance, with a Cronbach's Alpha reliability of 0.670. The beta values suggested how much a predicted value (e.g., Question 6, Q6) changed when the corresponding predictor increased while holding other factors constant. The data indicated a strong correlation between digital technology usage and teaching effectiveness.

Lecturers are adapting to digital technologies, which are essential for teaching in modern classrooms. These technologies provide them with the tools they need to create engaging and interactive learning environments [34]. Multimedia tools, including visual and audio resources, have enhanced the delivery of lessons and facilitated the exploration of innovative teaching methods [35], [36]. Lecturers' ability to utilize digital technology directly impacts the quality of teaching and student achievement, underscoring the importance of digital literacy for educators.

Leadership's Impact on Lecturer Performance

The data revealed a strong relationship between leadership and lecturer performance, with a Cronbach's Alpha reliability of 0.780. Lecturers' ability to lead in the classroom is closely tied to their performance, and leadership skills are crucial for successful teaching, especially in environments that rely on digital technology. Effective leadership in digital education requires a blend of organizational skills and proficiency in digital tools. Leaders in educational settings must embrace digital innovation and use new technologies, such as computers and digital platforms, to enhance the learning process [37], [38]. A well-equipped leader can guide their team to implement digital technologies effectively, transforming the classroom environment [39]. This study confirms that leadership is a key factor influencing the successful use of digital technologies in teaching.

The Role of Accommodation in Lecturer Performance

The relationship between accommodation (e.g., physical and technological support in the classroom) and lecturer performance was also explored. The data showed a moderate impact, with a reliability of 0.708. Accommodation in the form of adequate infrastructure and training is vital for lecturers to utilize digital technology effectively [40]. Lecturers generally reported that they had access to the necessary devices, such as computers and projectors, and did not face significant obstacles when integrating digital tools into their teaching practices Academic accommodation also includes providing professional development opportunities, especially for permanent faculty. While training was available, it was often limited, highlighting the need for continuous learning opportunities for all lecturers, including part-time staff [41].

Infrastructure's Impact on Lecturer Performance

Infrastructure plays a critical role in supporting lecturer performance, with a reliability value of 0.743. Adequate infrastructure—such as internet access, computer labs, and other technological resources—is necessary for lecturers to implement digital technologies in their teaching. Some lecturers reported limited support for new technologies, which affected their ability to teach effectively [42].

Colleges must prioritize the development of digital infrastructures to support the evolving needs of 21st-century education. Effective infrastructure provides the necessary tools and environment for lecturers to succeed in their roles, which, in turn, positively impacts student learning outcomes [43] All variables had been tested, and the results of the study from variable 1 to variable five were shown in Table 3.

Tabel 3. the relationship and impact of digital technology transformation on lecturer performance

Variables	Sig. (2-tailed)	Std. Coeff.	Correlation
Q1	0.000	0.357	0.775
Q2	0.000	0.282	0.801
Q3	0.000	0.314	0.650
Q4	0.000	0.254	0.662
Q5	0.000	0.192	0.653
TOTAL	0.000	-	1.000

The reliability of the relationship and influence of digital technology transformation on lecturer performance was 0.778. It indicated that the relationship and influence of digital technology transformation on lecturer performance were reliable and valid. From the data above, each category of questions in the questionnaire had stated that there was an impact between one variable to anothers. The strongest relationship was in Question 2 (Q2) (0.801; std. coeff. 0.282 and sign.2-tailed 0.000), teaching using digital technology. All lecturers agreed that digital technology was used in the classroom, and lecturers had to transform learning with digital technology. Digital technology has contributed to teaching and learning and made teaching easier. Q1 (0.775; std.coeff. 0.357 and 2-tailed sign 0.000) The attracts and empowers teaching and learning gave lecturers the power to teach in class because they used digital technologies such as PowerPoint, Excel, window doc, Internet, and social media. It could cause that teaching was on the right track, and students was focused on learning. In addition, Question 4 and 5 (Q4 and Q5) were in the third and fourth level, because they were concrete assets provided by the college. In addition, there were not many colleges provide accommodation and infrastructure, although they had to do the 21st-century teaching and learning process. Question 3 (Q3) was about leadership; in reality, all lecturers needed to have leadership in their personality.

The new educational paradigms had emerged as a result of the proliferation of new digital technologies, including the use of digital technologies to provide supplementary materials. Digital technology plays an important role in the teaching and learning process, which was provided for examination, and requiredd lecturers to find the right topics to teach [44] . Engaging and empowering digital technologies were basic tools and services to help lecturers to hone competency skills for the learning process [45]. Digital technology knowledge is a guide that should not be ignored when teaching. In addition, lecturers could use digital technology based on their ability to use the Internet, social media, and educational tools such as PowerPoint, Excel, and Microsoft Word with ease [. By using many features in digital technology, students will have a more natural way to follow the learning in the subject [46]. According to the analysis from table 2, which showed that Q2 (0.745) indicated that lecturers understood and comprehend digital technology transformation. It suggested that they knew how to use and transform digital technology, and it got and pushed lecturers' performance. Lessons are ready to teach with all their knowledge and skills [47], [48]. In the process of leadership, you impacted others. The relationship between leadership and lecturer performance was tied as an exercise to achieve goals under certain conditions. To compromise and establish legitimate power-which could be granted by laws or regulations, as well as entities that have binding issues-a leader needs authority. They must also use their knowledge to help students have better attitudes and knowledge [49]. Interaction was often considered the defining element of the teaching and learning experience, but leadership gave lecturers the ability to organize their performance in the classroom.

The accommodation for lecturers is measured in teaching and preparing for instruction, providing assessment to students, and interacting with students, staff, technicians, campus officers, and others [50], [51]. Lecturers should have work in the teaching process in conducting course content, achieving feedback, stimulating students' motivation to process and reflect on the content and helping them to engage in learning activities. In addition, they should perform various tasks in the teaching process, for example, providing the structure of the course content, providing feedback on achievement, stimulating students' motivation to process and reflect on the content, and helping them to engage in learning activities [52]. Currently, the infrastructure on colleges goes to the same system as the learning process. Infrastructure provides the capacity of how well the campus adapts to the 21st century learning process. Colleges infrastructure provides digital technology as part of the learning process, therefore lecturers must know how to use it. Every colleges should have the Internet as its infrastructure, and the college should make it easier for students to use these digital technologies during the learning process [53]. Colleges management will be a structure with online capacity, and each member of campus officials must understand the infrastructure and infrastructure management knowledge and the need to be evaluated in duration depending on the campus.

The transformation of digital technology for lecturer performance could enhance the learning process, and the campus became a favorable place to support teaching and learning in accordance to 21st century learning paradigm.

4. CONCLUSION

The transformation brought about by digital technology plays a pivotal role in improving lecturer performance. The study highlights a strong and significant relationship between digital technology, leadership, accommodation, infrastructure, and lecturer performance. It suggests that the successful integration of digital tools into teaching practices contributes to better learning outcomes and more efficient teaching methods. Lecturers who have the necessary digital skills, leadership abilities, and access to adequate resources are better equipped to engage students and create an effective learning environment. This reinforces the need for continuous professional development and the provision of robust infrastructure to ensure that digital technologies are effectively utilized in educational settings. In essence, for higher educational institutions to thrive in the 21st century, they must prioritize both the development of their lecturers' digital competencies and the provision of appropriate infrastructure to facilitate the effective use of these technologies in teaching and learning.

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