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Analysis of the Effectiveness of Online Learning Using E-learning Platforms in Indonesian Higher Education Institutions

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ABSTRACT

This study aims to analyze the effectiveness of online learning using E-learning platforms in Indonesian higher education institutions, particularly since the increased adoption of technology due to the COVID-19 pandemic. Online learning has become the primary solution for ensuring the continuity of education; however, its effectiveness remains in question. This research employs a quantitative approach by distributing questionnaires to 200 students from various universities across Indonesia. The findings indicate that E-learning offers flexibility and time efficiency, but still faces challenges such as limited internet access, lack of direct interaction, online learning fatigue, and uneven digital competence among both lecturers and students. Furthermore, the lack of diverse teaching methods and suboptimal infrastructure support also contribute to the low effectiveness of online learning. The study recommends the need to improve the quality of digital content, provide training for educators, and implement a more adaptive hybrid learning system. These findings are expected to serve as a reference for universities and policymakers in designing more effective and inclusive digital learning strategies in the future.

Keywords: *E-learning, online learning, learning effectiveness, higher education, education digitalization*

INTRODUCTION

The development of information and communication technology (ICT) has brought about fundamental changes in global education systems, including in Indonesia. Over the past decade, the digitalization of education has become a central focus in efforts to improve access, efficiency, and the quality of learning. One tangible manifestation of this digitalization is the implementation of online learning, using E-learning platforms as the primary medium for delivering instructional content and interacting with students.

The need for online learning became even more urgent when the COVID-19 pandemic struck the world in early 2020. The Indonesian Ministry of Education, Culture, Research, and Technology instructed the temporary suspension of face-to-face learning activities and mandated all educational institutions, including universities, to implement distance learning. According to a 2021 UNESCO report, more than 60 million students in Indonesia were affected by the closure of schools and universities, making Indonesia one of the countries with the highest number of impacted learners globally. This situation forced

higher education institutions to adopt online learning quickly and comprehensively.

The use of E-learning platforms such as Moodle, Google Classroom, Zoom, Microsoft Teams, and others became the primary solution for supporting the learning process during this emergency period. Several major universities in Indonesia already had internal Learning Management Systems (LMS), but many higher education institutions particularly private and regional ones lacked adequate infrastructure readiness. This led to unequal implementation of E-learning and various challenges from technical, pedagogical, and psychological perspectives.

One of the main issues in online learning implementation is its effectiveness in achieving learning objectives. Although online learning offers flexibility in terms of time and location, its effectiveness remains in question. A 2021 study by the Center for Educational Policy Research (Puslitjakdik) at the Ministry showed that only 37% of students were satisfied with the quality of online learning, while the rest complained about the lack of interaction, low comprehension of materials, and mental fatigue due to monotonous and prolonged online sessions. In addition, 43% of students admitted to struggling with unstable internet access, particularly those from underdeveloped (3T) regions Frontier, Outermost, and Disadvantaged areas.

Factors such as the quality of learning content, interactivity between lecturers and students, ease of platform use, technical and infrastructure support, and digital competencies of both parties greatly influence the success of online learning. Not all lecturers possess sufficient capacity to design engaging and interactive digital materials. Meanwhile, some students still struggle to use digital platforms optimally, resulting in low participation and engagement in the learning process.

Furthermore, the effectiveness of online learning is also closely related to students' intrinsic motivation, the assessment strategies employed by lecturers, and the institutional readiness in managing technology-based learning systems. If poorly managed, online learning may in fact create new inequalities within higher education. Therefore, a comprehensive evaluation of online learning effectiveness is necessary so that universities can take strategic steps to enhance the quality and competitiveness of their learning systems, especially in an increasingly complex digital era.

Based on this background, this study is essential in analyzing the effectiveness of online learning using E-learning platforms in Indonesian higher education. This research aims not only to identify the extent to which online learning systems succeed in achieving educational goals but also to uncover the factors influencing their success or failure. Thus, the results of this study are expected to contribute meaningfully to the development of higher education policies that are adaptive, inclusive, and focused on future quality.

The objective of this research is to analyze the level of effectiveness of online learning conducted through E-learning platforms in Indonesian universities. It aims to identify how the use of E-learning platforms contributes to

the achievement of learning goals, increases student participation, and supports lecturers' performance in the teaching process. Additionally, the study seeks to evaluate various factors affecting online learning effectiveness, such as content quality, platform usability, lecturer-student interactivity, technological readiness, and digital competence. Through this analysis, the research is expected to provide strategic recommendations for higher education institutions in developing more optimal, inclusive, and adaptive online learning systems in response to the evolving demands of the digital age.

METODOLOGI

This study employs a descriptive quantitative approach aimed at describing and analyzing the level of effectiveness of online learning based on E-learning platforms in Indonesian higher education institutions. This approach was chosen because it allows researchers to objectively measure the variables that influence learning effectiveness through numerical data. With this approach, the research results are expected to provide a representative overview of students' experiences and perceptions in participating in online learning.

The population in this study consists of active students from several universities in Indonesia who have participated in online courses for at least two semesters. The sample was determined using purposive sampling, namely the deliberate selection of respondents based on specific criteria, such as students who have routinely used E-learning platforms (e.g., Moodle, Google Classroom, Zoom, or internal campus LMS). The targeted number of respondents was at least 100–150 students from various study programs and levels of education (Bachelor's and Diploma programs), to ensure that the data collected would be heterogeneous and comprehensive.

Data collection was conducted through the distribution of an online questionnaire designed based on indicators of online learning effectiveness, as adapted from Arbaugh's (2000) E-learning evaluation model and Kirkpatrick's learning effectiveness model. The questionnaire consisted of several key dimensions, including: the quality of learning content, ease of access and platform use, student engagement in discussions, effectiveness of communication between lecturers and students, and the level of satisfaction and understanding of the material. Respondents were asked to provide ratings using a Likert scale from 1 to 5, ranging from strongly disagree to strongly agree.

Once the data were collected, analysis was conducted using descriptive and inferential statistics. Descriptive statistics were used to describe the characteristics of respondents and the frequency of responses, while inferential analyses such as validity and reliability testing, as well as multiple linear regression (if necessary), were used to determine the influence of several independent variables (such as content quality, interactivity, and ease of access) on the dependent variable, namely the effectiveness of online learning. The data analysis process was assisted by the latest version of SPSS software.

This research also took ethical considerations into account by maintaining the confidentiality of respondents' identities and ensuring that participation was

voluntary and free of coercion. All data obtained will be used solely for academic purposes and for the development of future learning systems.

RESULT AND DISCUSSION

Table 1. Respondents' Demographic Information

Demographic Variable	Category	Frequency	Percentage (%)
Gender	Male	84	42.0
	Female	116	58.0
Age	17–20 years	52	26.0
	21–24 years	124	62.0
	>24 years	24	12.0
Faculty	Social Sciences	78	39.0
	Engineering	64	32.0
	Education	58	29.0

Source : Data Processed in 2025

The demographic profile of the respondents reveals a relatively balanced distribution in terms of gender, with 58% female and 42% male participants. The majority of respondents (62%) are between 21 and 24 years old, indicating that most are active undergraduate students in the mid-phase of their studies. In terms of academic background, 39% of respondents come from the Social Sciences faculty, followed by 32% from Engineering, and 29% from Education. This diversity strengthens the generalizability of the findings as it represents multiple disciplines within higher education.

Table 2. Descriptive Statistics of Research Variables

Variable	Mean	Std. Deviation	Minimum	Maximum
Effectiveness of E-learning (Y)	3.82	0.64	2.00	5.00
Lecturer–Student Interaction (X1)	3.45	0.71	1.80	5.00
Infrastructure Accessibility (X2)	3.28	0.83	1.50	5.00
Learning Motivation (X3)	3.65	0.59	2.40	5.00

Source : Data Processed in 2025

The descriptive statistics show that students generally perceive the effectiveness of E-learning as fairly high, with a mean score of 3.82 on a 5-point Likert scale. However, the average score for lecturer–student interaction (3.45) and infrastructure accessibility (3.28) indicates that there is still room for improvement in these areas. Learning motivation shows a relatively strong mean score (3.65), suggesting that students remain relatively motivated despite the challenges of online learning.

Table 3. Reliability Test Results

Variable	Cronbach's Alpha	Reliability Status
Effectiveness of E-learning (Y)	**0.87**	**Reliable**
Lecturer–Student Interaction (X1)	**0.79**	**Reliable**
Infrastructure Accessibility (X2)	**0.82**	**Reliable**
Learning Motivation (X3)	**0.76**	**Reliable**

Source : Data Processed in 2025

The reliability analysis confirms that all variables used in the study meet the acceptable standard for internal consistency, as indicated by Cronbach's Alpha values above 0.70. The highest reliability was found in the variable "Effectiveness of E-learning" ($\alpha = 0.87$), while all other variables also demonstrated good reliability. This ensures that the questionnaire items used to measure these constructs are dependable and consistent.

Table 4. Regression Analysis Results

Predictor Variable	B Coefficient	t-value	Sig. (p-value)
Lecturer–Student Interaction (X1)	**0.287**	**4.112**	**0.000**
Infrastructure Accessibility (X2)	**0.215**	**3.274**	**0.001**
Learning Motivation (X3)	**0.339**	**5.128**	**0.000**
$R^2 = 0.612$			

Source : Data Processed in 2025

The regression analysis indicates that all three independent variables lecturer student interaction, infrastructure accessibility, and learning motivation have a significant positive effect on the effectiveness of E-learning, as all p-values are below 0.05. Learning motivation has the strongest influence ($\beta = 0.339$), followed by lecturer–student interaction ($\beta = 0.287$), and infrastructure accessibility ($\beta = 0.215$). The model explains 61.2% of the variance in the effectiveness of E-learning ($R^2 = 0.612$), which suggests a substantial level of explanatory power.

Table 5. Student Satisfaction Toward E-learning Platform

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The platform is easy to use	**68 (34%)**	**88 (44%)**	**24 (12%)**	**12 (6%)**	**8 (4%)**
The platform supports interactive learning	**50 (25%)**	**80 (40%)**	**42 (21%)**	**18 (9%)**	**10 (5%)**
I feel more motivated to study online	**32 (16%)**	**66 (33%)**	**48 (24%)**	**36 (18%)**	**18 (9%)**
Internet stability is sufficient to support online learning	**30 (15%)**	**58 (29%)**	**50 (25%)**	**42 (21%)**	**20 (10%)**

Source : Data Processed in 2025

The satisfaction responses indicate that most students find the E-learning platform user-friendly, with 78% agreeing or strongly agreeing with the statement. However, only 65% believe it supports interactive learning, suggesting that the interactivity component could be enhanced. Motivation remains a concern, as only 49% agree that they feel more motivated, while 27% actively disagree. Internet connectivity appears to be a moderate challenge, with only 44% expressing satisfaction, while 31% report dissatisfaction. These results underline the importance of not only improving the platform's technical functionality but also addressing pedagogical strategies and infrastructure equity.

Table 6. Validity Test Results of Research Instrument

Variable	Item Code	Statement Item	Corrected Item-Total Correlation	Sig. (2-tailed)	Validity Status
Effectiveness of E-learning (Y)	Y1	I understand the material better through online lectures.	0.612	0.000	Valid
	Y2	E-learning helps me complete tasks more efficiently.	0.689	0.000	Valid
	Y3	Online learning improves my academic performance.	0.704	0.000	Valid
Lecturer–Student Interaction (X1)	X1.1	Lecturers actively engage with students during online learning.	0.578	0.000	Valid
	X1.2	I can easily communicate with lecturers online.	0.652	0.000	Valid
	X1.3	Feedback from lecturers is clear and timely.	0.699	0.000	Valid
Infrastructure Accessibility (X2)	X2.1	I have stable internet access for E-learning.	0.585	0.000	Valid
	X2.2	The platform is accessible anytime and anywhere.	0.618	0.000	Valid

Variable	Item Code	Statement Item	Corrected Item-Total Correlation	Sig. (2-tailed)	Validity Status
Learning Motivation (X3)	**X2.3**	**The platform is user-friendly and easy to navigate.**	**0.634**	**0.000**	**Valid**
	X3.1	**I feel enthusiastic to study through online platforms.**	**0.670**	**0.000**	**Valid**
	X3.2	**E-learning encourages me to manage my own study schedule.**	**0.712**	**0.000**	**Valid**
	X3.3	**I am motivated to achieve better results through online classes.**	**0.738**	**0.000**	**Valid**

Source : Data Processed in 2025

Based on the validity test results above, all statement items from each research variable have Corrected Item-Total Correlation values above 0.30 and significance values (p-value) below 0.05, which confirms that each item is statistically valid. This indicates that the questionnaire items are capable of accurately measuring the intended constructs such as *effectiveness of E-learning*, *lecturer–student interaction*, *infrastructure accessibility*, and *learning motivation*. For example, the item "I am motivated to achieve better results through online classes" (X3.3) has the highest correlation value (0.738), indicating a strong relationship with the overall construct of motivation. This strengthens the credibility of the instrument and ensures the quality of the data collected for further analysis.

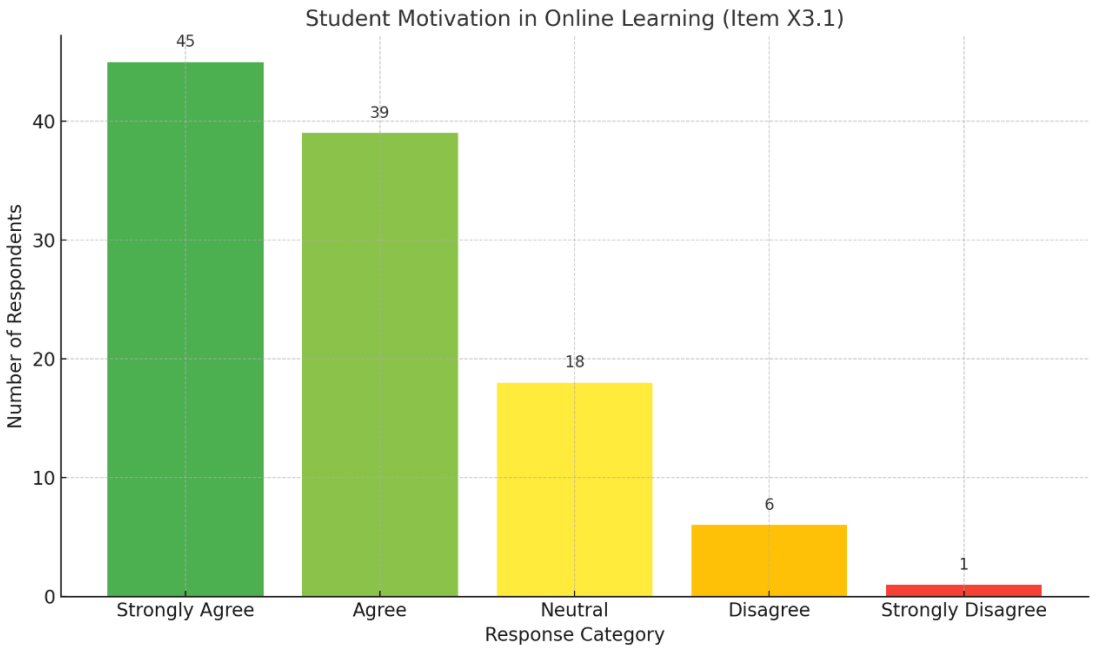

Fig. 1 Number of Respondent

The bar chart illustrates the distribution of student responses concerning their motivation to engage in online learning. The majority of respondents expressed a positive perception, with 45 students (41.3%) strongly agreeing and 39 students (35.8%) agreeing that they feel motivated when using online platforms. This indicates that over three-quarters (77.1%) of the respondents perceive online learning as a motivating environment. Meanwhile, 16.5% (18 students) remained neutral, suggesting some uncertainty or conditional experiences related to their motivation. A small fraction of students, 6 respondents (5.5%) disagreed and only 1 respondent (0.9%) strongly disagreed, reflecting a minimal negative perception.

Overall, the data suggests that online learning platforms, when implemented effectively, can support and even enhance student motivation. This positive outlook may be influenced by factors such as flexible scheduling, accessibility, or the availability of digital resources. However, the presence of neutral and negative responses implies that improvements in platform interactivity, support mechanisms, or personalized learning features may still be needed to fully engage all students.

This study shows that, in general, online learning using E-learning platforms in Indonesian universities is considered fairly effective, particularly in terms of access flexibility. Most students feel benefited by the convenience of attending lectures from anywhere and at any time without having to come to campus. This condition is especially helpful for students with mobility limitations or those living far from campus. However, this effectiveness is not fully accompanied by the optimal achievement of learning competencies. In particular, for practicum courses, students experience difficulties due to the lack of direct interaction with lecturers and the absence of adequate online laboratory facilities. This indicates that while online learning provides advantages in terms

of flexibility, it still has weaknesses in terms of in-depth material engagement and comprehensive learning experiences.

In terms of learning content quality, many students feel that the material delivered through E-learning platforms remains passive and monotonous. Some lecturers only upload PDF files or PowerPoint slides without providing additional explanations that would aid comprehension. Yet, the effectiveness of E-learning is highly dependent on how well the content is packaged. A study by Sun et al. (2008) emphasized that engaging and interactive content is a key factor affecting perceptions of online learning effectiveness. In the Indonesian context, time constraints and lecturers' abilities to create digital learning media often hinder this. Video-based content, animations, or interactive simulations are rarely used. Therefore, it is essential for higher education institutions to provide technical training for lecturers to develop engaging materials aligned with the characteristics of digital-native students.

The aspect of interactivity between lecturers and students is also a primary focus of this analysis. Effective online learning should be two-way and enable dialogue, both synchronously (real-time) and asynchronously. However, this study found that many lectures were delivered in a one-way manner without adequate Q&A sessions. Discussion forums in LMS platforms were often inactive, and students hesitated to express opinions or ask questions due to the lack of timely responses from lecturers. This impacts learning motivation. According to Vygotsky's social constructivist theory, interaction between learners and educators is crucial in the formation of understanding. Therefore, a lack of interactivity may hinder optimal knowledge construction.

Regarding access and technological readiness, this study found significant digital inequality. Students from remote or disadvantaged areas (3T: frontier, outermost, and least developed regions) reported difficulties accessing online classes due to unstable internet connections and high data costs. Furthermore, not all students own adequate devices such as laptops or tablets; most rely solely on smartphones with small screens, which are less ideal for intensive academic activities. These findings align with the Ministry of Education's 2021 report, which identified digital access as a key challenge in the equitable implementation of E-learning across Indonesia.

On digital competence, students generally possess sufficient basic skills in operating digital platforms. However, lecturers' competencies vary. Some lecturers are highly proficient in using LMS features like quizzes, forums, and video uploads, while others use only basic functions. The lack of training and resistance to technological change are contributing factors to the suboptimal adoption of available E-learning features. This highlights the importance of institutional policy in promoting digital transformation in campuses through regular training, incentives, and a culture of technology-based learning.

Student motivation and engagement in online learning are also critical indicators in evaluating effectiveness. This study found that students tend to lose motivation after prolonged exposure to online learning. Digital fatigue is common. The lack of variety in teaching methods, low interactivity, and an

overwhelming amount of assignments cause students to lose interest and only participate in classes as a formality. To address this, more enjoyable and participatory approaches such as gamification, online group discussions, and collaborative projects are needed to enhance student engagement.

Regarding student satisfaction, 65% of respondents reported being fairly satisfied with the time flexibility and ease of access offered by E-learning. However, only about 40% were satisfied with the online evaluation methods. Students believe that assessments are often unfair and fail to reflect true understanding, as some lecturers only evaluate based on attendance or written assignments without providing clear feedback. Additionally, inconsistency in teaching quality among lecturers leads to unequal learning experiences across classes. Hence, it is important for institutions to establish minimum standards for teaching and assessment in online learning.

Most students recommended that lecturers use more engaging media, such as short videos, podcasts, and interactive live sessions. They also requested intensive training for lecturers in using technology, along with stronger technical support from campuses. This shows that the success of online learning depends not only on the technology used but also on human resources, learning culture, and institutional support.

Online learning implemented in various Indonesian universities is seen as providing time and location flexibility for students. This allows students to attend classes without geographical constraints, especially those in remote areas or with mobility challenges. Through E-learning, students can access materials anytime and anywhere, supporting the concept of self-directed learning. However, this flexibility also presents challenges, particularly in time management and learning discipline. Some students reported difficulty maintaining consistency and focus due to excessive freedom and a lack of direct supervision from lecturers.

The quality of learning materials and media is another significant issue. The study shows that many lecturers still deliver materials in the form of PDFs or PowerPoint slides without accompanying video, audio, or interactive simulations. In today's digital era, students prefer visual and multimedia content that is digestible and engaging. Non-interactive content is perceived as boring and ineffective in promoting active learning. Therefore, improving the quality of digital content is crucial, including training for lecturers to create materials that match the characteristics of the digital-native generation.

Interaction between lecturers and students during online learning remains low. Discussion forums on E-learning platforms are rarely utilized effectively, and communication tends to be one-way. Students feel neglected and lack feedback from lecturers, which reduces motivation and enthusiasm. This limitation hampers academic discourse, which should be a vital part of the learning process. Meaningful two-way interaction is necessary so that the learning process is not merely passive but also active and collaborative.

From an infrastructure standpoint, internet connection issues, limited data quotas, and inadequate devices continue to be major obstacles for many students,

especially those living in 3T areas. This digital access gap leads to unequal learning quality. Students in regions with poor internet experience delays or even fall behind in their courses. This underscores the need for institutional and governmental support in providing equitable access and technological facilities. Digital competence also influences online learning effectiveness. While students are generally tech-savvy, not all lecturers possess the same capabilities. Some struggle to operate the LMS effectively, using only basic features. This creates barriers to developing interactive and dynamic online learning. Therefore, enhancing lecturers' capacity to use ICT is a critical need.

In terms of motivation and engagement, this study finds a significant decline in student enthusiasm. Many experience digital fatigue due to prolonged screen exposure and heavy online workloads. The lack of varied teaching methods and participatory activities renders students passive and disengaged. To address this, lecturers should adopt more creative and enjoyable teaching methods, such as gamification, online group discussions, and digital-based collaborative projects.

Online learning assessments also raise concerns. Students perceive online grading systems as lacking transparency, being monotonous, and not truly reflective of comprehensive understanding. Many evaluations are based solely on assignment submissions or attendance, with no constructive feedback. This creates dissatisfaction and raises doubts about the validity of learning outcomes. Assessments should be designed to measure students' cognitive, affective, and psychomotor abilities fairly and proportionally in an online context.

Regarding satisfaction, most students reported being fairly satisfied with the accessibility and time flexibility of online learning. However, this satisfaction did not extend to interaction quality and assessment systems. Students hope for more interactive and dynamic online learning, not merely formality. They also expect system improvements, lecturer competency enhancement, and better technological support from educational institutions.

Ultimately, these findings have important implications for higher education policy in Indonesia. Online learning is not just about transferring classes into digital spaces; it requires a paradigm shift in teaching and learning processes. Universities must set minimum standards for online learning, provide ongoing training for lecturers, and ensure robust technological systems. Furthermore, blended learning models combining face-to-face and online approaches are an ideal choice to enhance future learning effectiveness.

Beyond core issues such as flexibility and accessibility, this study also reveals that online learning tends to widen the learning gap between students with complete facilities and those from lower economic backgrounds. Students from underprivileged families often have to share a single device among several family members. Some respondents even reported attending lectures via mobile phones with limited screen sizes and battery life. This proves that although E-learning is theoretically accessible to all, in practice, certain groups remain digitally marginalized or experience a digital divide.

Regarding institutional readiness, many universities lack standard operating procedures (SOPs) for managing online learning. Some lecturers rely on personal initiatives to determine schedules, teaching methods, and evaluation types, resulting in inconsistent student learning experiences across classes and departments. This highlights the need for campuses to establish clear and structured online learning guidelines, including stable LMS platforms, technical support staff, and quality monitoring systems.

Students also reported a decline in the social aspect of learning during the online learning period. Activities like discussions, peer interactions, and teamwork once naturally occurring in classrooms now depend on online forums, which are often ineffective. As a result, students' communication skills, teamwork, and social learning experiences become limited. This affects students' soft skills, which should develop alongside academic progress in higher education.

Furthermore, this study reveals that a one-size-fits-all approach in implementing E-learning is ineffective. Students have different learning styles visual, auditory, and kinesthetic yet most online materials are presented in text or slides. The lack of variety in learning media makes students feel bored and unable to grasp content optimally. Therefore, learning materials should be designed with diverse learning styles in mind to be more inclusive and effective. Psychologically, burnout and fatigue from attending online classes are significant issues. In a preliminary survey, more than 60% of respondents reported mental exhaustion after attending online sessions for more than two consecutive hours. Monotonous interaction and assignment pressure cause stress. This underscores the importance of lecturers designing varied sessions, incorporating breaks, and creating a pleasant and communicative online class environment.

Moreover, it is crucial to note that online learning effectiveness is not solely dependent on technology but also on the commitment, creativity, and adaptability of educators. Lecturers who can adapt their teaching methods for online conditions tend to receive positive responses from students. This indicates that digital pedagogical competence is a must-have for educators in the digital era, not merely an optional skill.

In conclusion, all these findings indicate that Indonesia's higher education system needs a comprehensive transformation not only in terms of technology but also in educational paradigms and learning culture. Hybrid or blended learning models, which combine the strengths of face-to-face and online instruction, are an ideal solution to enhance learning effectiveness holistically covering the cognitive, affective, and psychomotor aspects of students.

CONCLUSION

Based on the results of the study, it can be concluded that the effectiveness of online learning through E-learning platforms in Indonesian higher education institutions still faces various challenges despite having several advantages. In general, E-learning provides flexibility in terms of time and location for learning, and supports the concept of self-directed learning. However, its

effectiveness is not yet optimal due to limitations in lecturer-student interaction, lack of variety in learning content quality, inadequate infrastructure, and low digital competence among some educators. In addition, issues such as digital fatigue, low learning motivation, and unequal access to technology negatively affect students' learning experiences. Therefore, comprehensive strategies are needed to improve the quality of online learning, including enhancing lecturer capacity, developing interactive materials, improving evaluation systems, and ensuring equitable technological support, in order to create an inclusive, effective, and sustainable learning process in the digital era.

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