Journal of Education Technology
Volume 8, Number 2, 2024, pp. 257-263
P-ISSN: 2549-4856 E-ISSN: 2549-8290
Open Access: https://ejournal.undiksha.ac.id/index.php/JET

Standardization in Digital Teaching and Learning in Higher Education: Indonesia Evidence

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ARTICLE INFO

Article history:
Received November 23, 2023
Accepted March 14, 2024
Available online May 25, 2024

Kata Kunci:
Standardisasi, Digital, Pengajaran dan Pembelajaran, Pendidikan Tinggi

Keywords:
Standardization, Digital, Teaching and Learning, Higher Education

DOI:
https://doi.org/10.23887/jet.v8i2.70548

ABSTRAK

Penelitian ini dilatarbelakangi oleh adanya tren pembelajaran baru berupa pembelajaran digital seperti blended learning, online learning, MOOC, e-learning dan berbagai tren pembelajaran baru yang muncul pada era revolusi industri, namun belum ditetapkannya standar pembelajaran digital yang lebih efektif. Maka penelitian ini bertujuan untuk menghasilkan standar pembelajaran digital yang sesuai dengan konteks Indonesia dengan kondisi demografi dan geografis yang beragam sehingga diharapkan dapat menjadi pedoman pelaksanaan pembelajaran digital di Indonesia khususnya pada jenjang pendidikan tinggi. Artikel ini secara khusus melakukan proses need analisis. Jenis penelitian ini ialah R & D menggunakan metode pengembangan 4D (define, design, development and dissemination) dengan subjek penelitian sebanyak 50 mahasiswa yang diambil dari 3 Perguruan Tinggi. Instrumen yang digunakan ialah angket, pedoman observasi serta wawancara dan diolah secara mixed method (bauran antara kualitatif dengan kuantitatif). Berdasarkan hasil need analisis diketahui perkembangan teknologi sudah dimanfaatkan oleh berbagai jenjang pendidikan untuk memfasilitasi pembelajaran dan mengatasi kesenjangan pembelajaran secara merata. Banyak juga studi kasus yang membuktikan bahwa kehadiran teknologi dalam pembelajaran membuat pembelajaran jauh lebih optimal. Namun, belum ada standar khusus yang ditetapkan untuk membuat proses pembelajaran digital menjadi lebih efektif. Oleh karena itu, diperlukan inovasi untuk menghasilkan standar pembelajaran digital.

ABSTRACT

This research is motivated by the existence of new learning trends in the form of digital learning such as blended learning, online learning, MOOC, e-learning and various new learning trends that emerged in the era of the industrial revolution, but more effective digital learning standards have not yet been established. So this research aims to produce digital learning standards that are appropriate to the Indonesian context with diverse demographic and geographical conditions so that it is hoped that they can become guidelines for implementing digital learning in Indonesia, especially at the higher education level. This article specifically carries out the needs analysis process. This type of research is R & D using the 4D development method (define, design, development and dissemination) with research subjects of 50 students taken from 3 universities. The instruments used were questionnaires, observation and interview guidelines and were processed using a mixed method (a mix of qualitative and quantitative). Based on the results of the needs analysis, it is known that technological developments have been utilized by various levels of education to facilitate learning and overcome learning gaps evenly. There are also many case studies that prove that the presence of technology in learning makes learning much more optimal. However, there are no specific standards set to make the digital learning process more effective. Therefore, innovation is needed to produce digital learning standards.

1. INTRODUCTION

The world of education is experiencing quite rapid development in the era of industrial revolution 4.0, namely the transformation from conventional learning methods to digital. At various levels of education, digital technology is used in the learning process and has experienced significant progress in recent years (Fatimah & Santiana, 2017; Williams et al., 2009). In line with research which shows the conclusion that the blended learning model can provide an effective and efficient educational experience compared to conventional learning (Khairunnisa, 2022). Similar research was also conducted states that information and communication technology has a big influence on the world of education, namely improving the quality of learning in the 21st century by

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using educational technology media (Anih, 2016). The rapid development in the era of Industrial Revolution 4.0 has significantly transformed various sectors, from manufacturing and healthcare to education and finance. This era is characterized by the integration of advanced technologies such as artificial intelligence, the Internet of Things (IoT), big data analytics, and robotics into everyday operations (Fatimah & Santiana, 2017; Tsang et al., 2021). As a result, businesses are experiencing unprecedented levels of automation and efficiency, leading to increased productivity and innovation. Moreover, the workforce is required to adapt to new skill sets, emphasizing the importance of digital literacy and continuous learning. The societal impact is profound, as these technological advancements not only reshape economic structures but also influence social interactions and cultural norms. Consequently, understanding and leveraging these changes is crucial for staying competitive and relevant in today's fast-paced, technology-driven world (Carayannis et al., 2022; Johnson, 2015).

Furthermore, there was also research conducted at universities, namely at STIKOM Bali and obtained analysis results that e-learning was proven to influence student learning motivation (Suwastika, 2018). A study related to the correlation between the use of information technology and the learning process and its impact was also carried out at Airlangga University and showed the results that information technology significantly influences student academic performance and also influences the learning process so that it has an impact on student academic performance (Hasan et al., 2019). Based on several studies above, it can be concluded that the presence of technology can effectively and significantly have a positive impact on the world of education.

The presence of technology can effectively and significantly have a positive impact on the world of education. Technological advancements have revolutionized traditional teaching and learning methods, providing educators with innovative tools and resources to enhance the educational experience (Bosica et al., 2021; Cole & Feng, 2015). Interactive platforms, digital textbooks, and online courses offer greater accessibility and flexibility, enabling students to learn at their own pace and according to their individual needs. Furthermore, technology facilitates collaborative learning through virtual classrooms and discussion forums, fostering a more inclusive and engaging learning environment. Additionally, the integration of artificial intelligence and machine learning in educational software allows for personalized learning experiences, where adaptive learning systems can tailor content to suit the unique learning styles and abilities of each student (Malik et al., 2023; Nozari et al., 2022). By leveraging technology, educational institutions can also streamline administrative processes, improve communication between teachers, students, and parents, and provide data-driven insights to inform instructional strategies. Thus, the strategic implementation of technology in education not only enhances academic outcomes but also prepares students for a technologically driven future.

This is in accordance with the definition of educational technology presented by the Association for Educational Communications and Technology, stating that educational technology is the study and ethical practice in an effort to facilitate learning and improve performance by creating, using, managing appropriate technological processes and resources (Qian & Choi, 2022). It is hoped that the presence of technology can overcome educational problems evenly and set standards for managing digital technology developed at all levels of education. It is proven by the phenomena that occur in the field that a lot of digital learning has been developed to optimize learning (Rosita et al., 2019; Varenina et al., 2021). However, standards have not yet been established to make the digital learning process more effective. In education, we do not only focus on achieving quantity, but also need to pay attention to the quality of efforts so that the innovation provided to the nation's generation remains of high quality and in accordance with established standards. With standards, an effort will have benchmarks for achieving goals, so that it can effectively assess goal achievement and continue to improve quality (Alawiyah, 2017; Fadhlan et al., 2022; Tegeh et al., 2022).

In this context, it is imperative to identify the critical factors necessary for the development of learning standardization. The establishment of such standards must be specifically tailored for implementation within Indonesia, while simultaneously aligning with national standards to ensure the process is consistent with those generally applied on an international scale. This developmental research aims to pinpoint and analyze the essential elements required for standard development, with a particular focus on the creation of digital learning taxonomies and the integration of various other tools essential for effective learning (Lazim et al., 2022; Martins & Gresse Von Wangenheim, 2022). The endeavour to harmonize local educational standards with global practices is crucial for fostering an educational environment that not only meets local needs but also prepares students to thrive in a globalized world. By identifying these key factors, the research contributes to the broader discourse on educational standardization and the strategic implementation of digital learning resources (Núñez-Canal et al., 2022; Robandi et al., 2019).

This research is motivated by the existence of new learning trends in the form of digital learning such as blended learning, online learning, MOOC, e-learning and various new learning trends that emerged in the era of the Industrial Revolution, so there is a need for digital learning standards. So this research will produce digital learning standards that are appropriate to the context of Indonesia with its diverse demographics and geographical conditions. The aim of this study is to conduct needs analysis as the initial stage. The novelty of this study can become a guide for implementing digital learning in Indonesia, especially at the higher education level.

2. METHOD

The development method used is a 4D model, consisting of 4 stages including design, development and dissemination as depicted in Figure 1.

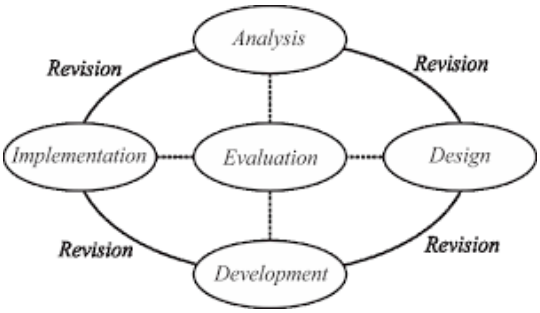

Figure 1. 4D Research and Development Method

Base on Figure 1, the first step of this stage is to carry out a needs analysis by collecting initial data and information regarding the standards that will be set in online learning. Data was collected from 25 lecturers and 50 students from each research location city, namely Eastern, Central and Western Indonesia. After the data is collected, it is continued by identifying fundamental considerations in efforts to standardize digital learning such as; (1) Connectivity for example internet stability, (2) Digital Learning Environment (VLE), (3), Accessibility to technology, (4) E-portfolio, (5) barriers related to distrust/feeling of security/lack of openness, (6) ownership devices, and (7) legality, for example software. The digital divide can be determined based on certain indicators so that the components to be standardized are linked to the context/condition of the digital divide. Next, diagnostic results are developed regarding the standards that will be developed that will support the digitalization of the learning process.

At the design stage, researchers carried out standardization designs in digital learning and carried out according to technical and non-technical standards in digitalizing learning. The third step is to develop the components and facility standards needed for digital learning, as well as developing lecturer guides and student guides for learning. In this stage, feasibility testing or product validation was also carried out involving 4 experts, namely experts in learning objects, learning design, learning digitalization standards and learning evaluation, each of whom came from West, Central and East Indonesia. After obtaining the validation results, the researchers analyzed them to determine the level of effectiveness and efficiency of the 4 experts against the standards that had been set. The final step at this stage is to thoroughly evaluate the standards that have been set. Direct implementation of standards in Western, Central and Eastern Indonesia is carried out at this stage. Apart from that, researchers disseminated information via social media, made revisions based on effectiveness test results, and validated the standards set.

In this research, the research location was carried out in 4 locations, namely in West, Central and East Indonesia with the research subjects being 50 students taken from 3 HEIs in West, Central and East Indonesia. The estimated research implementation is targeted for three years, starting from 2023 to 2025. Data collection instruments are used to collect the data needed for research using the following instrument grid is show in Table 1.

Table 1. Needs Analysis Instrument Grid

No	Aspect	Indicator
1.	Message Design	a. Ease of understanding the message
		b. Ease of access via various devices
		c. The content is felt to support the virtual learning environment
		d. Ease of being captured by each of the five senses
		e. Visuals to support essential messages
		f. Ease of understanding content that can activate students
		g. Appropriate use of visual components
		h. Ability to encourage short term to long term transmission
		i. Ability to stimulate associations
2.	Material Characteristics	j. The material is organized systematically
		k. Metadata-based Learning Object Management
		l. Flexible and reusable
		m. Can be used for various learning purposes

No	Aspect	Indicator
3.	Methods And Media	n. Ease of accessing the platform from various devices
		o. Helps users to focus on using information
		p. The methods and media used support the thinking/learning process
		q. Accommodating adaptive and personalized learning needs
		r. Integrated with the learning management system
4.	Assessment	s. Up to date and has accuracy in the grading system
		t. Accessibility to feedback within the platform
		u. Ask open questions with opportunities for natural responses
		v. Providing user performance tracking information (depth tracking)
		w. Provide holistic assessments effectively
		x. Facilitates decision making through
		y. Allows for organization and testing
5.	Environment And Interaction Patterns	z. User friendly
		aa. Easy navigation to understand and use
		bb. Ease of wider interaction
		cc. Users can collaborate and own interaction patterns
		dd. The learning process takes place according to learning principles
		ee. Fulfillment of a sense of security (confidential)
		ff. Ease of carrying out self-assessment
		gg. Presentation of management (administrative) learning that is simple and functional
6.	Copyright	hh. Copyright is managed and owned by the program designer
		ii. Ease of accommodating across countries
7.	Security And Privacy	jj. Guaranteed information privacy
		kk. Use of tools and platforms
		ll. There is a security guarantee
		mm. Content protection

In this research, data collection was carried out using observation sheets, expert validation questionnaires, trial questionnaires, interview guidelines. The data collection procedure starts from the needs analysis stage through a questionnaire, then the product design and development is tested for validity, practicality, effectiveness, as well as the product dissemination stage. Next, the data is processed using a mixed method (a mix of qualitative and quantitative).

3. RESULT AND DISCUSSION

Result

The initial stage carried out in this research was to carry out a needs analysis by distributing questionnaires to lecturers and students in three research areas, namely Western Indonesia, Central Indonesia and Eastern Indonesia. The questionnaire is divided into 8 indicators, namely:

Message Design

The questionnaire results showed the average score was 86.47% in the very strong category. This means that in terms of message design the results show that the content is understandable and interesting for students. The highest aspect of message design is the ease of understanding the message reaching 89.64 (very good), followed by ease of access via various devices 88.21 (very good), content that is felt to support the virtual learning environment and ease of being captured by the five senses respectively 86.79 (very good), visuals in supporting the essential message and ease of understanding of the content which is able to activate each student 86.7 (very good) suitability of use of visual components 85.71 (very good), Ability to encourage short term transmission to long term 84.64 (good), and the lowest is the ability to stimulate associations 84.26 (good).

Material Characteristics

The results of the questionnaire on these indicators showed a total score of 86.87 (very strong), with details of the material felt systematic with a score of 88.87 (very good), followed by an indicator of the ease of the material to be used for various purposes with a score of 87.50 (very good), the material is easy to understand because it is flexible and can be reused with a score of 86.79 and finally it is related to LOM management with a score of 84.64 (good).

Methods and Media

The results of the questionnaire on this indicator show a total score of 86.87 (very strong). In the method and media indicators, the highest score was in the aspect of ease of accessing the platform from various devices with a score of 88.93. Furthermore, the methods and media used were felt to support the thinking/learning process with an average of 87.86 (very good), the methods and media made it easier to convey messages with a score of 86.43, the ease of accommodating adaptive and personal and integrative learning needs with the respective learning management systems. 86.07 (excellent).

Assessment

The results of the questionnaire from the assessment indicators showed a total score of 85.119 (very strong). In detail, the aspect of openness in presenting questions with opportunities for natural responses received the highest score of 86.07 (very good), ease of providing tracking information (tracking) user performance (depth tracking) and accessibility to feedback on the platform respectively 85.36 (very good) , the assessment is holistic and effective with a score of 85.00 (very good), the assessment is up to date and has an accurate grading system with a score of 84.64 (good) and the assessment makes decision making easier by enabling the organization and testing of data with a score of 84.29 (good).

Environment and interaction patterns

From the results of the environmental and interaction pattern questionnaire, a total score of 87.411 (very strong) was obtained. With detailed aspects of user friendly ease of use getting the highest score of 88.93 (very good), ease of navigation to understand and use and ease of interaction more broadly each with a score of 88.21 (very good), then it relates to the possibility that users can collaborating and having interaction patterns got a score of 87.86 (very good), the learning process took place according to learning principles with a score of 87.50 (very good), fulfilling a sense of security (confidential) a score of 87.14 (very good), then ease of doing things independently. assessment and presentation of simple and functional management (administrative) learning each received a score of 85.71 (very good).

Copyright

The results of the copyright indicator questionnaire obtained an average of 78.57 (strong). Regarding copyright, it consists of 2 aspects, the copyright aspect that has been managed and owned by the program designer, getting a score of 78.93 (quite good) and then the ease of accommodating across countries with a score of 78.21 (quite good).

Security and privacy

In terms of security and privacy indicators related to ensuring information privacy, it is considered the best with a score of 86.07 (very good), then the use of tools and platforms with a score of 85.71 (very good), security guarantees with a score of 85.00 and content protection with a score of 83 .57 (pretty good).

Discussion

Technological developments in the world of education are currently growing quite rapidly. Many media are used in the learning process in order to facilitate learning optimally. So appropriate digital learning standards are needed to serve as guidelines for implementing digital learning, especially at the higher education level. The current condition of digital learning is in line with research, that the use of digital learning media or online media has a positive impact on students, namely it can improve learning outcomes and hone students' digital literacy skills (Beer & Mulder, 2020; Meyers et al., 2013). Previous study also revealed in the research conducted that the integration of technology in higher education has a significant positive impact on the student experience, namely increasing the accessibility of learning materials, developing digital skills in students, collaboration and communication between students and lecturers more effective, and makes it easier for students to choose a learning path that suits their needs and interests (Li & Swanson, 2014). In fact, in education innovation is needed to continue to develop and create more creative output. One of the innovations in education is to involve technology in the learning process optimally and comprehensively to create the expected positive impact. Other study stated that technology can simplify the learning process and search for various learning resources (Miniawi & Brenjekjy, 2015). In implementing it, cooperation from various parties is still needed so that the implied innovation has a much more optimal impact.

Good implementation of digital learning innovation will improve the quality of higher education and vice versa. So it can be said that the correlation between the application of e-learning and the quality of higher education is unidirectional. This is supported by the results of a study conducted by previous study and it was concluded that there is a significant influence on the application of e-learning on the quality of higher education in terms of understanding learning, creation and innovation, as well as the formation of entrepreneurial attitudes (Octaviani &

Rizky, 2019). Another supporting study was carried out and presented the results that E-learning had a positive and significant effect on the learning quality of FKIP UNINUS Bandung students (Karwati, 2014). This influence shows results in strong categories. The more intensively e-learning is used, the quality of learning for FKIP UNINUS students will also increase. The results of the study also show relevant results that 77.3% of students' learning motivation is influenced by e-learning, and the remainder is influenced by other variables from outside the research (Sujiwo & A'yun, 2020).

From the results of relevant research it can be concluded that digital learning has a positive impact. For this reason, appropriate standards are needed so that digital learning, especially in Indonesia, has appropriate guidelines. In the research conducted by researchers, results were obtained in the strong to very strong category. This means that the research carried out can support the implications of digitalization in learning from material to security aspects. The development of digital learning standards is in accordance with the educational technology area, namely the development area, namely to facilitate learning so that it can improve performance and optimize learning. This research contributes to determining digital learning standards that suit needs, so that learning can take place more effectively and efficiently and learning objectives can be achieved optimally. This research experienced limitations in that it was only implemented in 3 universities in West, Central and East Indonesia. The suggestion that the researcher would like to convey for further development is to further expand the implementation of standards directly.

4. CONCLUSION

Currently, in the era of industrial revolution 4.0, the world of education is experiencing a new learning trend, namely the change in learning patterns from conventional to completely digital, such as blended learning, online learning, MOOC, e-learning, and various other learning trends. This technological development is utilized by various levels of education to facilitate learning and address learning gaps evenly. There are also many case studies that prove that the presence of technology in learning makes learning much more optimal. However, specific standards have not been set to make the digital learning process more effective. Therefore, innovation is needed to produce digital learning standards.

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