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INSTRUCTIONAL DESIGN PRINCIPLES IN LEARNING MANAGEMENT SYSTEM (LMS) TO IMPROVE CRITICAL THINKING SKILLS

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Abstract. *The advancement of the times characterized by technological developments requires students to have critical thinking skills as one of the main competencies in facing the challenges of the 21st century. The main purpose of this paper is to suggest and emphasize the principles of instructional design on an effective LMS to improve critical thinking skills, an essential competency that learners must have. Through the literature review method, this paper provides a theoretical foundation related to instructional design principles that are relevant in supporting LMS-based learning. The results of this study are expected to be useful for teachers and educational institutions as a guide to design and utilize LMS optimally, so as to improve students' critical thinking skills and answer the challenges of education in the 21st century.*

Keywords: *Critical Thinking, Instructional Design, Learning Management System.*

1. INTRODUCTION

One of the important questions to be answered in this paper is how to implement an instructional design on the Learning Management System (LMS) that can improve critical thinking skills. This question can only be answered if there are principles underlying the instructional design process on the Learning Management System (LMS). As a basis or principle in thinking and acting (KBBI, 2018), principles become the main understanding before determining instructional design on the LMS so that it is effective in improving students' critical thinking skills. The need to establish instructional design principles on this LMS so as to improve critical thinking skills is very important considering that technological advances require learners to be able to innovate (Ovbiagbonhia et al., 2019). On the other hand, innovation is only possible if learners are able to think critically (Lindfors & Hilmola, 2016). This is because critical thinking contains abilities that are indispensable in this era such as analysis, evaluation, reflection, judgment and decision making (Chusni et al., 2020).

In Indonesia, efforts to improve this ability are needed because the PISA 2022 survey (OECD, 2023) for example shows the weak ability of students in critical thinking. The result is that only 18% of Indonesian students reached level 2 proficiency in mathematics, far below the average achievement of OCED countries of 69%, and almost no students reached levels 5 and 6. Likewise with reading skills, only 25% of students reached level 2 or higher and almost no students reached level 5 or higher. Likewise with science, where only 34% of students reached level 2, and there were no students who reached level 5 or 6. These results are also reflected in a study conducted by Fitriani and team (2022). The study, which involved 175 high school students in Bengkulu, showed that critical thinking skills were still very weak. Learners who get low scores in the aspects of providing simple explanations (48.15), presenting advanced

depictions (49.46), and making assumptions and integration (50.25). These data prove that it is necessary to apply more effective and efficient learning strategies and approaches to encourage the improvement of critical thinking skills.

One of the efforts to improve these critical thinking skills is to develop instructional design on the LMS. Research conducted by Oguguo and team (2021) showed that students who used LMS experienced a higher average increase in academic achievement compared to students who used CAI (Computer Assisted Test). The same results were obtained by Raafat George Saade (2012) in his research in Canada which showed that learning through online courses such as LMS, which are interactive, is considered to contribute to critical thinking. According to research conducted by Liudmila Varenina and her team (2021) that there is a correlation between online learning, students' critical thinking levels, and their learning style preferences.

Although LMS has an influence on improving critical thinking skills, it must be assumed that it is only possible if there is an instructional design. This means that an LMS development must presuppose an instructional design. According to Gary R. Morrison, et al (2019, pp. 2-9) instructional design is a systematic approach designed to create learning experiences that are more efficient, effective, and less difficult for learners. By referring to the basic principles of instructional design, learning materials can be designed to meet learning objectives, match student needs, be interesting, well organized, and delivered through relevant methods or media.

2. LITERATURE REVIEW

2.1 Critical Thinking

Critical thinking is very important because it encourages the problem-solving process, affects one's intelligence, to adapt and improve academic achievement (Thornhill-Miller et al., 2023). According to Ennis (1996), as cited by Mason (2007, pp. 2-3) that critical thinking is an assessment of true statements or a reflective thought. Critical thinking is evident in the ability to observe, infer, generalize, reason and evaluate. In line with Ennis, Matthew Lipman (2003, p.209) asserts that critical thinking is the mental processes, strategies and representations that people use to solve problems, make decisions and learn new concepts. Such abilities, by Stella Cottrell (2005, p.4), are thought to bring precision in thinking and working, thus bringing accuracy in presenting what is relevant and what is not, which is beneficial for problem solving and management of specific projects.

2.2 Instructional Design

According to Gary R. Morrison, et al (2019, pp. 2-9) instructional design is a systematic approach designed to create learning experiences that are more efficient, effective, and less difficult for learners. By referring to the basic principles of instructional design, learning materials can be designed to meet learning objectives, match student needs, be engaging, well organized, and delivered through relevant methods or media. This process is known as instructional design, which emphasizes the use of best practices in designing instruction. Instructional design also ensures continuous evaluation of learning materials and methods to maintain relevance and improve their quality.

According to Charles M. Reigeluth (2013, pp. 5-7), instructional design theory is an explicit guide designed to help individuals learn and develop better, covering various aspects such as cognitive, emotional, social, physical, and spiritual. It provides a structured approach to instruction that consists of clear information, thoughtful practice, informative feedback, and strong motivation, both intrinsic and extrinsic. Clear information helps learners understand the objectives, required knowledge, and expected performance. Thoughtful practice encourages active and reflective engagement, while feedback provides specific suggestions for improvement. In addition, motivation is necessary to ensure deep engagement and learning

achievement.

2.3 Instructional Design

Learning Management System (LMS) can be understood as an online learning technology for the creation, management, and delivery of learning materials pembelajaran (Sabharwal et al., 2018). In today's pervasive digital environment, LMS plays an important role in enhancing and facilitating teaching and learning. LMS not only enriches learners' learning in a collaborative environment, but also allows teachers to focus on the design of meaningful learning activities (Kattoua et al., 2016).

In addition, according to Robin Mason (2008), LMS refers to a learning management system that organizes a managed learning environment or virtual learning environment. LMS is the preferred term in the United States and is often used for corporate training provision. Regardless of the term, the software provides a way of administering e-learning by providing an access system as well as a learner progress tracking system. Of course facilities for communication, assessment and content display are also part of the platform.

An LMS allows learning materials to be delivered over the internet, so learners can acquire the knowledge and skills necessary for their learning process from anywhere at any time. To improve the use of LMS for learner training, the usability aspect should be explored, yet this aspect is generally overlooked. Usability is the extent to which a system can be used by specific users to achieve specific goals effectively, efficiently and satisfactorily in a defined context, and if an e-learning system has poor usability, users may spend more time learning the system itself than learning the content delivered.

3. RESEARCH METHODS

This research uses the literature study method in determining the instructional design principles that must be the basis for developing a Learning Management System to improve students' critical thinking skills. By using a literature study, the theoretical foundations, approaches and previous research will be explored and obtained that provide an overview of the principles of instructional design on an LMS that effectively improves critical thinking skills. The first thing to do is to search, analyze and explore various scientific sources such as journals, books, research reports and articles that provide an understanding of how the principles of instructional design in encouraging the effectiveness of LMS development so as to increase the critical thinking skills of learners. Of course, the main focus of this process is to obtain relevant and credible sources to provide an adequate and comprehensive basis for understanding. After finding credible sources, the next step is to conduct a critical analysis to establish an understanding of the instructional design principles that must be present in the LMS so that it can improve critical thinking skills. This section examines in depth what instructional design, Learning Management System, critical thinking and the principles needed to develop an instructional design on an LMS with the aim of improving critical thinking skills.

4. RESULTS AND DISCUSSION

4.1 Basic Components of Instructional Design

An instructional design on the Learning Management System to improve critical thinking skills for learners must contain at least four basic components. According to Gary R. Marrison, et al (2019, p. 16), the four basic components are learner characteristics, learning objectives, methods and evaluation. First, considering learners' characteristics aims to make learning adaptable to their backgrounds and learning styles. This will certainly have an impact on creating active and participatory learning. Second, good learning is learning that has a purpose. The purpose is focused on what the learning is done for. Third, effective learning is always supported by a method that

encourages learners to be active and participatory, which can be project or problem-based. The right method will encourage learners to improve their critical thinking skills. And fourth, continuous evaluation is needed to provide records and feedback on whether the learning is successful or otherwise. A good instructional design should encourage continuous reflection and improvement.

The basic components above, by Marrison (2019, pp. 6-7), are understood as instructional design approaches that include things such as: what level the learners need to achieve the set objectives, what learning strategies best suit the objectives and characteristics of the learners, what technology or resources can support the process of learning effectiveness, what support is needed, how to measure the achievement of objectives and what improvements are needed to make learning better in the future. These basic components must be present in an instructional design for a Learning Management System that effectively improves learners' critical thinking skills.

4.2 Self-regulated Learning

The utilization of Learning Management System is the potential and wealth of education in this era of technological advancement. However, an online learning environment will experience problems if learners are not familiar with self-regulated learning (Wong et al., 2019). The failure is due to the lack of awareness of the strengths and limitations of learners and how they anticipate them to be successful (Zimmerman, 2010). According to Zimmerman (2010), self-regulated is a strategy to transform their mental abilities into academic skills. That means, learning is a way for learners to understand their own characteristics and in what ways, they should succeed. Sharpening Zimmerman's idea above, Philip H. Winne in his article entitled Inherent Detail in Self Regulated Learning (Winne, 1995) explains that in SRL, students become active figures who explore information libraries. They are actively called to access knowledge and information massively and systematically. In the learning process, SRL-driven students set goals to expand their knowledge and deepen their skills while maintaining motivation. They realize what their strengths and abilities are to achieve their goals but also understand where their limitations and weaknesses are.

According to Broadbent et al, (2023) there are 10 key factors for Self regulation that form the basis for online learning to be effective and successful. These include: (1) online self- efficacy, (2) online intrinsic motivation, (3) online extrinsic motivation, (4) online achievement emotions, (5) planning and time management, (6) metacognition, (7) learning environment, (8) online effort regulation, (9) online social support and (10) online task strategies. These key factors can be a guide in implementing strategies to succeed in online or blended learning where an LMS is utilized.

It must be emphasized that an instructional design on a Learning Management System must familiarize learners to have self-regulated learning, as a basic principle if it is to be successful in online learning. The critical thinking skills to be improved by the development of instructional design on LMS ultimately familiarize learners to have self-regulation. This means that learner must be accustomed to a learning that is born from personal motivation and awareness. In the end, learning is not a teacher process but a learner activity.

4.3 HOTS Learning

One of the principles that must be present in the instructional design of the Learning Management System to improve critical thinking skills is implementing High Order Thinking Skills (HOTS) learning. In Bloom's taxonomy as revised by Anderson & Krathwohl (2001), HOTS learning includes higher order thinking skills such as analyzing, evaluating and creating. This ability is needed to encourage critical thinking as an effort to solve problems and find solutions that are useful in this era. Research conducted by Ragil et al (2023) found that HOTS learning integrated with LMS significantly increased learning effectiveness, with the average passing score of students reaching 83%. That means an instructional design on the LMS is only effective

in improving critical thinking skills if it contains HOTS-based learning.

Furthermore, Anderson & Krathwohl (2001, pp. 79-85) provide an understanding of the three abilities in High Order Thinking Skills, namely analyzing, evaluating and creating. First, analyzing is a way of sorting material or information by organizing it properly so that it becomes parts that can be connected to one another or distinguished from one another. Second, evaluating means making judgments based on certain criteria or standards. This is needed to monitor a certain level of effectiveness, efficiency and consistency of an outcome or process. In this process, inspection activities are carried out or making critical notes aimed at improvement. Thirdly, creating refers to the attempt to unite separate elements into one part that has a specific function. In this process, learners are directed to make a new product by arranging various elements so that a product is produced that has a certain function and purpose.

CONCLUSION

Thinking and implementing instructional design principles in the Learning Management System is necessary to support a learning experience that is structured, independent, effective and in accordance with the characteristics of learners. These principles enable the LMS to become an active, participatory and interactive classroom or learning environment and not just a space for exploration of learning materials. With these principles, it provides insight for teachers, schools or media developers such as LMS or the like to present an online learning experience that is contextual to the situation of students as well as actual in this era. So that efforts to improve critical thinking skills can be achieved through an instructional design on an appropriate and effective LMS.

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