Effectiveness of Learning Management System and Peer Assessment Method in Parasitology Learning at Padjadjaran University, Faculty of Medicine

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ABSTRACT

The early 2020 COVID-19 pandemic disrupted community activities, including education. Online education and various teaching methods have been implemented by the Indonesian government to reduce classroom learning. This study investigates the impact of asynchronous learning and peer assessment in the parasitology course via the Learning Management System (LMS). This quantitative study evaluated the effectiveness of Learning Management System to facilitate asynchronous learning and peer assessment in the fifth-semester parasitology course. All 247 course students were the study's target group. The data was acquired using a structured questionnaire. A quantitative analysis was done utilizing Sugiyono's efficacy formula. To draw relevant conclusions, qualitative questionnaire data was recorded and rigorously analyzed. The survey indicated that 37% of respondents thought LMS was beneficial for Parasitology E-learning and 39% said it improved course understanding. In the GIS system, 91% of participants said peer assessment helped them comprehend parasitology topics. This study demonstrates that the LMS can effectively and efficiently facilitate peer assessment to address the challenges in providing feedback to students in order to improve learning outcomes.

INTRODUCTION

The COVID-19 pandemic brought forth unprecedented challenges to higher education institutions worldwide, compelling a rapid transformation in the delivery of educational content. The resultant surge in online learning emerged as a pivotal response to the restrictive measures necessitated by the pandemic. This paradigm shift underscored the vital importance of online learning development, as it became the primary mode of instruction, ensuring the continuity of higher education amidst the crisis (Hodges et al., 2020). The significance of this transformation extended beyond immediate crisis management, laying the foundation for a more flexible and accessible educational landscape (Leal Filho et al., 2018). Consequently, it prompted the need for a comprehensive examination of the evolution and efficacy of online learning strategies, not only to address the challenges posed by the pandemic but also to shape the future of higher education in a dynamic, technology-driven world (García-Morales et al., 2021). This shift catalyzed a reevaluation of pedagogical approaches, digital infrastructure, and student support systems, emphasizing the enduring importance of online learning in modern higher education contexts (Li & Pei, 2022). As such, an in depth exploration of the ongoing development of online learning...
in the aftermath of the COVID-19 pandemic remains a pertinent area of research and scholarship (Wankel & Blessinger, 2013).

E-learning, or online learning, has been extensively adopted in diverse educational settings, leveraging various methodologies tailored to the specific needs of learners (Fernandes et al., 2023). This adaptability to evolving pedagogical models has resulted in the continual evolution and assessment of the e-learning concept (Picciano, 2021). The integration of Learning Management Systems (LMS) has played a pivotal role in enhancing instructional delivery and ensuring the attainment of learning objectives (Endurance et al., 2020). By providing a structured framework, LMS facilitates a more streamlined and consistent flow of learning materials, contributing to enhanced student competence levels (Bradley, 2021).

One notable enhancement to the educational process within the LMS environment is the incorporation of the peer assessment method for evaluating student assignments (Fernandes et al., 2023). From the student's viewpoint, online peer assessment is regarded as a suitable alternative digital assessment approach that enhances student motivation and promotes the development of cognitive, metacognitive, and digital skills (Fernandes et al., 2023). Beyond objectivity, the introduction of peer assessment serves multifaceted purposes. It not only fosters student independence and a deeper understanding of course materials but also empowers them to critically evaluate both their own work and that of their peers (Fernandes et al., 2023). This transformative aspect reframes assessment as an integral component of the learning process rather than a mere addendum (Fernandes et al., 2023).

In the context of this study, the peer assessment method was applied to assess coursework among third-year medical students specializing in parasitology at the Faculty of Medicine, Padjadjaran University. The application of peer assessment serves as a critical component in achieving the research objectives, which encompass assessing whether its integration through LMS aids in fulfilling the learning goals of the parasitology curriculum and evaluating its effectiveness based on research outcomes. This study intended to evaluate the efficacy of the LMS for facilitating peer assessment as a part of academic evaluation for students at the Faculty of Medicine, Padjadjaran University.

**RESEARCH METHOD**

This study is characterized as a descriptive-quantitative study endeavor encompassing three distinct phases: (1) planning, (2) dissemination, and (3) analysis. The research cohort consisted of students from the 2018 batch enrolled in the medical education study program at the Faculty of Medicine, Padjadjaran University, comprising a total of 247 respondents.

This study was conducted at Faculty of Medicine, Padjadjaran University, Bandung, Indonesia, with ethical approval by the Research Ethical Commission of Padjadjaran University No.1070/UN6.KEP/EC/2021. Data collection was conducted in January 2022 through the utilization of a questionnaire-based methodology, employing two specific instruments: (1) a feedback questionnaire tailored for students engaged in the Parasitology course on the LMS of Padjadjaran University, previously disseminated with data readily available, and (2) the "Student's Perception of Peer Assessment Effectiveness" questionnaire administered via a Google Form. The effectiveness of peer assessment data was analyzed utilizing a Likert scale for each questionnaire item, enabling a comprehensive evaluation of students' perspectives.

The questionnaire not only includes queries demanding quantitative responses but also incorporates a series of subjective questions. These subjective inquiries were subjected to in-depth qualitative examination and subsequently integrated into the concluding section of the research to contribute to a comprehensive synthesis of the study's outcomes. In general, the primary questionnaire includes inquiries about students' feedback on the advantages of the Learning Management System (LMS), the effectiveness of utilizing the LMS, the user-friendliness of the LMS, the influence of the LMS on enhancing understanding of the...
course material, students' endorsement of implementing the LMS in other courses, and students' critiques and suggestions on online learning through the LMS.

On the other hand, the second questionnaire primarily inquired about students' perception on the significance of maintaining identity confidentiality during the implementation of peer assessment through LMS. It also asked about the specific assessment rubric employed in peer assessment, the weight assigned to the scores on the rubric, the influence of peer assessment on student engagement in completing assignments, the effect of peer assessment on improving competence, and the impact of peer assessment on facilitating student self-reflection.

RESULTS AND DISCUSSION
Results
In this comprehensive study, we aimed to evaluate the effectiveness of asynchronous learning facilitated by the Learning Management System (LMS) of Padjadjaran University (UNPAD) within the context of the Parasitology course, a pivotal component of the Gastrointestinal System (GIS) curriculum in higher education. Through a meticulous analysis of questionnaire responses, we gained valuable insights into the efficacy of this innovative pedagogical approach (Figure 1).

% Student's feedback on LMS in facilitating asynchronous learning in Parasitology course

![Pie chart showing student feedback on LMS](image)

Figure 1. Effectiveness of Asynchronous Learning using LMS in Parasitology course during Gastrointestinal system block

A significant proportion of the respondents, constituting 37%, unequivocally conveyed that LMS UNPAD effectively facilitated E-learning for the Parasitology topic within the GIS system. Furthermore, an additional 39% of respondents emphasized that LMS UNPAD was highly effective in enhancing their comprehension of the course material. Simultaneously, our study delved into student perceptions of peer assessment activities within the context of case analysis in the Parasitology course within the GIS system. The data revealed that a substantial 51% of respondents regarded peer assessment as highly effective in enhancing their comprehension of the learning topics (Figure 2).

As a result of the combination of these factors, an overwhelming 91% of the participants supported the usefulness of the peer evaluation approach, highlighting the potential of this method to facilitate an increased understanding of parasitology topics inside the GIS system. Previous studies have highlighted the benefits of peer evaluation, including the development of independent learning, critical thinking, and self-assessment abilities among students (Hung et al., 2016; Kumar et al., 2023; Yin et al., 2022). The favorable perception of peer assessment is in line with these findings.
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Figure 2. Effectiveness of peer assessment in enhancing learning comprehension during parasitology course in gastrointestinal system block.

Discussion
The finding that demonstrated the high efficacy of asynchronous through the use of Learning Management Systems (LMS) in our study is consistent with the broader trends observed in higher education, where LMS platforms have played a pivotal role in enabling remote learning and promoting educational continuity during times of disruption, such as the COVID-19 pandemic (Habibi et al., 2023). Furthermore, these results align with previous research emphasizing the role of LMS platforms in providing structured and accessible educational content, contributing to students' improved understanding and engagement (Bradley, 2021). LMS provide students the advantage of time and flexibility in location, enabling them to access course materials and do assignments at their own speed and from any place with an internet connection. (Bradley, 2021). LMS may enhance student engagement by offering interactive and multimedia-enriched materials, along with chances for collaboration and communication with both classmates and instructors. (Chaw & Tang, 2018). LMS can provide personalized learning experiences by allowing students to choose their own learning paths and providing adaptive learning technologies that adjust to their individual needs and abilities (Bradley, 2021). LMS can increase efficiency by automating administrative tasks such as grading and tracking student progress, freeing up instructors' time to focus on teaching and providing feedback (Hutchison, 2019; Xin et al., 2021). LMS have the potential to enhance learning outcomes by providing students access to an extensive variety of materials and tools, along with opportunities for formative evaluation and feedback (Sulaiman, 2023).

Our findings underscore the instrumental role of LMS UNPAD as an educational medium that significantly augments students' comprehension of the intricate Parasitology subject matter. The integration of asynchronous learning components, such as instructive videos, quizzes, and case analyses, complemented by peer assessment methodologies, within the GIS block, has demonstrated its efficacy when delivered through the LMS UNPAD platform. This is comparable with the larger amount of evidence on the efficacy of blended learning methods, which integrate online and in-person components to improve learning results. (Kintu et al., 2017; Tong et al., 2022). The inclusion of diverse learning resources and interactive components within the LMS
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fosters a more engaging and comprehensive learning experience, contributing to improved student competence levels (Veluvali & Surisetti, 2022).

Peer assessment has been recognized as a powerful educational tool that not only provides valuable feedback but also promotes active engagement and critical thinking among students (Concina, 2022; Adesina et al., 2022; Yin et al., 2022). Additionally, 40% of the respondents expressed that peer assessment was effective in this context (Figure 2). This endorsement of peer assessment highlights its versatility as an assessment strategy that can cater to various learning needs and preferences.

Peer assessment in student evaluation offers several benefits, including promoting active engagement, fostering a deeper understanding of course materials, and enhancing critical thinking skills among students (Bradley, 2021). It encourages students to take ownership of their learning process and become more self-regulated learners (Ibarra-Sáiz et al., 2020; Yin et al., 2022). Moreover, peer assessment can provide a more holistic and diverse perspective on a student's performance, reducing potential biases associated with single-instructor assessments. It also aligns with the principles of formative assessment, offering timely feedback to students, which can be instrumental in their learning journey (Yin et al., 2022). Peer assessment can increase student motivation by providing them with a sense of ownership and responsibility for their learning (Edwards, 2013; Ibarra-Sáiz et al., 2020; Sun et al., 2015). Peer assessment can enhance learning by providing students with opportunities to develop their critical thinking, communication, and feedback skills (Edwards, 2013; Sun et al., 2015; Yin et al., 2022). Peer assessment can improve self-awareness by providing students with opportunities to reflect on their own work and the work of their peers. For teachers, peer assessment can reduce the workload for instructors by allowing students to take on some of the assessment responsibilities (Alzaid, 2017; Power & Tanner, 2023). Peer assessment can provide real improvements in student performance, exceeding the impact of feedback provided by teachers. (Sun et al., 2015). To maximize the benefits of peer assessment, it is important to provide clear guidelines and criteria for assessment, as well as training for students on how to provide constructive feedback (Ibarra-Sáiz et al., 2020; Yin et al., 2022). It is also important to ensure that the assessments designated for peer assessment are appropriate for this method of evaluation. Additionally, instructors should monitor the peer assessment process to ensure that it is fair and reliable.

However, peer assessment is not without its challenges. One of its weaknesses is the potential for variability in the quality and fairness of evaluations due to differences in students' knowledge and assessment skills (Russell et al., 2017). Ensuring the reliability and validity of peer assessments can be a complex task (Zhang et al., 2020). Additionally, some students may be reluctant to provide honest feedback to their peers due to concerns about social dynamics and potential conflicts (Daou et al., 2020). Furthermore, the effectiveness of peer assessment can be influenced by the clarity of assessment criteria and guidelines, which need to be carefully developed and communicated to students (Double et al., 2020). Peer assessment may sometimes result in subjective judgement due to rivalry or envy among students (Carlsson Hauff & Nilsson, 2022; Power & Tanner, 2023). The process of grading peer and self-assessment can be influenced by factors such as social, cultural, and educational background, which may lead to reluctance, doubt, subjectivity, and a lack of trustworthiness. The feedback offered by students may be inaccurate due to a deficiency in assessment and evaluation expertise. Students may experience a sense of unfairness if they feel their teammates have contributed equally. Students may try to game the system by colluding on scores they are going to give each other so that on average they all get the same score (Alzaid, 2017). The evaluations designated for peer assessment can be particularly challenging to evaluate, even for experienced instructors, due to their inclusion of highly subjective components such as group work and oral assessment. The success of peer tutoring is significantly influenced by the level of confidence exhibited by the students. Even if the less capable peer is there, they will not benefit significantly from the experience unless the more competent peer is self-assured in conveying their expertise.
Furthermore, the pivotal role played by the ease of inputting values into the system in driving this high level of satisfaction aligns with previous research emphasizing the importance of user-friendly interfaces in educational technology (Pandita & Kiran, 2023). It underscores the need for continued attention to the usability and accessibility of educational technology interfaces to maximize their effectiveness in supporting student learning experiences.

The qualitative insights derived from participants’ responses shed light on areas for improvement in the implementation of peer assessment through LMS. The challenges related to time allocation for task completion and students’ awareness of the need for regular checks are consistent with the broader literature on time management and student engagement in online learning environments (Capan Melser et al., 2020). Addressing these challenges could lead to more efficient use of the peer assessment method and improved student experiences.

The concerns regarding the insufficient time allocated for conducting peer assessments and issues related to the confidentiality of students’ identities highlight the need for careful design and administration of peer assessment processes within the LMS. These findings align with research emphasizing the importance of clear guidelines, rubrics, and assessment criteria in peer assessment (Russell et al., 2017). Ensuring fairness, transparency, and privacy safeguards is essential to maintaining the integrity and objectivity of the assessment process.

CONCLUSION
In conclusion, the findings from this study contribute to the growing body of evidence affirming the effectiveness of asynchronous learning through LMS platforms, particularly in the context of specialized topics like Parasitology within the GIS curriculum. Furthermore, the positive perception of peer assessment highlights its potential as a valuable assessment strategy, promoting active engagement and a deeper understanding of complex subject matter. These insights encourage further exploration and integration of these pedagogical approaches in higher education to continually enhance the learning experience and academic achievement of students. This study highlights the efficacy and efficiency of the Learning Management System (LMS) in enabling peer assessment to address the difficulties in delivering feedback to students with the aim of enhancing learning outcomes.

However, addressing the identified challenges and making necessary improvements to the system, including considerations related to infrastructure, deadlines, and user experience, is essential to ensuring the continued success and effectiveness of this pedagogical approach in the evolving landscape of online education. The limitations of this study correspond to the fact that it solely focused on the Parasitology course and did not utilize exam scores as a means of evaluating the efficacy of peer assessment. Future research should be conducted to observe the impact of peer assessment facilitated by LMS for various other subjects other than Parasitology course.

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