Buletin Edukasi Indonesia (BEI)
DOI: 10.56741/bei.v2i01.271
E-ISSN 2962-1674
P-ISSN 2962-5742



Online Physics Learning with Seesaw App Based on Discovery Learning

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Abstract

This study aims to analyze the importance of the Learning Management System (LMS) in terms of usefulness, ease of use, ease of learning, and satisfaction. The method used in this study is the use of the Seesaw LMS and discovery learning approach, which was incorporated with constructivist learning theories. The results show that the average for each aspect was 3.11 (usefulness), 3.10 (ease of use), 3.30 (ease of learning), and 3.11 (satisfaction), with a maximum scale of 4. The overall average for all categories was 3.16, indicating that the application is suitable for online learning. The study found that using the features of Seesaw in conjunction with discovery learning can improve the quality of education and increase students' learning outcomes. Implementing Seesaw in the learning process using discovery learning is an appropriate method for online learning. Using Seesaw features and collaborating with other supporting applications like PhET can make the learning process more engaging and not monotonous.

Keywords: *Discovery Learning, Online learning, Physics learning, Seesaw App*

Introduction

In the era of globalization, the world presents various challenges in various aspects of life. Individuals must compete and overcome these challenges, such as cybersecurity, production reliability, lack of skills, resistance to change, job loss due to automation, and more. These challenges require breakthrough thinking processes to produce high-quality, competitive outputs in a globalized world. The globalization era has introduced mass production technologies and has influenced the education sector [1]. Technology has changed how education is viewed, with manual processes replaced with digital ones. The Covid-19 pandemic has accelerated the shift towards online education, including e-books, e-learning, e-modules, and e-reports [2]. Distance learning was previously limited to print materials distributed via post. Still, with the advancement of technology, distance learning now incorporates various tools and strategies, including communication, video conferencing, social networks, television broadcasts, web-based instructions, and more. The use of technology in distance learning allows for maximum execution, connecting teachers and students virtually [3]. Despite the virtual connection, the quality of education should stay the same as traditional in-person learning.

Technology helps the assessment process to be faster and can be utilized according to the needs of both assessments of learning, assessment as learning and assessment for learning. The use of assessment for learning in education is essential to assess the progress of students' learning [4]. One advantage of assessment for learning is that review can be done throughout the learning process through the provision of feedback. Feedback is used as information to determine the shortcomings and strengths of the learning process so that it can be used as material for improvement for students in

developing their skills [5]. According to Ref. [6], the feedback given makes students able to modify the completed task so that the quality of the job improves. Based on the results of the study that has been conducted, learning through technological assistance can be facilitated by Seesaw [7]. Seesaw is used as a platform that is utilized as an assessment tool, especially assessment for learning. Seesaw is used to access tasks and provide feedback to students [8]. Seesaw is one of the platforms that can be used during this pandemic. Seesaw is one of the alternatives for digital portfolio assessment. On Seesaw, teachers can provide materials and tasks through available features. Students can also download materials, upload tasks, and upload learning products on Seesaw. On Seesaw, not only is there an activity between teachers and students, but it can also establish communication with students' parents. It makes digital learning activities more meaningful as students are trained by parents and teachers in a balanced manner [9]. In addition, Seesaw can also be used in any learning, one of which is physics. Students can do simple experiments from home and upload their work or learning products by utilizing the features on Seesaw. The features on Seesaw allow students to upload work and developments in the form of files, texts, images, sounds, and videos.

The use of Seesaw can be used together with the discovery learning model. The learning process uses the stages of the discovery learning model and is assisted by utilising the features available on Seesaw. Features on Seesaw can be used in each stage of discovery learning. It makes learning more exciting and more varied. Tasks can also be given through Seesaw using available features. In Seesaw, physics lessons can contain learning materials in the form of files or notes and videos or links. The problem statement can be formulated as "how is the superiority of the Seesaw LMS based on discovery learning for improving learning outcomes." The general objective of this research is to show the superiority of the Seesaw LMS design based on discovery learning.

Methods

This research is development research, with the result being a preliminary design of a learning management system for measurement material for 10th-grade students. Based on the analysis, the characteristics showing the superiority of this design are located in the LMS used. The LMS was created using the free application/software Seesaw, accessed at www.seesaw.com. Seesaw contains more features that can be used, and in the learning process, it can be monitored directly by parents. The development process includes several stages: creating the preliminary learning design with Seesaw, expert validation, and a small-scale user test.

The learning design has a characteristic that sets the model to be used: the discovery learning model. Seesaw contains learning goals, content, outcomes, and materials used. In the learning activities, most students must have skills in using the available features and multimedia processing (text, images, files, videos, etc.). The learning process follows the stages of discovery learning, including stimulation, problem statement identification, data collection, data processing, verification, and generalization. Qualitative experts validated the completeness of the LMS content, such as learning goals, content, learning activities, presentation techniques, and clarity of actions to achieve goals. Two experts were involved in the Seesaw learning design. Ten 10th-grade students conducted a small-scale trial, and trial data were analyzed using an Excel program.

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DOI: 10.56741/bei.v2i01.271 **P-ISSN 2962-5742**

Results and Discussions

The LMS design has been developed with good relevance to the physics material for 10th-grade students, as shown in Figure 1. The learning process using physics learning media is not limited to using words. Still, it is also given external stimulation through the direct application of the concepts being learned in the real world. The Seesaw physics lesson can accommodate not only teaching materials in the form of files or notes but also the form of videos or links. The figure shows a teacher assigning a task to students to perform experiments at home using the PhET media. Students do simple physics experiments at home, and the project, student research, or laboratory results can be presented in writing. In addition, students can upload pictures of experiments or results. Many features in Seesaw can be used for physics material.



Fig. 1. The learning subject on the LMS

The LMS has been developed with good relevance to the discovery learning teaching model, shown in Figure 2. The discovery learning model has stages, including the stimulation stage, problem statement stage, data collection stage, data processing stage, verification stage, and generalization stage. In the figure, a student is shown measuring the length of a table at home. The student's measurement results are uploaded to Seesaw using the picture feature and explained. This measurement is part of the discovery learning model stage, data collection, where the student is invited to try, observe, and gather data. Seesaw and discovery learning can be used together in the learning process.

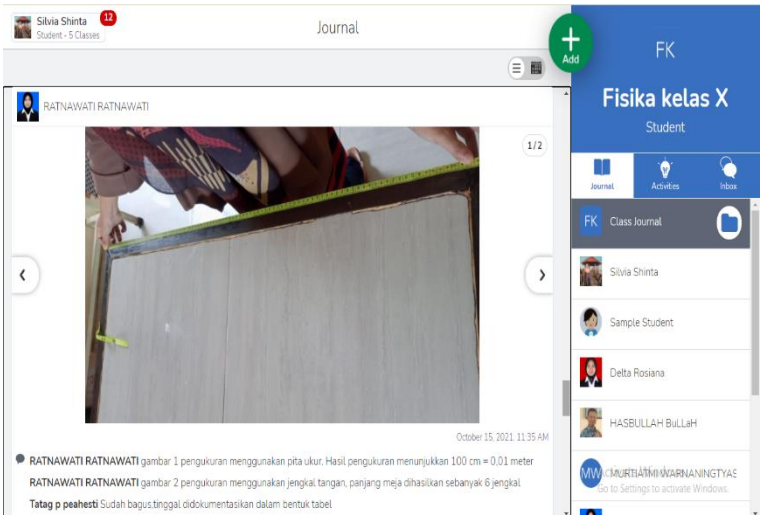


Fig. 2. The learning strategy in the LMS

E-ISSN 2962-1674
DOI: 10.56741/bei.v2i01.271
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The LMS has been developed with good relevance to the student's learning outcomes, as shown in Figure 3. After the learning process using the stages of the discovery learning model, the learning process using the features available in Seesaw makes learning more exciting and not monotonous. Tasks can also be given through Seesaw using available features. The picture above shows a teacher giving students a question. So, later the students can complete the task and answer it using the available features, such as the image feature. The student's learning process and outcomes can be monitored and seen by their parents.

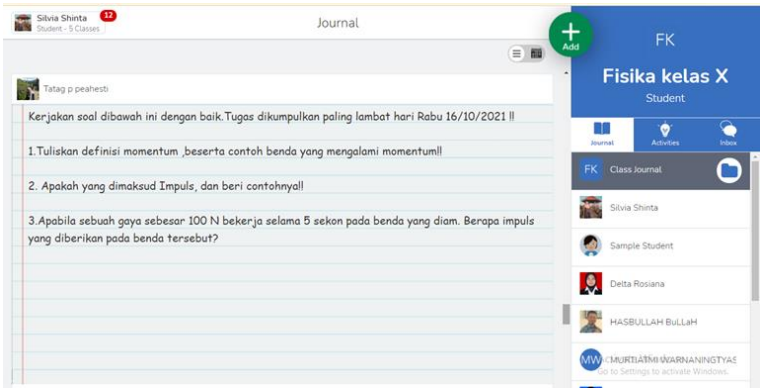
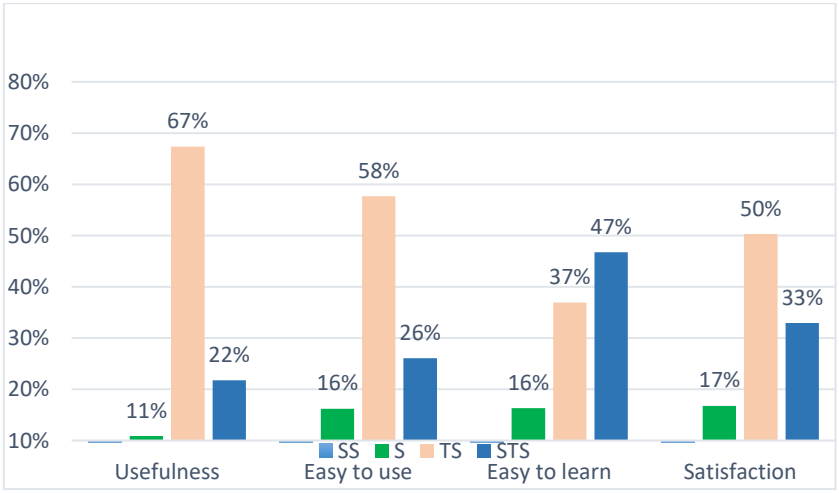


Fig. 3. The learning competence in the LMS

Based on the user test results, some users still consider the application lacking (score 2). However, most users have expressed that the application suits all aspects. The calculation in the appendix shows that the average for each element is 3.11 (usefulness), 3.10 (ease of use), 3.30 (ease of learning), and 3.11 (satisfaction), with a maximum scale of 4. The average for all categories is 3.16, which means that the Seesaw application is suitable for learning. See Figure 4.



Remark: SS=Absolutely Agree, S=Agree, TS=Disagree, STS=Abolutely Disagree

Fig. 4. The student response toward the LMS

Technology development can bring together different learning activities, students and teachers/facilitators. The planned and structured learning activities are delivered through a media that contains interaction between students, teachers, and educational resources [10]. Distance education through various media channels allows both one-way and multi-directional communication. It involves

students with teachers, educational resources, and parents. Multi-directional communication facilitates students and teachers [11]. Synchronous and asynchronous learning activities are easy to monitor and evaluate. The use of Seesaw in learning activities is expected to be more effective and efficient.

The importance of a Learning Management System (LMS) can be analyzed in terms of its usefulness, ease of use, ease of learning, and satisfaction for the learners. Seesaw is a popular LMS that incorporates various features to support these factors. In terms of usefulness, an LMS like Seesaw provides a centralized platform for teachers to manage and distribute learning resources and materials, track student progress, and assess their work. It helps teachers to have a comprehensive view of their student's learning and provides insights into areas where students might be struggling. Ease of use is another crucial aspect of an LMS. Seesaw provides a user-friendly interface and intuitive design that makes it simple for teachers and students to navigate and use the platform. It leads to a more efficient and streamlined learning experience. Ease of learning is also a critical factor in the effectiveness of an LMS. Seesaw supports discovery learning, a learning approach emphasising exploration and experimentation. By providing interactive resources and activities, Seesaw encourages students to actively engage in their learning process, which can lead to a deeper understanding of the material [12.] Satisfaction with the LMS is an essential factor in determining its success. Seesaw receives high ratings for its user-friendly design, engaging resources, and supportive features, which contribute to a positive learning experience for teachers and students.

The constructivist approach, which posits that learning is an active and personal process, is another learning theory supported by Seesaw. By providing opportunities for students to explore, experiment, and make meaning of their learning [13], Seesaw aligns with this approach and can lead to more meaningful and lasting learning. In conclusion, using an LMS like Seesaw enhances the learning experience. By providing a centralized platform for managing learning resources, tracking student progress, and supporting discovery learning [14], Seesaw can lead to more functional, efficient, and satisfying learning outcomes.

Conclusion

The initial design of learning with Seesaw becomes the proper method for online learning. The learning design is created using the Seesaw media and the discovery learning model. Seesaw contains exciting features that can be used in the learning process. Teachers can control students and upload learning materials to Seesaw by utilizing the existing multimedia, such as files, videos, images, text, etc. Students can also upload and display their learning results, works and products that have been created. The discovery learning model accompanies the use of Seesaw. In delivering lessons using Seesaw, the teacher follows the stages of discovery learning. Utilizing Seesaw media and the discovery learning model can improve the quality of education and increase students' learning outcomes. The calculation shows that the average for each aspect is 3.11 (usefulness), 3.10 (ease of use), 3.30 (ease of learning), and 3.11 (satisfaction), with a maximum scale of 4. The average for all categories is 3.16, which means this application is worth using. The learning process using the features available in Seesaw makes learning more exciting and varied. Assignments can also be given through Seesaw using the available features and can be collaborated with other supporting applications such as Phet. PhET contains many

features such as files, notes, images, videos, etc. The initial design of learning with Seesaw becomes the proper method for online learning.

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