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Development of Online Learning Management in Physics Learning Technology Course

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ABSTRACT

Purpose of the study: Development of online learning management in Physics Learning Technology course.

Methodology: The research method used is the development research method with the research subjects of students of the Department of Physics Education, Faculty of Teacher Training and Education, Sebelas Maret University, Surakarta, Indonesia. Data were collected using an open questionnaire method and analyzed using a method of concluding from the opinions expressed by students participating in the course.

Main Findings: The development of an online learning management model for the Physics Learning Technology course in the Physics Education Study Program at Sebelas Maret University was carried out through the stages of planning, organizing, implementing, and supervising to achieve learning objectives. Planning involved preparing a blended learning-based course syllabus. Organizing included arranging the necessary materials, media, and learning tools. Implementation followed the planning and organizing stages, while supervision was conducted by analyzing student responses. The results show that all seven learning objectives were achieved, including the ability to collaborate, manage time, use online learning applications, select appropriate materials, complete assignments on time, rewrite information from library sources, and properly cite references.

Novelty/Originality of this study: Online learning management of Physics Learning Technology course can be done by learning of designing, organizing, actuating, and controlling according to learning objectives.

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1. INTRODUCTION

Learning in higher education is managed by lecturers and attended by students who have registered in the lecture attendance system. Learning management is management in terms of learning which consists of four steps, namely planning, organizing, actuating, and controlling. Management is a process consisting of planning, organizing, actuating, and controlling which is carried out to achieve the specified goals by using human resources and other resources [1]. The definition of management is known as POAC that is Planning, Organizing, Actuating, Controlling [2]. An example of a publication that uses POAC states that in its research, the management process refers to POAC (planning, organizing, actuating, controlling) [3], [4].

Online learning is learning that is done virtually with the help of online learning tools. Online learning can be done synchronously, asynchronously, or both. Synchronous online learning means that lecturers and

students meet virtually at the same time so that communication can take place directly [5], [6]. Asynchronous online learning means that lecturers and students meet virtually at different times so that communication does not take place directly [7], [8]. Synchronous and asynchronous online learning means that lecturers and students meet virtually at the same time when synchronous and meet not at the same time when asynchronous.

Asynchronous online learning can aim to provide undergraduate students with the opportunity to practice independent learning with the target of completing assignments according to the specified time. Asynchronous online learning, like synchronous online learning, can provide new experiences for learning that will later support lifelong learning [9], [10]. Lifelong learning means that at any time and with anything, a person can learn as a provision for his life in the future.

Online learning in higher education using e-learning has become a necessity in the learning process. Although the learning process using virtual classes (e-learning) is not something new anymore, it can still be a breakthrough in solving problems in the learning process between educators and students [11], [12]. Online learning in higher education using e-learning can be done synchronously and asynchronously [13], [14]. The arrangement of synchronous or asynchronous learning in e-learning can be arranged by the lecturer in charge according to the Semester Learning Plan (SLP).

The results of research related to the use of e-learning in higher education have been presented in publications, namely e-learning is developed more comprehensively towards the effectiveness and efficiency of learning in higher education [15], online learning in higher education is a challenge for students and lecturers in the midst of a pandemic [16, and the implementation of online learning management assisted by the Kahoot platform can increase student satisfaction, which is in the very effective category [17]. The results of research related to higher education learning management have been presented in publications, namely higher education learning innovation management 18], e-learning-based learning management in higher education [19], online learning management in higher education during the Covid-19 pandemic [20], and online-based learning management in order to break the chain of Covid-19 transmission in private universities [21]. The results of research related to the management of online learning in courses have been presented in publications on the analysis of student responses in online learning based on activities in higher education [22] and analysis of the online learning process of PGSD students during the Covid-19 pandemic [23].

The results of recent research related to the effectiveness of online learning have been presented in publications, namely that online learning assisted by web blogs has a positive influence on improving students' English reading skills [24], that online learning that is implemented can indeed replace face-to-face learning but with certain preparations [25], that there is an increase in students' understanding skills after participating in online learning [26], that online learning is effective in improving students' creative thinking skills [27], that online learning models improve students' learning competencies [18], and that students' creativity in online learning [29].

Online learning at Sebelas Maret University (UNS) is part of offline learning. Being part of offline learning means that learning at UNS is blended learning. Blended learning can be done with offline learning and the use of the https://spada.uns.ac.id/ page. Offline learning can be done synchronously or asynchronously. UNS provides many alternatives that can be used by lecturers in charge of courses in managing their learning. The Physics Learning Technology (PLT) course, Physics Education Study Program, UNS, Surakarta, Indonesia is one of the courses with one of the learning objectives being to provide experience to students taking the course to learn online through the https://spada.uns.ac.id/ page.

2. RESEARCH METHOD

The research was conducted in the PLT course in the odd semester of the 2023/2024 academic year. The participants in the PLT course were 57 students. The PLT course was held in two classes, namely class A and B. Data collection was carried out during the course and data processing was carried out after the course was completed.

The development research method used is the Plomp model. The Plomp model consists of the preliminary research phase, the design phase, the realization/construction phase, the test, evaluation, and revision phase, and the implementation phase [30], [31]. The purpose of the study was to develop online learning management for the PLT course in the Physics Education Study Program. The research design carried out in accordance with the Plomp model is the initial investigation phase in the planning step, the design phase in the preparation step, the realization phase and the test, evaluation, and revision phase in the implementation and data processing steps, and the implementation phase in the research conclusion drawing step.

Research planning is carried out by setting research objectives and determining the interests and benefits of the research. The purpose of the research is to develop an online learning model for the PLT course and the benefits of the research are that it is hoped that the results of the research can be used for further PLT course learning or can be used as a reference for the development of other courses. Research preparation is carried out by building the contents of the PLT course on the page https://spada.uns.ac.id/course/view.php?id=1785. The implementation of the research was carried out by monitoring the use of the course for eight learning meetings.

The first meeting was used to introduce the course page to students and the next six meetings were used by students to learn by doing assignments. Data processing was carried out by processing the data that had been obtained in the course on the Assignment 7 menu, namely the evaluation of the learning process. Drawing conclusions from the research was carried out by drawing conclusions from student opinions based on the learning objectives conveyed at the beginning of the lecture. The appearance of the PLT course on the page https://spada.uns.ac.id/course/view.php?id=1785 accessed on July 4, 2024 is presented in Figure 1 below. The research instruments used were the SLP of the PLT course, PLT learning materials, blended learning methods, learning media in the PLT course, and learning tools, namely the page https://spada.uns.ac.id/course/view.php?id=1785.

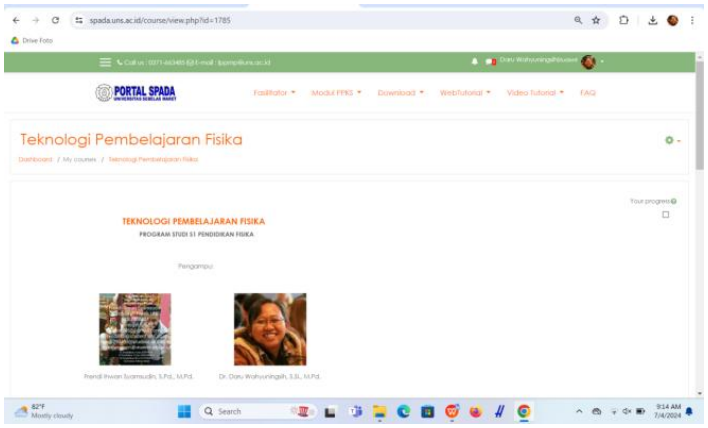

Figure 1. Physics Learning Technology course display

3. RESULTS AND DISCUSSION

The research steps taken are planning, preparation, implementation, data processing, and drawing conclusions from the research. The result of the design research step is the page https://spada.uns.ac.id/ in accordance with the PLT for online learning and continued with the development of courses on the page. Course development consists of developing a collection of online learning resources, attaching the results of the selection of online learning resources that are in accordance with the learning material, and attaching research instruments. The research instrument is designed based on library sources and is built using a questionnaire instrument. After implementing the planning and preparation steps, data collection is carried out as a step in implementing the research. Data collection is carried out during the learning process, namely eight meetings out of 16 meetings or 50% of the course meetings. After the eight meetings have been completed, the next step in the research is data processing. Numerical data processing is carried out in the Microsoft Excel application. Based on the results of the data processing, conclusions are obtained in accordance with the research objectives, namely information that course participants can carry out learning objectives. The learning objectives are 1. Students are able to work together in groups, 2. Students are able to manage learning time, 3. Students are able to use online learning support applications, 4. Students are able to choose materials according to the provisions, 5. Students are able to complete assignments according to the deadline, 6. Students are able to rewrite things taken from library sources, and 7. Students are able to write citations according to the provisions. The research implementation has been carried out and obtained 57 respondents, namely students participating in the PLT course. Respondents amounting to 50 out of 57 respondents or 87.72% stated that they could carry out learning objectives and 7 respondents or 12.28% did not give an opinion. The diagram of the research results is presented in Figure 2 below.

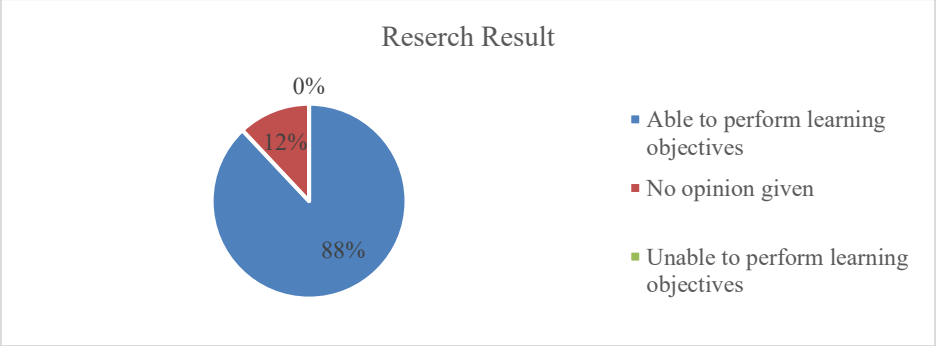

Figure 2. Research results

Online learning management is the management of learning carried out online using four management functions and four resources to achieve effective and efficient goals. The four management functions are planning, organizing, actuating, and controlling. The four resources involved are humans, learning methods, learning media, and learning tools.

The research begins with the application of the first management function, namely planning. The learning planning carried out is to determine learning objectives, namely the achievement of seven learning objectives. The learning objectives are shown in Figure 3 below.

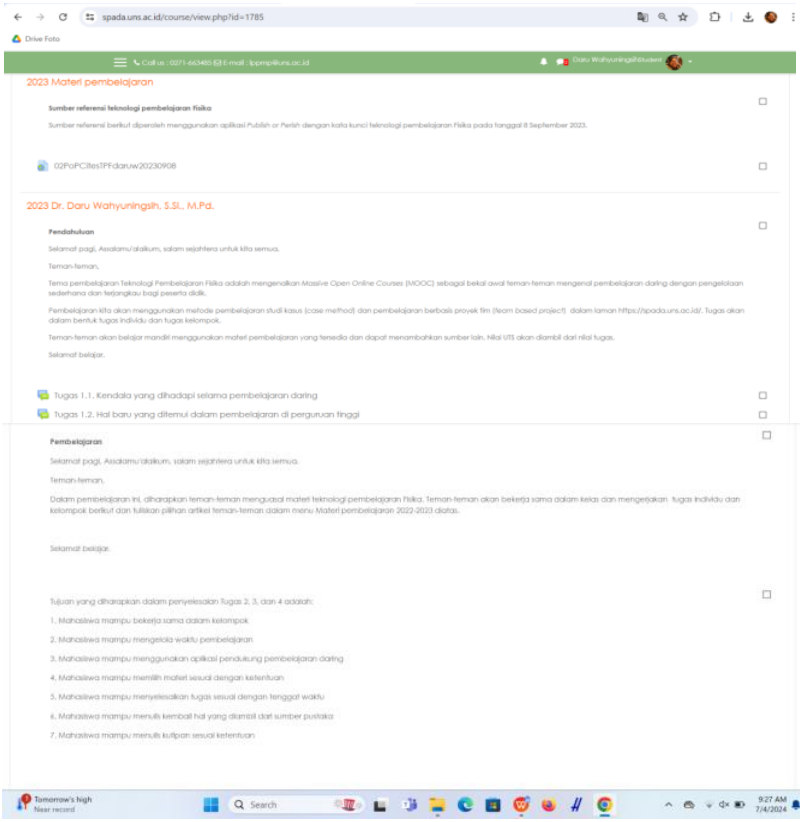

Figure 3. Learning objectives for the PLT course

The management function after planning is organizing. In this function, preparation of learning materials, learning media, and learning tools is carried out. Learning materials are prepared in the form of links to the material. The links are obtained from library sources using the Harzing's Publish or Perish application. Learning media are prepared in the form of media selection that is easily accessible to students, namely in the form of pages that can be visited or downloaded in the Microsoft Word file type, namely pdf. The devices needed by students to access assignments are a computer device connected to the internet and a Microsoft Word application or a pdf file reader. The display of learning material sources in learning is shown in Figure 4 below. Learning tools prepared in the course are introductory texts, questions along with the provisions for working on questions in each question, and a conclusion accompanied by an evaluation of the learning process. The evaluation of the learning process aims to find out students' opinions on learning objectives.

Figure 4. Display of learning material sources

The third management function is the implementation of learning. Learning is carried out for seven meetings, starting with an introduction in the first meeting and the next six meetings, students study independently by completing assignments with a predetermined time limit. During independent learning, the lecturer and the student in charge of the class communicate via the Whats Apps Group (WAG) application. An example of evidence that students have completed Assignment 2 is shown in Figure 5 and a screenshot of the WAG in Figure 6 below.

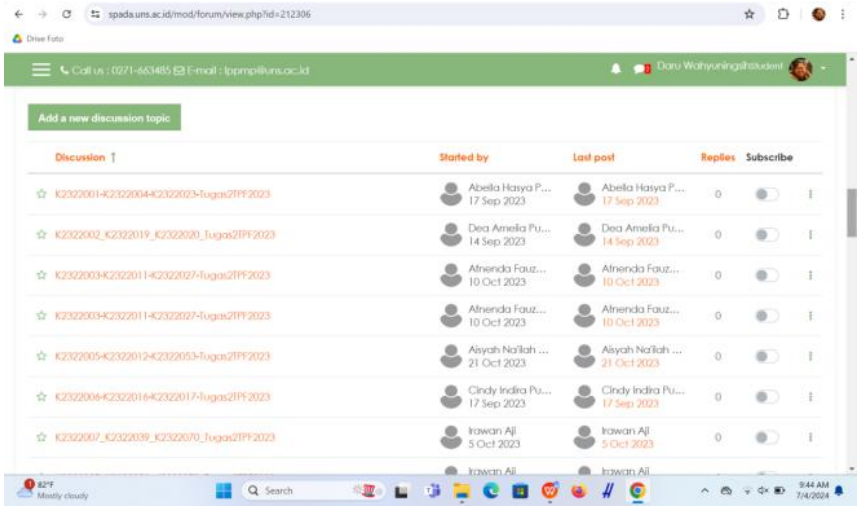

Figure 5. Example of evidence that students have completed Assignment 2.

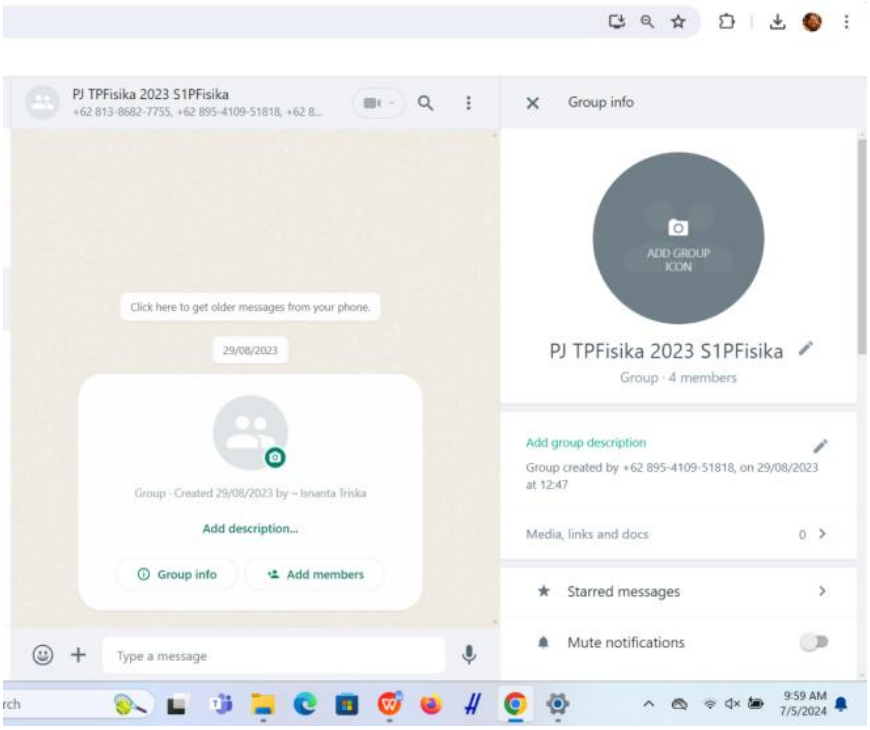

Figure 6. Whats Apps Group of students who is responsible of their own PLT class

The function of learning supervision management is carried out in two activities, namely evaluation of learning outcomes and evaluation of the learning process. Evaluation of learning outcomes aims to determine students' abilities in mastering the cognitive, affective, and psychomotor aspects that have been set in the SLP. Evaluation of the learning process aims to determine the advantages and disadvantages of learning experienced by students participating in the course. This information will be a suggestion for further learning. Based on the results of the study above, 87.72% of course participants stated that they could carry out learning objectives. The achievement of these learning objectives indicates that the planned research objectives have been achieved. The display of the results of the evaluation of the learning process in the course is shown in Figure 7 below.

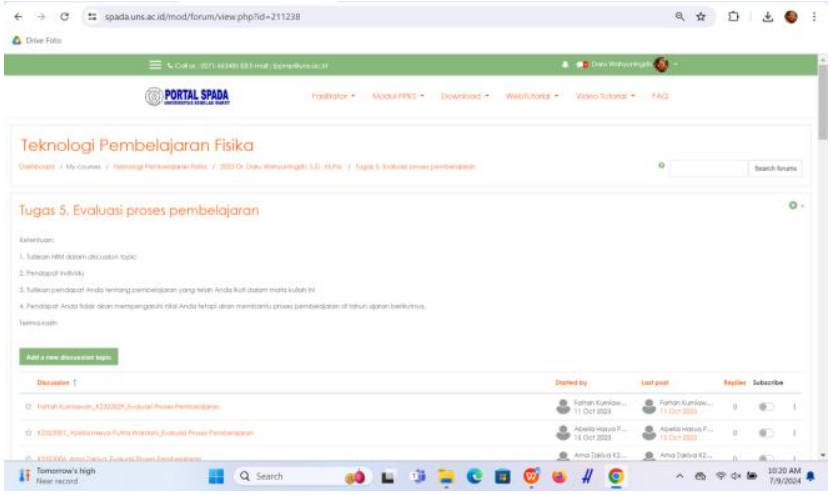

Figure 7. Evaluation of the learning process for the PLT course

The obtained research results can be used for PLT courses in particular and education courses in general. The novelty of the research obtained is an online learning management for PLT courses in particular and can be applied to education courses in general. There are six previous studies that support the research results that online learning can improve students' abilities. The six previous studies are online learning assisted by web blogs has a positive influence on improving students' English reading skills [24], online learning that is implemented can indeed replace face-to-face learning but with certain preparations [25], there is an increase in students' understanding skills after participating in online learning [26], online learning is effective in improving students' creative thinking skills [27], online learning models improve students' learning competencies [28], and students' creativity in online learning [29].

The difference with previous research is the form of online learning management carried out, namely learning with independent assignments. The limitation of the research conducted is the dependence of research respondents on internet connections to access the used learning media. The solution to this limitation is to open a discussion with respondents (student participants in the course) if there are difficulties accessing the page using a different discussion application. The recommendation based on the research results is the need for a detailed explanation of the use of learning tools before learning begins so that there are no obstacles in the implementation of learning.

4. CONCLUSION

The development of an online learning management model for the Physics Learning Technology course in the Physics Education Study Program, Sebelas Maret University, Surakarta, Indonesia with planning, organizing, actuating, and controlling steps to achieve learning objectives has been carried out. Learning planning is carried out by preparing the Semester Learning Plan (SLP) for the course with a blended learning form. Organizing learning is done by preparing the materials, media, and learning tools needed for the implementation steps. The implementation of learning is carried out by implementing learning in accordance with the planning and organizing steps. Learning supervision is carried out by analyzing student responses to the learning carried out. A total of 50 respondents out of 57 respondents or 87.72% stated that they could carry out learning objectives and 7 respondents or 12.28% did not give an opinion. Based on these data, it can be concluded that the learning objectives have been achieved. The seven learning objectives achieved are that students are able to work together in groups, manage learning time, use online learning support applications, choose materials according to the provisions, complete assignments according to deadlines, rewrite things taken from library sources, and write citations according to the provisions. The results of the research that has been conducted are expected to be used for teaching the Physics Learning Technology course in the Physics Education Study Program in the following academic year or can be used as a reference for developing other courses.

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