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Training Module of Learning Management in the Education 4.0 System

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Abstrak

Keterampilan abad 21 sangat penting untuk dikuasai, oleh karena itu sistem Education 4.0 harus diterapkan dalam kegiatan pembelajaran. Pemerintah Indonesia mendesain ulang kurikulum baru (K13) dan menetapkan berbagai kebijakan untuk mendukung implementasi ini. Namun, hasilnya tidak seperti yang diharapkan. Penelitian ini bertujuan untuk menganalisis program pelatihan K13, termasuk kelemahan modul yang digunakan dalam program ini, dan mengembangkan modul manajemen pembelajaran dalam sistem Education 4.0 untuk mendukung program pelatihan K13. Metode yang digunakan adalah penelitian dan pengembangan dengan prosedur model ADDIE. Subyek penelitian ini adalah 30 guru di satu kabupaten. Teknik pengumpulan data adalah wawancara, angket, dan tes. Analisis data menggunakan pendekatan kualitatif dan kuantitatif. Hasil penelitian menunjukkan bahwa pelaksanaan diklat K13 semakin baik dari tahun ke tahun, namun kelemahan modul terdapat pada konsep Pendidikan 4.0, integrasi pembelajaran aktif dan teknologi pendidikan, serta konsep manajemen pembelajaran. Sebuah modul dikembangkan untuk mengisi kelemahan tersebut, dan hasilnya menunjukkan bahwa modul tersebut meningkatkan kompetensi guru dalam manajemen pembelajaran dalam sistem Education 4.0. Skor rata-rata meningkat dari 33,33 menjadi 68,70; jumlah peserta yang lulus tes meningkat menjadi 73%. Rata-rata respon peserta adalah 97%; ini mengikuti para ahli.

Kata Kunci: *Pendidikan 4.0, Pembelajaran Abad Ke-21, Pendekatan Pembelajaran Aktif, Manajemen Pembelajaran, ADDIE*

Abstract

21st-century skills are essential to master. Therefore, we must implement the Education 4.0 system in learning activities. The Indonesian government redesigned a new curriculum (K13) and assigned various policies to support this implementation. However, the results are different than expected. This study aims to analyze the K13 training program, including the modules' weaknesses, and develop a module learning management module in the Education 4.0 system to support the K13 training program. The method used is research and development with the ADDIE model procedure. The subjects of this research are 30 teachers in one district. The techniques to collect data are interviews, questionnaires, and tests. The data were analyzed using a qualitative and quantitative approach. The research findings show that implementing of K13 training is better from year to year. Still, found module weaknesses in Education 4.0, active learning and educational technology integration, and the learning management concept. Developed a module to fill these weaknesses, results show that the module improves teacher competency in learning management in the Education 4.0 system. The average score improved from 33.33 to 68.70; the number of participants who passed the test increased to 73%. The participants' average response is 97%, following the expert's.

Keywords: Education 4.0, 21st-Century Learning, Active Learning Approach, Learning Management, ADDIE

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1. INTRODUCTION

The 4th Industrial Revolution (4IR) has enormously impacted human life, including how humans work. In the future, many jobs will no longer be relevant to humans. Those jobs will be replaced by machines, robots, or artificial intelligence (Shanks et al., 2017; Sriarunrasmee et al., 2015). Many jobs will disappear, but there are other problems. The future challenges are skills demanded by new types of jobs. Education 4.0 is an effort to respond to the needs of 4IR, where humans and machines harmonize with each other, discover new possibilities, and utilize the potential of digital technology, personalized data,

and search content from various sources in learning activities (Pratidhina, 2020; Robandi et al., 2019). Education 4.0 can ensure that the learning activity will meet the future needs of jobs and skills (Lawrence et al., 2019; Yoshino et al., 2020).

In the past ten years, the Indonesian government has assigned various policies to ensure teachers use an active learning approach in their learning activities, starting with the implementation of the Character-Building Strengthening in the implementation of the 2013 Curriculum (K13) (Hayati et al., 2020; Lian et al., 2020; Pramono & Hanita, 2021). Afterwards, it was followed by implementation of literacy programs and the introduction of Higher Order Thinking Skills (HOTS) as students' learning objectives (Antara & Dewantara, 2022; Widana, 2017). In 2017, the government began socializing 21st-century skills (4Cs) as skills students must possess. Then, the government encourages teachers to integrate those policies like PPK, literacy, 4Cs, and HOTS into their learning activities (W. N. T. W. Hussin et al., 2018; Njui, 2017; Priyatni & Martutik, 2020). The active learning approach is included in the National Education Standards as stated in the Ministry of Education Regulation. The government's efforts to integrate education policies into learning activities are a practical step toward the Education 4.0 system (Agustini et al., 2019; Nurtanto et al., 2020). However, some fundamental problems must be clarified between subjective reality and objective, primarily for education in Salatiga. Those discrepancies disrupt the achievement of educational goals. Preliminary studies were carried out to find these problems.

The first problem is that teachers understand comprehensive learning concepts. The interview of 30 teachers in Salatiga shows that 80% need an adequate understanding of the relationship between various learning concepts. A review of the lesson plan from these teachers also indicates that all plans did not combine an in-depth understanding of learning concepts. This is unacceptable because the government introduced those concepts through K13 training (Madu, 2020; Nørgård, 2021). A previous study stated that without providing an in-depth understanding of learning concepts, it would be hard to enhance teachers' beliefs in implementing Change (Fullan, 2007). Teachers will only implement changes in teaching materials and learning methods under their subjective realities. Therefore, it is crucial to thoroughly explain learning concepts and provide a big picture of those concepts' relationship.

The second problem is integrating active learning approaches with technology in education. In the past few years, there have been many ICT training that the government and other public institutions have organized (Fitriansyah et al., 2020; Valverde-Berrocoso et al., 2021). A relevant study shows that the Indonesian government emphasizes integrating technology into a learning activity through state education policies (Sukmawati et al., 2020). However, in most conditions, technology must contribute more efficiently to students' learning. This is caused by technology implementation that only focuses little on the learning process and students' actual needs (Gai et al., 2018; Ningsih et al., 2019). The observations on some training found that the focus in those training was on the introduction of technologies used in learning activities. There is no solid example of integrating ICT in the form of learning management using the active learning approach. The other problem found that there needs to be a significant gap between the planning and implementation of learning activities (Magdalena et al., 2020; Nurlaily et al., 2019). The lack of formative evaluations compounds these problems by the teacher during learning activities (Nurtanto et al., 2020; Schildkamp et al., 2020). Formative evaluation is only for knowledge assessment, while attitude and skills assessment is only summative

The study to evaluate the implementation of Curriculum 2013 stated that the learning planning is good, but there were still problems with the learning process and assessment, especially the attitude assessment (Astuti et al., 2018). Teachers have received training, facilities, and infrastructure support. However, they need to understand the 2013 Curriculum,

learning models, assessment, HOTS questions, and the ability to use information technology in the learning process. Another study stated that teachers needed more curriculum 2013 training in the learning process due to the lack of curriculum 2013 training (Makaborang, 2019). This study found gaps in the learning design, learning process, and learning assessment, especially for affective or attitude assessment. Another study stated that teachers needed more curriculum 2013 training in the learning process due to the need for curriculum 2013 training (Magdalena et al., 2020). The training is only one week, and just a few teachers participate.

The solution provided in this study is module development of learning management in the Education 4.0 system, which includes three aspects as follows, (1) the Education 4.0 basic concept explanation in a simple narrative sentence; (2) various educational technology and concrete examples of ICT and active learning integration explanation; and (3) provision of learning management examples from planning, implementation, and evaluation based on previous explanations. A previously conducted relevant study related to Education 4.0 discusses the influence of 4IR on education (Shahroom & Hussin, 2018). It stated that there were concerns about teachers' readiness to face 4IR. The focus of this research is the use of educational technology in the class and needs to be an explanation of learning management in dealing with 4IR. Research on learning management stated that learning management has positive educational implications (Cavus & Alhih, 2014). Learning management is capable of encouraging experimental studies and the use of problem-solving learning applications. These are the form of an active learning approach.

Based on the problem and previous study, the researcher is interested in conducting this research. This study is needed to develop learning management modules in the Education 4.0 system. The study aims to analyze the K13, including the training program and the weaknesses of the modules and develop a learning management module in the Education 4.0 system to support the K13 training program.

2. METHODS

The method used is research and development (RnD). This method is a process of developing a product or validating and testing the effectiveness of a product (Sugiyono, 2019). This study used the RnD method to develop a learning management module in the Education 4.0 system. The subjects of this research are 30 teachers in Salatiga. The module development approach is the ADDIE model, an acronym for Analyze, Design, Develop, Implement, and Evaluate (Branch, 2010). The ADDIE model is a learning design methodology to help develop teaching materials and learning models. The procedure of the ADDIE model started with analyzing the current condition and identifying the problems. The next step is to create a product design based on the previous result. Once the design completes, then continue to develop the product. After the product is ready and passes the expert's validation, then continue to implement the product in the research subject. Evaluation is carried out to measure whether the product is following the standards set at the design stage.

The techniques used to collect data are interviews, questionnaires, and tests. Interviews were conducted with core and target teachers from implementing K13 training in 2019 and national instructors (IN) from implementing K13 training in 2014 - 2018. At the same time, questionnaire instruments were prepared into three types. The expert in module development and learning management in the Education 4.0 system used the first two types of questionnaires as module validation instruments. The third questionnaire was used to measure the participant's responses. Each questionnaire has ten questions, while questions for the experts are related to the suitability, accuracy, completeness, and clarity of learning

materials and objectives with the subject of learning management in the Education 4.0 system. The questionnaire for participants contained responses to the display, learning material, and the use of the module's language. The test instrument was used to measure the improvement of teacher competencies after attending training, and test implementation used pre-test and post-test.

Data analysis in this study uses quantitative and qualitative approaches. Data from interviews and documents were analyzed using a qualitative method with an interactive model. Analysis of competency improvement was measured by comparing pre-test and post-test results. The key performance indicator is that 70% of participants pass the post-test with a score greater than or equal to 70 from the maximum value of 100. Participants' responses were obtained from questionnaires at the implementation stage. The number of questions in the questionnaire instrument is 16 items. Participants' valuation data were analyzed using a Likert scale.

3. RESULTS AND DISCUSSION

Result

The ministry of education has conducted yearly K13 training for the past few years. Implementation of the K13 training aims to improve teacher competency, especially regarding learning management integrated with PPK, literacy, 4Cs, and HOTS. K13 training is improving yearly, with the teacher as the center of learning and the core teacher as the facilitator. The training was held using the In-On model with an active learning approach and supported by an online learning system. The material of the module used during the training includes higher-order thinking skills and 21st-century skills concepts; the ways to run learning activities in the class started from creating learning designs, lesson plans, and conducting evaluations.

The latest K13 training module stated that one of the training objectives is to provide the concept of higher-order thinking skills (HOTS), PPK, literacy, learning development, learning assessment, and practice. These objectives are then described in a learning module oriented to higher-order thinking skills for the target teacher. The module contains higher-ordered thinking and 21st-century skills concepts, integrated thematic, SKL/KI/ KD analysis, learning models, learning design, lesson plans, and evaluation. The integrated thematic section explained the principle of active learning based on the ministry of education's regulation concerning the Standard process. The learning model section described the learning models compatible with active learning approaches such as inquiry, problem-based learning (PBL), and project-based learning (PjBL). Further explanations are more on the procedural knowledge starting from SKL/KI/KD analysis, preparation of lesson planning, and learning assessment and evaluation.

Based on the training description of the training, several weaknesses of the module used during K13 training can be concluded. The first area for improvement is the concepts of learning, especially those related to the Education 4.0 system, which needs to be complete and does not explain the relationships between those concepts. There needs to be an explanation about the need for 21st-century skills as the Impact of 4IR and the relationship between 21st-century skills and 21st-century learning that form learning trends in an Education 4.0 system. The second are fpr improvement is that there needs to be an explanation about the basics of technology utilized in education, especially educational technology used in the application of active learning. The third weakness is related to learning management. There needs to be an explanation about the concept of comprehensive learning management, how to prepare a lesson plan appropriately, how to implement learning based on the plan, and how to do the optimum evaluation. A Learning management module

in the Education 4.0 system is developed under the stages of the ADDIE model to solve those problems.

Result of the Analysis Stages

The material presented in the training module still needs to resolved the problems mentioned above. The module used in training needs to mention the concepts of learning management in the Education 4.0 system and the relationship between those concepts. Most of the materials inside the module are procedural knowledge. This kind of information will only encourage teachers to implement Change without understanding of the effects and consequences of the changes. The Integration of learning concepts like PPK, literacy, 4Cs, and HOTS in learning activities as planned by the government will be implemented without delivering better results.

The active learning approach is necessary to be implemented in the classroom. To ensure this approach will succeed, teachers must understand the relationship between this approach with PPK, literacy, 4Cs, and HOTS. Therefore, a training module for learning management in the Education 4.0 system is developed to ensure that all teachers will understand the needs of modern education. There are three main concerns in the module, (1) providing a comprehensive explanation of the Education 4.0 basic concepts, including the active learning approach and its relation with PPK, literacy, 4Cs, and HOTS; (2) providing knowledge of technology; digital literacy resources, and solid examples of ICTs in education integrated with Education 4.0; and (3) providing concepts and examples of learning management including planning, implementation, and evaluation based on previous needs. The module is developed with the principles of self-instruction, self-contained, stand-alone, adaptive, and user-friendly. Training is carried out with on-the-job learning models; modules will be shared online and accessed using various devices such as smartphones, tablets, computers, and others.

Result of the Design Stages

This stage includes the module design and competency mapping of learning management in the Education 4.0 system. Then, the module's framework and writing systematic completed with user instructions are arranged. The framework and writing systems of the module are (1) the initial section consisting of the title page, preface, instructions for using the module, table of contents, and list of drawings; (2) the introduction chapter consisting of background, competency targets, objectives, and indicators; (3) the learning activities section containing the material of Education 4.0, active learning, educational technology, and learning management; and (4) the final chapter consisting of closing, evaluation answer key, and bibliography.

The result of the design stage is a competency mapping which is then elaborated into several learning activities and becomes the chapter title in the module on learning management in the Education 4.0 system. The Competency mappings are (1) education 4.0, discussing the basic concepts of the Education 4.0 system based on 21st-century learning needs and 4IR; (2) active learning approach, combining active learning methods with PPK, digital literacy, 4Cs, and HOTS; (3) educational technology, summarizing digital literacy resources and the use of technology in education; and (4) learning management, linking the concept of active learning approach and educational technology with learning management.

Result of the Development Stages

The first development step is writing a module under the structural framework and the writing system. The module is generated by following the module preparation instructions, while the contents of the module are based on theoretical studies and other resources. The

module is written using Microsoft Office 365 Education and then converted to PDF to simplify the distribution process. The module of learning management in the Education 4.0 systems is shown in Figure 1.

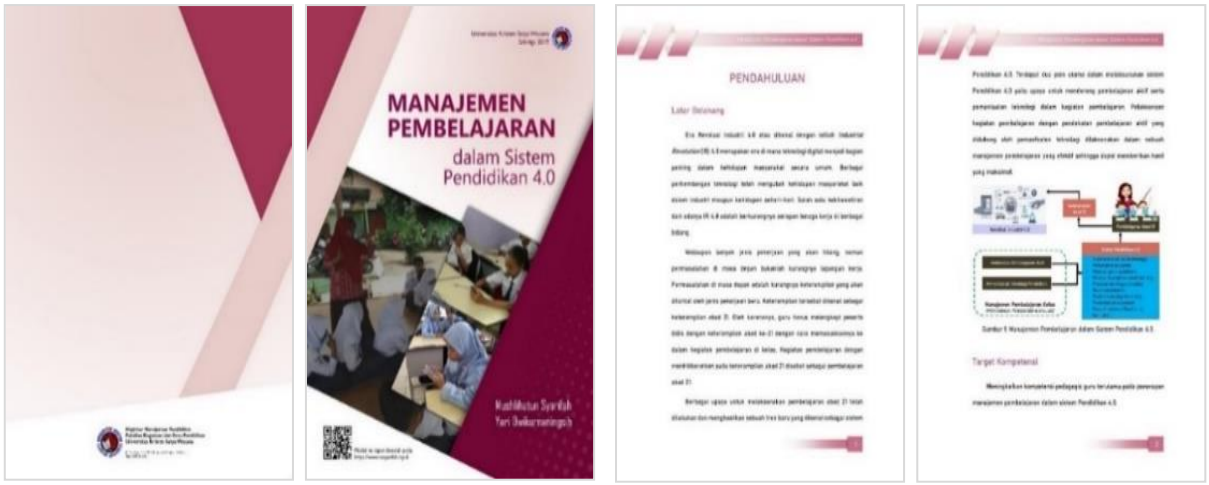

Figure 1. The Module of Learning Management in the Education 4.0 Systems

Based on Figure 1, show user instructions inside the module are added to help users to conduct self-regulated learning. After the writing process is complete, the validation process is then conducted by the expert on module development and learning management in the Education 4.0 system. Validation results from the experts become the basis of the module revision. On completion, the module is ready to be implemented for the next stage.

The objective of the validation is to assess the feasibility of the module. From this process, experts' responses and suggestions are obtained. Furthermore, these results are used as evaluation material to improve the learning management module in the Education 4.0 system. The validation by module development experts aims to ensure the validity and feasibility of the module so that it can be used for self-regulated learning or as discussion material in scientific forums. The total score of the assessments by module development experts is 45 of 50 points, and the percentage is 90%. This percentage is included within a perfect category rating scale. The experts said that the module is relatively relevant to the application of ITC in 4IR, and the material is complete. According to the advice, the learning management module in the Education 4.0 system is valid and feasible to be used with improvements.

The module's validation by learning management in the Education 4.0 system experts aims to ensure the validity and feasibility of the module so that it can be used for self-regulated learning or as discussion material in scientific forums. The total score of the assessments by learning management in Education 4.0 experts is 42 of 50 points, and the percentage is 84%. This percentage is included within a perfect category rating scale. The expert responds that the learning management module in the Education 4.0 system is valid and feasible to be used with improvements according to the advice given. Improvements to the module, as suggested by experts, are explained in the following Figure 2**.**

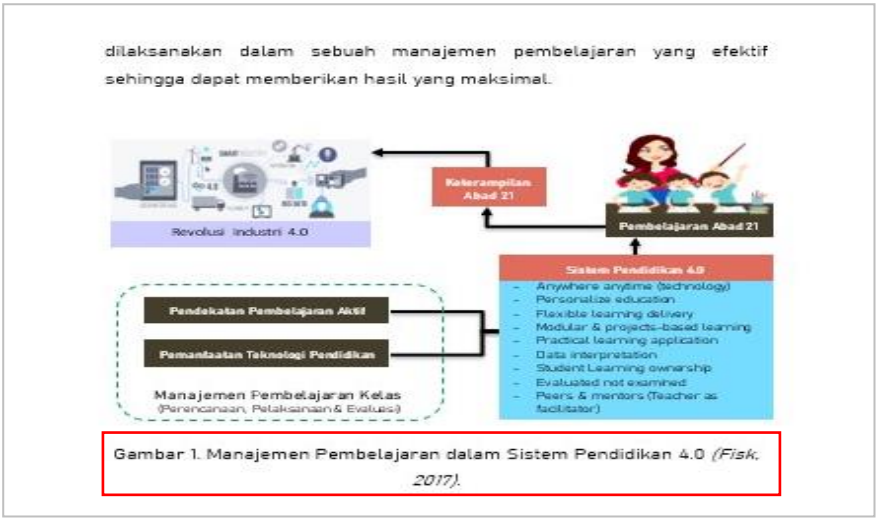

Figure 2. Module Revision According to Experts' Suggestions

Result of the Implementation Stages

The next stage is module implementation through self-regulated learning. The subjects of the training are ten junior high school teachers. The training model is on-the-job learning which was conducted for six working days. Teachers conduct training independently using the learning management module in the Education 4.0 system. Before the training, several preparations were made as follows: (1) submitting a research permit to the school principal; (2) requesting the willingness and readiness of ten teachers to take part in the training; (3) multiplying the module to 11 each in hard copies; (5) multiplying pre-test and post-test assessment instruments; and (6) multiplying the participant's questionnaire. Implementation of learning management in the Education 4.0 system started with the pre-test for teachers who participated in the training. Once complete, the modules were distributed to the participants. Each participant explained the objectives of the training. During the training, participants actively and independently learned all the module material.

Result of the Evaluation Stages

The evaluation stage was carried out after the implementation stage was completed. The stage aims is to determine whether the quality of the module meets the standards set in the design stage. The ITEMAN (Item and Test Analysis Manual) application analyzed validity and reliability tests. The acceptable point range of participants' proportion who get the item correct is between 0.10 to 0.90, and the good point biserial is more than 0.25 (Tomak & Bek, 2015). The reliability test uses Cronbach Alpha with a good coefficient of 0.64 - 0.85 (Taber, 2018). The validity analyses showed that 15 out of 25 items are valid. The Alpha reliability coefficient is 0.642, meaning that the test instrument is reliable. Based on those results, the items used to measure the participant's competency improvement after attending the training are 15 items. The analysis was made by comparing pre-test and post-test results.

Pre-test and post-test were used to measure the competency of training participants. The competency improvement of participants was determined by comparing the pre-test and the post-test scores. Furthermore, the success of the module that has been developed was measured by analyzing the number of participants who passed the test. A predetermined success indicator is that 70% of participants pass the test.

Data analysis show that the average pre-test score is 33.33; all participants did not pass the test. The average post-test score is 68.70, in which 22 out of 30 teachers who participated in the training passed the test. The percentage of participants who passed the test

is 73%. Those data confirm teachers' competency improvement after attending the training in learning management in the Education 4.0 system. Competency improvement was also analyzed from the lesson plans, which is the final assignment of the training. All participants succeeded in making lesson plans according to the criteria in learning management in the Education 4.0 system.

A Likert scale was used to analyze the participant's responses to the modules (Joshi et al., 2015). Analysis results show that the module display got scored of 98%, the module material got 97%, and the use of language in the module 97%. The average user's response refarding display, training materials, and use of language is 97%. The data shows that the participants responded perfectly responses to the module on learning management in the Education 4.0 system. The participants also gave positive comments about the module.

Discussions

Module development for teacher learning using the ADDIE model was successful and in line with a study that states that the ADDIE model provides the basis for module development and is easy to apply (Zulkifli et al., 2018). The developed module is valid and easy to implement in learning activities. In addition, other study shows that an instructional design approach such as ADDIE can offer scientists and practitioners to implement a flexible and systematic learning approach in developing modules (Patel et al., 2018). The ADDIE model can be a guide for building effective learning (Batalla-Busquets & Pacheco-Bernal, 2013; Wibawa, 2017).

Learning management in the Education 4.0 system module encourages teachers to understand new teaching approaches by comprehensively explaining the learning concept, learning technology, and learning management (Ariyana et al., 2018; Zalilia et al., 2019). Teachers need to understand various educational changes, especially changes related to teaching approaches. The second difficulty in implementing educational change is a change in the teaching approach. In addition, another study states that harmonizing the world of education in the 4IR era is very important by ascertaining teachers as educators to understand the Education 4.0 systems and not only follow what others do (A. A. Hussin, 2018). Implementing the Education 4.0 system by integrating various concepts into learning activities is essential. The main approaches in Education 4.0 are the active learning approach (supported by PPK, literacy skills, and 21st-century skills) and the use of ICT in learning (Burner, 2018; Pratidhina, 2020).

Active learning is a method that is successful in increasing knowledge, understanding, and application of information for students. The affective responses to active learning were overwhelmingly positive and helped students learn, satisfaction, efficacy, and improved participation and attendance. The affective domain of active learning includes emotions, attitudes, and feelings (Borrego et al., 2019; Harris & Bacon, 2019). In 21st-century learning integrating information technology and making it relevant to pedagogy and learning techniques is a part of helping and supporting the advancement of 21st-century learning among students and offers opportunities for students to master 21st-century skills (Ibuki, 2016; Rusdin, 2018). The use of information technology in learning can significantly improve learning outcomes. The use of technology in the classroom is becoming increasingly important and necessary to comprehend perceptions, obstacles, and expectations in using ICT (Bansa & Asrini, 2020; Suyatna, 2020). The adopted training courses helped teachers improve their ICT-related skills and knowledge. Several factors, including timing and modes of training, follow-up, teacher's beliefs, school culture, workload, and motivation, appeared to impact the effectiveness of training courses (Abuhmaid, 2011; de la Peña et al., 2021).

Teachers create lesson plans containing learning management in the Education 4.0 system and arrange learning management, including planning, implementation, and

evaluation. They understand that it can increase the effectiveness of learning activities. A previous study states that effective classroom learning management is an effort to make continuous improvements based on management in general, namely planning, implementation, and evaluation (Chandra, 2015). Effective learning management in the classroom is an effort to make continuous improvements based on management, starting with planning, implementation, and evaluation. Teachers' role in learning management is critical, and they should be able to choose the right strategy and find effective implementation in learning activities (Egeberg et al., 2016; Gultom & Saun, 2016). Therefore, teachers must have adequate training and understand the importance of teaching management to prevent and respond to behaviors that jeopardize the learning experience for students. Ineffective classroom management negatively impacts learning activities and contributes to teacher attrition (Cartwright & Hallar, 2018; Stevenson et al., 2020).

The module on learning management in the Education 4.0 system explains the learning concepts, the use of ICT, and explanations of learning management. The module also includes examples of learning activities using the project-based learning (PjBL) model. Active learning using PjBL can stimulate students to think critically and creatively, enable learners to learn effectively in an active, authentic environment, and enhanced life skills for future careers (Fitzsimons, 2014; Mukti et al., 2020). Learning with project work in the form of props is a student-centered learning distillation laboratory that is essential and beneficial for students to develop the three learning domains; cognitive, affective, and psychomotor (Sumarni et al., 2016; Suyatna, 2020). A significant relation was found between the PjBL method and collaborative, disciplinary subject learning, iterative and authentic, which produced student engagement. The results show that the PjBL technique improves student engagement by enabling knowledge, information sharing, and discussion. Thus, the PjBL approach is highly recommended for educational use by students and should be encouraged in universities (Afriana et al., 2016; Almulla, 2020).

The implication of this research is to provide an overview related to Module Development of Learning Management. This research will be beneficial for educators as a reference in implementing appropriate modules for classroom teaching related to project-based learning. This research still has many limitations; one of the recommendations of researchers to further study is to deepen the scope of the research by considering other aspects, such as whether teacher understanding is only related to changes in the teaching approach or has succeeded in changing teacher pedagogical beliefs and also has an impact on student learning outcomes.

4. CONCLUSION

The results of this research and development are the module of learning management in the Education 4.0 system. The validation test by the expert on module development and learning management in the Education 4.0 system shows that the module is in a perfect category. The module is implemented as self-regulated learning using the on-the-job learning model. The evaluation results show an increment of participants' competency in both the scoring average and the number of participants who pass the test. Based on the above discussion, the module on learning management in the Education 4.0 system is an excellent learning material that can be used for self-regulated learning or in discussions at scientific forums. The material in the module is compiled entirely and systematically, using language that is easy to understand and has an excellent design. Further elaboration on learning management and an example of implementation in PjBL can facilitate teachers understand the teaching approach. They succeed in making lesson plans that have supported learning management in the Education 4.0 system.

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