Developing of E-Assessment for Microteaching Using ADDIE

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Abstract
This study aimed to develop a digital assessment system. The system was developed with the ADDIE model. Based on the results of the research, it shows that at the Analysis stage a curriculum mapping is carried out which includes fourteen learning outcomes that students must master. At the design stage, the system interface design, database design and system user design are carried out. In the Development stage, the rubric integration and assessment grids that have been developed in the analysis and design stages are carried out. At the implementation stage, activities are carried out using the e-assessment system for students who are taking microteaching courses. At the Evaluation stage an analysis of learning outcomes and student responses is carried out. The results of the response analysis stated that e-assessment was very effective in microteaching courses.

Keywords: E-Assessment, Microteaching Course, ADDIE

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1 Introduction

ADDIE is one of the development models used in instructional development research. The advantages of the ADDIE model are: structured, easy to use, each stage is evaluated. In software development, ADDIE has good planning so that errors in planning can be overcome properly because there is an evaluation at the end of each process.

As the name suggests, ADDIE has five stages including: Analysis, design, development, implementation and evaluation. The analysis stage is to carry out the initial analysis required for each process carried out. The design stage is the stage of creating a framework from the results of the analysis that has been carried out. The development stage is a derivative of the framework obtained from the design stage. The implementation stage is to carry out trials of the resulting framework. Meanwhile, the evaluation stage is conducting field trials to see the effectiveness of the product produced.

In developing E-assessment, the ADDIE model is very effectively used. E-assessment is an assessment system packaged in the form of web-based digital technology.

1.1 E-Assessment in Learning

Assessment is the process of determining the value of data collection carried out (Sugihartini & Agustini, 2017). Assessment is also said to be the final decision on the overall assessment process of a person (Munazar & Qomarudin, n.d.). In the world of education, assessment is a very important activity process carried out by teachers because it will provide an overview related to the effectiveness or absence of a learning process [10], the level of achievement of learning objectives, the effectiveness of a learning method applied, and information about the learning progress of students (Adnyana et al., 2019).

In the independent curriculum that applies in Indonesia, under the supervision of the Ministry of Education and Culture, student assessment began to be encouraged to support learning based on student development. This learning trend is known as Teaching at the Right Level (Tarl). The process of learning progress should look at the abilities of each individual (learner). Thus, this is in accordance with the concept of assessment where not only information on learning outcomes is obtained, but also: information related to learning ability [12], the learning progress of each student, and things that need to be improved and strengthened by students can also be described in detail through the assessment process in learning with the type of peer assessment.

Peer assessment is an assessment involving peers that are classmates (Misiejuk & Wasson, 2021). In peer assessment, student performance is assessed by fellow learners (Iglesias Pérez et al., 2022). This assessment strategy involves more than just using key criteria in assessment (Yu, 2011). This strategy also provides opportunities for students to explore the basics of the assessment process, provide specific and descriptive educative feedback, and can maximize self-directed learning to improve student performance (Lai & Hwang, 2015). Peer assessment allows students to give each other valuable feedback, so they can learn and support each other. This provides another dimension to learn, including opportunities to speak, discuss, explain, and challenge, so that they can achieve higher than what they learn (De Brún et al., 2022).

If most teachers conduct assessment by positioning students more than mere assessment objects, then by applying peer assessment students have different positions in learning. In peer assessment, assessment is carried out by asking students to express the strengths and weaknesses of their friends with various things. Thus, peer assessment use a friend as an appraiser. In more detail, the benefits of peer assessment for students include: the development of metacognitive skills so that students can know their strengths and weaknesses, and what must be done to improve the quality of their performance; development of critical thinking skills; learn more about things learned through the approach when learners see their peers assigned tasks; practice and development of communication and social skills when learners provide useful and meaningful feedback to their peers; Instilling good character such as self-confidence and fostering honesty in assessing the performance or work of others.

The main objectives of using peer assessment in classroom learning are to increase student responsibility and autonomy; provide a deeper understanding of subject, skills and processes; improve the role and status of students from passive learners to active learners as well as assessors; engage students in critical reflection; develop a better understanding of learners based on their own subjectivity and judgment. Currently is an era of student-centered learning, so it is better for assessments to be carried out that are also student-centered by involving these students in the assessment process (Xiao & Lucking, 2008).

The advantages of peer assessment are: it helps expose misconceptions; provide direct support to learning activities in the classroom; often learners will respond more positively to their friends than to their teachers; assessments are more individual, interactive and contextual; social and communication skills can be improved; teachers can focus more on observing and intervening in the learning process; learners are egaged in reflection on their own learning and know what to improve and how to iprove it; learners take more responsibility for their own learning; help develop skills needed in their environment; Learners can gain a clearer understanding of the purpose and need for assessment thereby maximizing the efficiency of time use for teachers and learners (Ng & Yu, 2023).

Peer assessment is very well used in applicative and practical learning (Double et al., 2020). Morever, the goal to be achieved in learning is skills, such as microteaching courses (Ristapawa Indra Antomi Saregar, 2018). Microteaching courses are courses that teach concepts, theories, simulations [22] (Sugihartini et al., 2021)[23] (Zhou et al., 2017). The teaching ability provided includes eight teaching skills and one individual comprehension technique (Sugihartini, Hadi, Wahyuni, & Agustini, 2023). The eight teaching skills include: lesson opening skills; skills of closing lessons; questioning skills; classroom management skills; skills of using variations; skills in managing small and large groups; discussion guiding skills; and the ability to explain lessons [25] [26] (Bak, 2014).

1.2 Microteaching Course

Microteaching is a course that provides theoretical concepts of teaching skills and trains prospective teacher students to simulate teaching on a small (micro) scale (Altuk et al., 2012). There are several teaching skills provided in microteaching courses including (Sugihartini & Agustini, 2017):

1) Questioning skills
   Questioning skills are skills that must be mastered by a teacher in conducting questioning activities. There are 2 questioning skills, including: basic questioning

skills and advanced questioning skills. Basic questioning skills are questioning skills that are usually carried out at the beginning of learning such as conducting apperception activities or providing trigger questions for students. Meanwhile, advanced questioning skills are questioning skills that are carried out according to the cognitive level of students' learning. Advanced questioning skills are usually carried out in the middle of the learning process and at the end of learning.

2) Reinforcement skills
   Reinforcement skills are skills that must be possessed by a teacher in providing emphasis to emphasize the material presented. Reinforcement skills can be done verbally or non-verbally.
3) Skills using variations
   The skill of using variation is a skill that must be mastered by a teacher in using various variations. Variations can be in the form of using variations in learning media, variations in learning models, variations in learning approaches, variations in learning methods, and so on.
4) Explaining skills
   Explaining is the core activity of the learning process. Explaining skills are essential skills that must be mastered by a teacher. Explaining skills reflect the teacher's mastery of the material presented.
5) Lesson opening skills
   Lesson opening skills are skills that are carried out when starting the learning process, for example: saying greetings (good morning, good afternoon), asking how you are, and conveying learning objectives. Opening the lesson is important because it will lead to a more meaningful learning process.
6) Lesson closing skills
   Closing skills are skills that must be mastered by the teacher in ending the learning process, such as saying closing greetings, conveying subject matter for the next meeting, giving assignments, or conducting learning evaluations.
7) Classroom management skills
   Classroom management skills are skills that must be possessed by a teacher in maintaining classroom conditions during the learning process.
8) Small group and individual teaching skills
   Small group teaching skills are the skills of a teacher in managing small group discussions. While individual teaching skills are the skills of a teacher in personally guiding students, for example for students who have very high abilities or vice versa.

2 Method

This research is a research and development (R & D) study. The development model used adapts from the ADDIE model (Fig. 1). However, the model of the innovation process that occurs in this development research is in accordance with Systematic model of Education innovation (fig. 5) which is described in detail in the result and discussion section. The ADDIE model has a focus or emphasis on iteration and reflection, so that continuous improvement can be made focusing on feedback (Zhou et al., 2017). The ADDIE model (Yao et al., 2022) is a development model popularized by Reiser and Molenda (1990). The ADDIE model is a guide in building effective and dynamic tools and infrastructure. The ADDIE model was chosen because it is often used to describe a systematic approach to instructional development. The ADDIE process is sequential but interactive, where the results of the evaluation of each stage can lead to development at the next stage.

Figure 1. The concept of ADDIE model

a. The analysis stage is the initial stage carried out in the research, including analyzing system requirements, analyzing table requirements in the database and analyzing the curriculum used in microteaching courses.
b. The design stage is the second stage carried out after the analysis stage. The activities carried out in the design stage are designing a database, designing instruments that will be used by teachers and students.
c. The development stage is the third stage carried out after the design stage. The activities carried out are developing a web system, integrating microteaching instruments into the web system. Before the microteaching instrument is integrated into the web system, expert testing is first carried out on the instrument that has been developed. if the expert test has been fulfilled, then the microteaching instrument is integrated into the web-based system.
d. The implementation stage is the stage of using peer assessment performance to students and lecturers. The implementation of this web-based peer assessment is only carried out a limited trial, namely testing on students who are taking microteaching courses and then analyzing learning outcomes and responses.

3 Results and Discussion

The results and discussion are described in accordance with the stages of ADDIE which include: Analysis, Design, Development, Implementation, and Evaluation and supported by Systematic model of Education innovation that is in accordance with the innovation management process in this study.

1. Analysis

In the system, there are three levels of users, namely admin, lecturer and student. Admin is a user with full rights which means that the admin can do all tasks in the system such as managing users (can add lecturers and students), managing assessment rubrics (assessment indicators, assessment item items, scoring), and logging in and out on the system. While the next user level is Lecturer. Lecturers can manage student names (delete, edit, add student mana), can manage assessment rubrics (assessment indicators, assessment items, scores), assess student assignments / performance when bringing teaching skills, can log in and log out on the system. Then the last one is the student user level. Students are the lowest user level. As for what students do, namely providing grades and comments on other students'

assignments / performances. The visualization of the user level of the Web-based peer assessment system can be seen in figure 2. The differences between the three user levels can be seen in table 1.

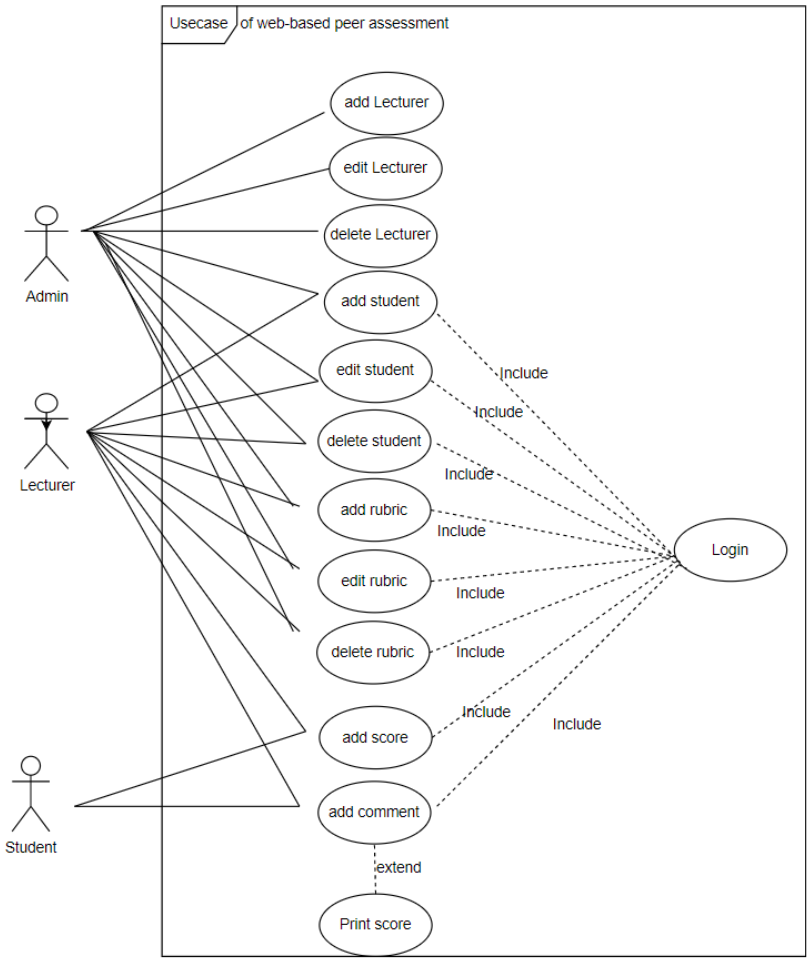

Figure 2. usecase system Web-based peer assessment

Table 1. Web-based peer assessment system user-level access rights

No	User Level	Access Right
1	Admin	Manage users (can add lecturers and students), can manage assessment rubrics (assessment indicators, assessment items, scoring), and can log in and log out on the system.
2	Lecturer	manage student names (delete, edit, add student where), can manage assessment rubrics (assessment indicators, assessment items, scoring), assess student assignments / performance when bringing teaching skills, can log in and log out on the system.
3	Students	Provide grades and comments on assignments / performance of other students, see grades and comments given by lecturers and other students.

Based on the results of the analysis stage, an instrument mapping was obtained based on 14 (fourteen) learning outcomes from the microteaching course curriculum. The learning outcomes include:

1) Students are able to analyze the differences between microteaching and ordinary learning,
2) Students are able to analyze the components of questioning skills and reinforcement skills and their implementation,
3) Students are able to apply questioning skills in the learning process,
4) Students are able to apply reinforcement skills in the learning process,
5) Students are able to analyze the skills of using variations and the skills of giving explanations and their implementation,
6) Students are able to apply the skills of using variations in the learning process,
7) Students are able to apply explaining skills in the learning process,
8) Students are able to analyze the skills of opening and closing lessons and classroom management skills and their implementation,
9) Students are able to apply the skills of opening and closing lessons in the learning process,
10) Students are able to apply classroom management skills in the learning process,
11) Students are able to analyze small group and individual teaching skills and small group guidance skills and their implementation,
12) Students are able to apply small group and individual teaching skills in the learning process,
13) Students are able to apply small group guiding skills in the learning process,
14) Students are able to analyze basic integrated teaching skills.

Microteaching courses study how to teach prospective teachers and then train prospective teachers how to teach. The microteaching lecture process is carried out on a small scale with a total of 8-10 students. Microteaching is a very effective course used to train prospective teachers' teaching skills (Zahraini et al., 2021) (Kartal et al., 2012) (Cubukcu, 2010).

2. Design

At the design stage, the results of the draft instrument used in the assessment and the design of the web system were obtained. The instrument was developed based on the 14 learning outcomes, developed an instrument that has gone through expert testing obtained a Gregory coefficient of 1.00. The instrument that was declared valid in the expert test was 26 items. Henceforth, these 26 items are used as a reference in giving quantitative scores through the web system. In addition, the system also provides an open assessment that is used to provide feedback on the developed product. For the web system design, there are three levels of users in the system, including: admin, lecturers and students. Admin is the highest level of system users (Suni Astini, 2020). Admin has full access rights to the system such as user management, rubric management, grade management, and product management. Meanwhile, the lecturer is the highest level after the admin. Lecturers cannot do user management. Lecturers are only able to do rubric management, grade management, and product management. Meanwhile, students are the lowest level of system users. Students are only able to do product management and assess other students' products.

3. Development

At the development stage, the integration of assessment instruments that have been developed at the analysis and design stages is carried out (Fig 3). At the development stage, system testing activities are also carried out which aim to find out errors (bugs) in the system. The system test includes white box test and black box test.

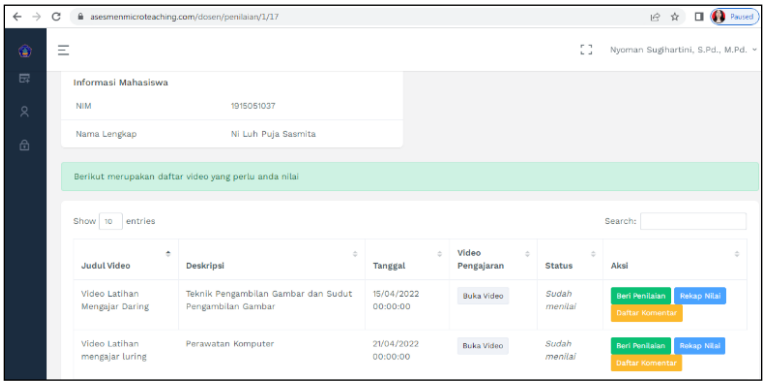

Figure 3. System Peer Assesment in microteaching course

4. Implementation

In the implementation stage, a limited trial was conducted. The limited trial is the implementation of the use of a digital peer assessment system to students who are taking microteaching courses, namely a total of 53 students. The activities carried out are students recording teaching practice activities online and offline then the two videos are uploaded to the web system. The first video result is an offline teaching practice video (fig.4) and the second video is an online teaching practice video (fig.5).

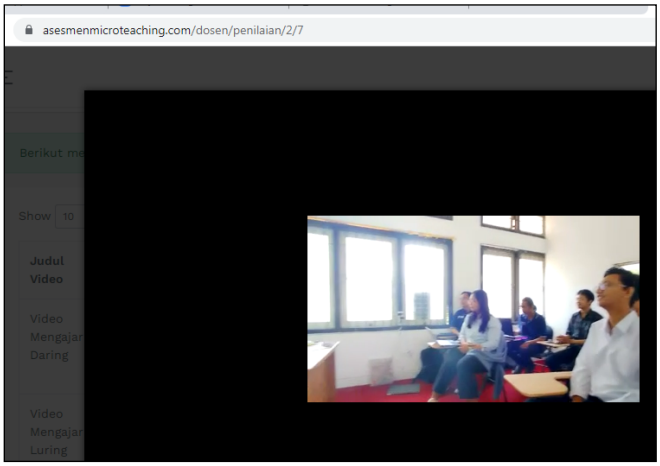

Figure 4. Offline teaching video product

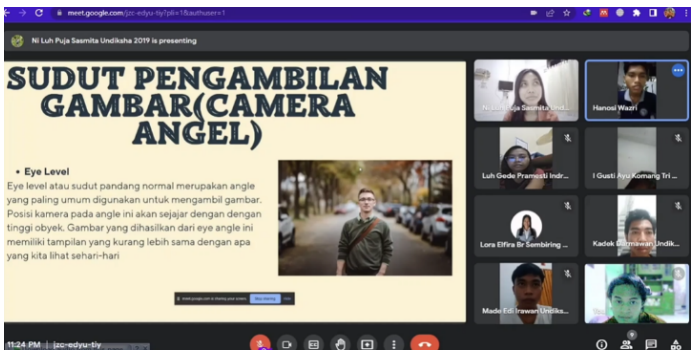

Figure 5. Online teaching video product

At the implementation stage, system user responses were also taken. Then the results are reviewed and analyzed at the evaluation stage.

5. Evaluation

In accordance with the ADDIE stages in Figure 1, the evaluation stage is carried out at each stage of analysis, design, development and implementation. At the evaluation stage, learning outcomes data were also collected. The analysis of student learning outcomes for online and offline teaching videos using the standard deviation formula (SDi) and the mean ideal (MI). The learning outcomes for Online Teaching Practice obtained an average score (N) of 53 students which was 87.12, classified as "Very Good". While the learning outcomes for Offline Teaching Practices obtained an average value (N) of 87.65 which is classified as "Very Good".

> Based on the results of the response calculation analysis, the results obtained were 113.25 with the criteria "Very Practical" referring to table response test criteria. So, the peer assessment digital can support the learning process of microteaching courses effectively, both in online and offline classe. (Choirul Huda, 2017) (Sugihartini, Hadi, Wahyuni, Agustini, et al., 2023) (Sugihartini, Hadi, Wahyuni, & Agustini, 2023)

Innovation Strategy

Innovation strategy is a way to make the innovation process and implement it in the midst of society. In this study, the intended implementation is to apply digital peer assessment to students. Very good responses were given by students after using digital peer assessment in microteaching courses. Analysis of student responses using the standard deviation formula and the ideal mean shows very practical results with an average value of 113.25. While the analysis results for student learning outcomes in online teaching practice amounted to 87.12 which is classified as very good. And learning outcomes for offline teaching practice amounted to 87.65 which is classified as very good. This shows that digital peer assessment is very well used in supporting the microteaching learning process. The implementation of digital peer assessment in microteaching courses has changed the students' mindset in the learning process. There are several concepts that students feel after using peer assessment in learning (Enny Wijayanti, 2015), including:

1) Students learn to give good feedback based on the quality of the video products they watch.
2) Students learn to compose sentences to provide objective and constructive feedback for the improvement of teaching methods on the video.
3) Students learn to understand and translate into quantitative numbers through instruments available on the web system.
4) Very good interaction occurs on the web system, it can be seen that the final score on the system that provides a linkert scale of 1-5, after being given an average peer assessment gives a score between the ranges of 3-5.
5) There is a conducive learning environment, because students support each other and improve themselves in the practice of teaching through the feedback provided.

Strategic innovations that occur in the implementation of digital peer assessment are expected to continue and be developed in other courses with a larger number of students. This innovation has created excellent students and processed them to improve critical, objective and transparent thinking so that the learning process with higher order thinking skills (HOTS) can occur (Salbiah Omar et al., 2017).

4 Conclusion

Based on the results of research on the development of E- assessment as one of the trends of innovation in the field of learning, it can be concluded that E-assessments for microteaching courses have met the criteria of validity and practicality. The results of the microteaching instrument expert test showed that the instrument was valid with a gregory value of 1.00. The instrument was then integrated with a web-based system to implement peer assessment. The response analysis results show that the digital assessment system is very practical to use with an average value of 113.25. The analysis results for student learning outcomes in online teaching practice amounted to 87.12 which is classified as very good. And learning outcomes for offline teaching practice amounted to 87.65 which is classified as very good. This shows that digital peer assessment is very well used in supporting the microteaching learning process. In further research, experimental research can be carried out that distinguishes two groups to see the learning outcomes of students who use digital peer assessment and those who do not.

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