

IDEA ENGINEERING ASSESSMENT MODEL AND MINI RESEARCH BASED ON
COMPUTER-BASED TESTING IN GENERAL PHYSICS COURSES

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Abstract: The purpose of this study was to develop an assignment and assessment model for Idea Engineering and Mini Research based on Computer Based Testing by utilizing the online learning system (SIPDA) of Universitas Negeri Medan (UNIMED). This type of research is a research and development (R&D) Van de Akker model with four stages, namely Preliminary Research, Prototyping Stage, Summative Evaluation, Systematic Reflection, and Documentation. The research subjects were Physics Department students who received General Physics courses. The data analysis technique uses qualitative and quantitative analysis techniques from the results of the validator's assessment, and the assessment of user responses. Based on the analysis of the results of the validity test, the average percentage for Idea Engineering is 87, 8% in the Very Good category and for Mini Research by 80% in the Very Good category. From the analysis of the score, the indicators that get the maximum score are the indicators of the functionality of the features, the ease of use of the effectiveness of using the system, and the usefulness of the assessment process, which means that the features of this scoring system function well to provide convenience in the process of assessing the tasks of Idea Engineering and Mini Research. These two results, shows that all features function well so that they can be used for the assessment process. Students can work on assignments with clear procedures and receive direct, objective and transparent assessments and reflections. the indicators that get the maximum score are the indicators of the functionality of the features, the ease of use of the effectiveness of using the system and the usefulness in the assessment process, which means that the features in this scoring system function well so as to provide convenience in the process of assessing the tasks of Idea Engineering and Mini Research. From these two results, it shows that all features function well so that they can be used for the assessment process. Students can work on assignments with clear procedures and receive direct, objective and transparent assessments and reflections. the indicators that get the maximum score are the indicators of the functionality of the features, the ease of use of the effectiveness of using the system and the usefulness in the assessment process, which means that the features in this scoring system function well so as to provide convenience in the process of assessing the tasks of Idea Engineering and Mini Research. From these two results, it shows that all features function well so that they can be used for the assessment process. Students can work on assignments with clear procedures and receive direct, objective and transparent assessments and reflections. From these two results, it shows that all features function well so that they can be used for the assessment process. Students can work on assignments with clear procedures and receive direct, objective and transparent assessments and reflections. From these two results, it shows that all features function well so that they can be used for the assessment process. Students can work on assignments with clear procedures and receive direct, objective and transparent assessments and reflections.

Keywords: Idea Engineering, Mini Research, Computer Based Testing, General Physics

1. Introduction

In the Strategic Plan of the State University of Medan (RENSTRA UNIMED) for 2020-2024, UNIMED continues to strive towards a world class university that can be achieved by increasing innovation in performance programs in the field of education. Performance innovation aims to improve the quality of learning by utilizing IT/ICT. Starting from the application of an internet-based learning approach (online learning), the use of learning resources and the implementation of an assessment system. In fact, one of UNIMED's flagship programs is the application of web-based course standard tests. Therefore, these programs must be able to motivate and challenge UNIMED lecturers to innovate in learning. More specifically, innovation can be carried out on the learning assessment model from

conventional to computer-based (Jamil, Thariq dan Shami, 2012) and it is hoped that this computer-based assessment system can be applied optimally to measure student learning outcomes.

Based on the conclusion of the online questionnaire of 63 students of the Class of 2020 Physics Department, FMIPA Unimed FY 2021/2022 which was conducted online, the assessment system was good using Learning Management System SIPDA but the assessment model had not included the results of the KKN assignment assessment, namely Critical Book Report, Critical Journal Review, and Engineering. Ideas, Mini Research and Projects. These five types of assignments aim to train students' abilities in terms of attitudes, knowledge and skills so that students are able to solve problems, have a critical, creative and innovative attitude. This is in accordance with Hasruddin's (2016) statement that university graduates are required to have comprehensive attitudes, knowledge, and skills that are reflected in the performance of graduates. Through these six types of tasks, it is hoped that students will master the content and process of the courses in a more integrated manner.

In the implementation of the KKN orientation curriculum or the Independent Learning policy, the assessment is carried out starting from the learning process to the end of the lesson. This is in accordance with Suyasa's (2017) statement in the implementation of the KKN, the assessment of each course consists of assessing the lecture process and completing assignments as well as self-assessment which includes mid-semester exams and end-semester exams. In the assessment, appropriate instruments are needed and are in accordance with the learning objectives. The assessment instrument is able to train students' critical thinking and problem solving skills (Saheri, 2017). The application of problemsolving methods on question instruments also has the potential to develop divergent thinking skills (the ability to find ideas to solve problems) and logical thinking skills (the ability to verify these ideas into a creative solution) (Syafii, 2011).

So far, assessments for KKN-based assignments are carried out by lecturers manually and based on PBT so that subjective assessments often occur; students rarely get feedback on the results of their assignments and exams. In the assessment process, the weights of the six types of tasks are entered in the assessment format according to the latest assessment format. Each has a weight that has an impact on a student's final grade for one course. If students do not understand the purpose and how to do the task, it will affect the acquisition of the value of the assignment and indirectly also have an impact on the final grade of the student. It is not uncommon for lecturers and students to have different opinions in carrying out assignments and assigning assignments so that the purpose of the authentic assessment process is not achieved. Suyasa (2017) argues that assessment instruments that are not standardized have resulted in each lecturer having their own assumptions in the assessment process so that the assessment results are subjective, less authentic and unaccountable.

Test instruments that use a computer to display questions and provide scores are called computer-based tests or computerized based testing (CBT). In principle, CBT is the same as PBT; it's just that the presentation of the questions uses a computer. The use of computers can allow randomization of questions and the availability of time to take the test can reduce the opportunities for cheating for test takers. In addition, CBT reduces the time to do test assessment work and make written reports, eliminates logistical work such as distributing and storing test papers and the most important advantages in the assessment process, assessment results can be seen directly by test takers thereby reducing the burden on test takers in correcting answers. test takers (Suyoso, Istiono & Subroto, 2017). Computer-based tests also accurately measure test takers with moderate to high abilities.

In this research design, a special assessment model will be made for the task of idea engineering and mini research. Through these two types of assignments, students are able to build creative and innovative ideas that can be verified using experimental methods. Judging from the characteristics of these two tasks, educators can maximize student potential by directing students to modify their ideas so that they can produce new theories through experimental methods. This means that these two tasks are related to each other. The design of the CBT-based assessment is intended so that students can see the assignment guide and the results of the assessment on the CBT system so that they can complete them optimally. Assignment assessment uses the CBT method and the results will be formulated into the CBT system so that students get grades objectively and reduce the difficulty of lecturers in carrying out assessments.

In Khoshsima (2017), it is said that the Computer Based Test (CBT) has advantages over the Paper Based Test (PBT), where the CBT assessment is considered more effective, efficient and practical to use as a test medium than conventional assessments. CBT is part of the trending e-learning (Garas, 2018) and is more commonly used today

than Paper Based Test (PBT) and is a more practical change in assessment methodology (OECD 2010). With CBT allows assessments to be done online.

In the development of education, the assessment system must be able to adapt to technological developments using computer media such as Computerized Based Testing (CBT). CBT is a transformation of change from aspects of learning and curriculum in the world of education (Scheuermann & Pereira, 2008) which has developed rapidly, especially in educational assessment (Piaw, 2012). CBT instruments have added value compared to PPT (Martin, 2008). The CBT instrument is able to package questions more effectively and efficiently so as to reduce paper costs and is equipped with scoring facilities so that a quick and precise assessment can be made. Values that are immediately known by test takers can be used for self-evaluation. Besides that, CBT instruments have a working time that will stop automatically according to the time setting so that it encourages children to focus more on answering questions because there is no opportunity for cheating. Furthermore, CBT is not only an alternative method of assessment; it is able to train students' self-confidence both before and after taking the test (Jimoh, Shittu & Kola, 2012).

The CBT referred to in this study is a computer-based assignment and assessment using the Unimed SIPDA (Online Learning System) learning management application. So far, lecturers have used SIPDA for activities and interacting with students. Materials in the form of videos, modules or presentation materials are entered into SIPDA, so that students can access all lecture materials anywhere. Lecturers also conduct assessments through SIPDA by entering test or non-test assessment instruments that will be done by students. However, SIPDA is only used as a means for collecting assignments, not yet used for assessment.

Therefore, the research team saw that it was necessary to design a six-task assessment model, especially the idea engineering task and mini-research so that students can work on assignments to the maximum and get an assessment according to the results of their assignments. This activity can indirectly maximize the function of SIPDA as a Unimed learning management application. It is hoped that the results of this research will also contribute (benefit) in the implementation of IT/ICT-based lectures and assignments.

2. Method

This research is a type of development and descriptive research with qualitative and quantitative approaches with documentation studies, namely collecting data using written sources related to research problems. The data collected is in the form of student answers and questionnaire results which are then analyzed qualitatively and quantitatively. The research method used in this study is a research and development (R&D) method with the development stages of Van de Akker (2006). The development method aims to produce design principles that can be used to solve problems in the field of education (Akker, 2006).

According to Suharsimi Arikunto (2013), instrument procedures consist of planning, implementation and closing or the final stage. The stages of Van de Akker's research design consist of four stages, namely Preliminary Research, Prototyping Stage, Summative Evaluation, Systematic Reflection and Documentation. The following describes each stage:

1) Preliminary Research Stage

This is a preliminary study stage which includes literature and field studies. At this stage, the initial data documents and research needs were collected, such as General Physics curriculum data, physics material sources, KKN assignment guides, assignment grids and computer-based test model development guidelines. Furthermore, the preparation of instrument development designs, test application system designs, test instrument validation sheets and user response sheets was carried out.

2) Prototyping Stage

This stage is a follow-up to the analysis of problem findings and preliminary studies at the Preliminary Research stage. At this stage, the design of the assignment items is carried out, the design of the application system for the appropriate test instruments, the validation test by a team of experts, the (limited) instrument trial to determine the results of the item analysis, the refinement of the instrument with the assessment design in SIPDA, the instrument trial (large scale).

In the item design, item preparation and validation and feasibility tests are carried out through the assessment of expert validators in the field of material and learning evaluation. Then enter the design stage of assembling the assignment of engineering ideas and mini research on the SIPDA application with several provisions. Assignment packages and assessments on the system are tested for feasibility through the assessment of expert validators. Then make product improvements based on validator input. Furthermore, field trials are carried out, namely system performance tests and user feedback tests.

- 3) Summative Evaluation Stage
At this stage, the students' responses to the final product were tested through direct implementation and filling out a questionnaire.
- 4) Systematic Reflection and Documentation Stage
At this stage an evaluation of all stages of research, reflection and documentation is carried out so that the final product, namely the idea engineering assessment model and mini research, can be used by lecturers and students.

Data collection techniques were carried out using expert validation sheets and user response sheets. Validation sheets are used to obtain data on product deficiencies and improvements and to test product feasibility. User response questionnaire sheet is used to obtain readability data and user responses to the product.

The data analysis technique uses qualitative and quantitative analysis techniques from the results of the validator assessment, user response assessment and product implementation. The data in this study were obtained from the results of product validation and student response and readability tests. Product validation and response readability test using a questionnaire which is analyzed by calculating the average value of the Likert scale of all respondents.

Using the formula above results in the calculation of numbers in the form of percent. The score classification is converted into a classification in the form of a percentage which is then interpreted with qualitative sentences (Sujana, 2009) in Table 1:

Table 1. Percentage of Indicator Compliance Criteria

| No | Percentage Interval | Category |
|----|--------------------------|-------------|
| 1 | $80\% \leq X \leq 100\%$ | Veryvalid |
| 2. | $60\% \leq X \leq 80\%$ | Valid |
| 3. | $40\% \leq X \leq 60\%$ | Quite valid |
| 4. | $20\% \leq X \leq 40\%$ | Notvalid |
| 5. | $0\% \leq X \leq 20\%$ | Invalid |

For student responses, it is interpreted using the criteria in Table 2:

Table 2. Interpretation Criteria for Response Assessment Score

| Achievement Level | Criteria |
|-------------------|-------------|
| 0-20 | Not Good |
| 21-40 | Not Good |
| 41-60 | Pretty Good |
| 61-80 | Well |
| 81-100 | Very Good |

3. Results

Through this research, an assessment model has been developed for the assignment of Ideas Engineering and Mini Research based on CBT by utilizing the Unimed Online Learning System (SIPDA) application. Starting with the design of the assessment rubric according to the characteristics of the task, designing the assessment model at

SIPDA, testing feasibility by validators and testing student responses. The following are the results of the product development process and research data analysis:

Preliminary Research Stage

At this stage, a preliminary study as well as a literature study of theoretical studies and research implementation techniques is carried out to suit the research objectives. At this stage, some data were obtained regarding the results of the needs analysis, assignment design and assessment rubrics for Idea Engineering and Mini Research which were integrated into SIPDA, feasibility validation instruments and student responses instruments.

1) Results of Research Needs Analysis

The process of developing an assessment model begins with potential problems. From the analysis of potential problems, it was obtained data that lecturers of the General Physics course at the Physics Education Study Program applied the KKN assignment system such as Idea Engineering and Mini Research, but the assessment process was still carried out manually so that students did not know the results of their assignments more transparently and there was no reflection of the results of these assignments.

2) Assignment Plan

The assignment design is made in the student assignment plan format which contains learning sub-achievements, task descriptions, task execution methods, output forms and formats, indicators/criteria for assessment weights. In order, the following is the Student Task Plan in Figure 2 and Figure 3.

The assignment design is equipped with an assignment assessment rubric that is used as a reference in conducting objective assessments for students in Figure 4.

At this stage, a product feasibility test design is also produced, namely a feasibility test instrument by a validator and a student response test. These two instruments are used to evaluate the accuracy and functionality of the product. The feasibility test instrument is presented in Tables 3 and 4:

Table 3. Feasibility Test Instruments

| No. | Indicator | Assessment criteria | | | | |
|-----|--------------------------------------|---------------------|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 1 | Functionality of features | | | | | |
| 2 | Complete features | | | | | |
| 3 | Ease of use | | | | | |
| 4 | System access speed | | | | | |
| 5 | Page access speed | | | | | |
| 6 | System usage efficiency | | | | | |
| 7 | Effective use of the system | | | | | |
| 8 | Score Accuracy | | | | | |
| 9 | Usefulness in the assessment process | | | | | |

Table 4. Instrument Response/Student Response

| No | Statement | Scale | | | | |
|----|------------------------------------|-------|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 |
| 1 | Ease of running the system | | | | | |
| 2 | Practicality of running the system | | | | | |
| 3 | System flexibility | | | | | |
| 4 | Clarity of assessment criteria | | | | | |
| 5 | Disclosure of assessment results | | | | | |

| | | | | | | |
|----|---|--|--|--|--|--|
| 6 | Clarity of feedback from assignments | | | | | |
| 7 | Easy access to hosting | | | | | |
| 8 | Assessment becomes more effective and efficient | | | | | |
| 9 | The assessment model trains honesty (No Plagiarism) | | | | | |
| 10 | The assessment model trains accuracy | | | | | |
| 11 | Assessment model trains discipline (Timeliness) | | | | | |

Prototyping Stage

At this stage, the design of an Idea Engineering and Mini Research Assessment model based on CBT is carried out. The results obtained at this stage are the design of the assignment, the making of the assessment rubric and the assessment process which are presented in the following flowchart:

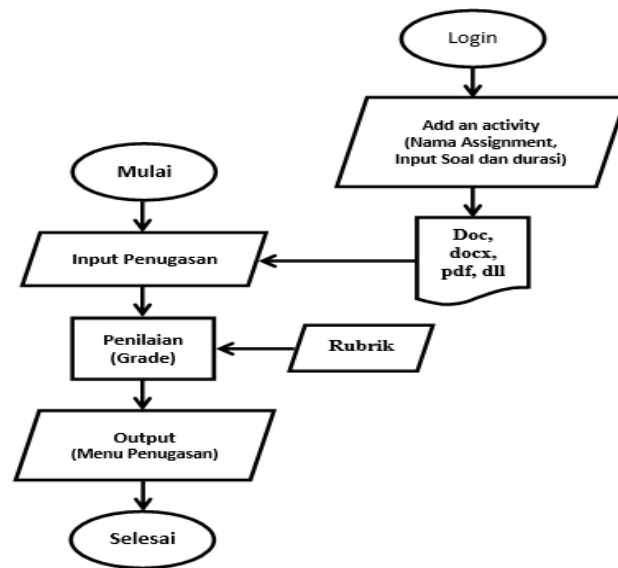


Figure 2. Assignment Menu Flowchart

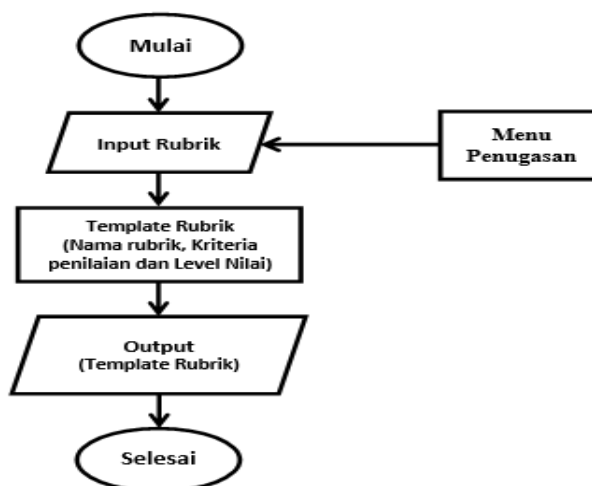


Figure 3. Rubric Making Flowchart

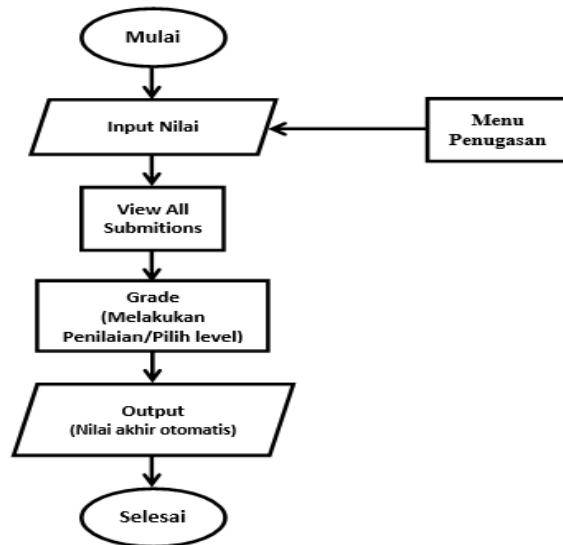


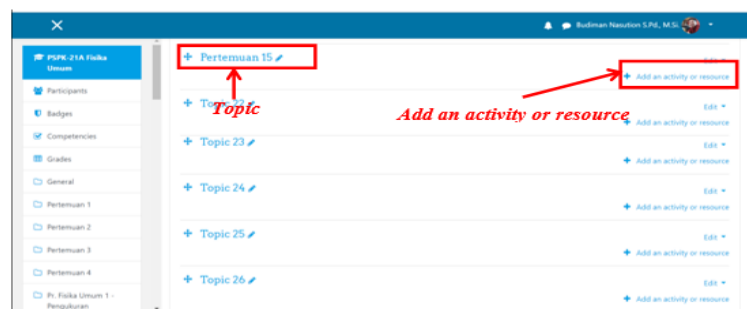
Figure 4. Flowchart of the Assessment Process

This flow chart is used as a design flow for the assignment menu, the menu for making the assessment rubric and the assessment process. Based on this flowchart, the developer designed an Idea Engineering and Mini Research assignment at SIPDA. The following is a description of the stages of making the assignment assessment menu at SIPDA:

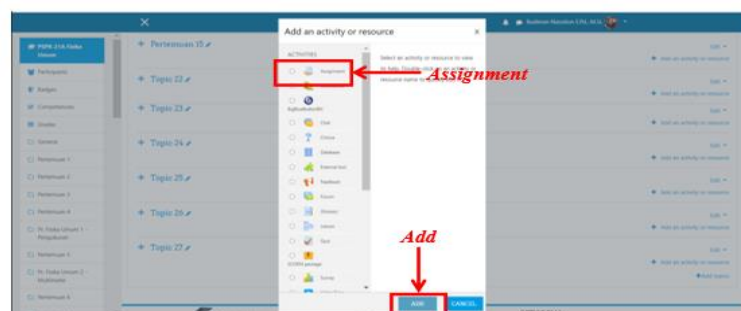
1) Creating an Assignment menu

Based on the flow chart, the menus and features in SIPDA are processed with the following steps:

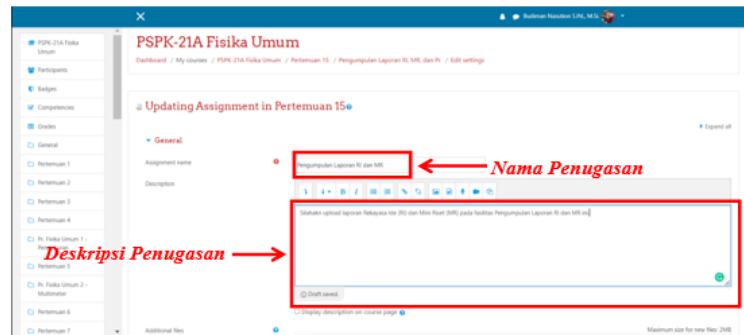
- Open courses or courses for the courses for which the assignment menu will be created.
- Activate the Turn editing on facility.
- Specify the name of the Topic for which the assignment menu will be created. Then click the Add an activity or resource facility.
-



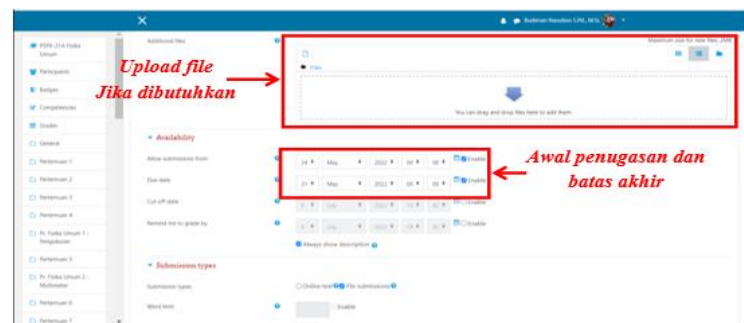
- Clicking on the Add an activity or resource facility will bring up a dialog box with several activity options. Then select the Assignment activity then click ADD.



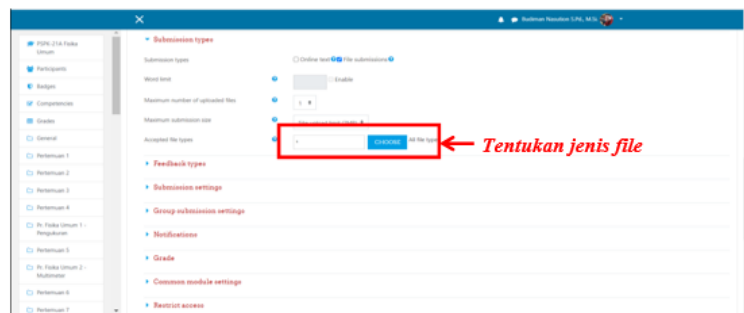
- f. Next, a display will appear for the assignment settings to be made. Specify the assignment name and job description.



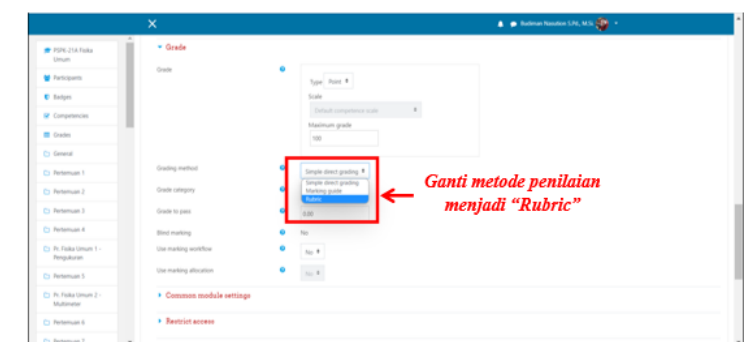
- g. Input the question document in the file upload facility. Set the assignment start time and collection deadline at the Availability facility.



- h. Specify the types of files that can be uploaded on assignment using the Submission types facility.



- i. Determine the type of assessment on the Grade facility. In the Grading method section, change the assessment method to Rubric.

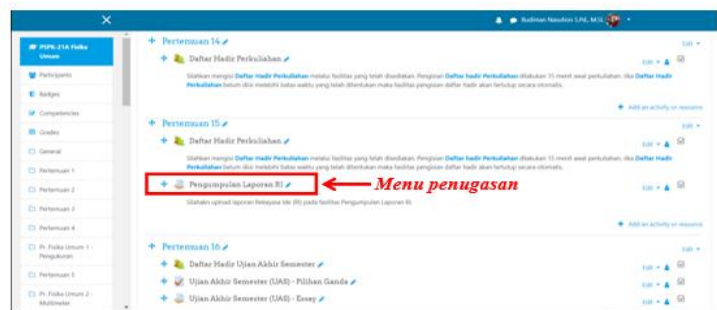


- j. Click Save and Return to Course to save the assignment.



2) Making an Idea Engineering assessment rubric

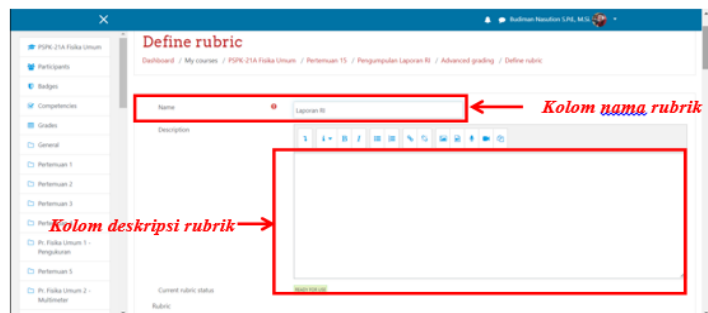
- a. To create an Idea Engineering assessment rubric at SIPDA, it is started by opening (clicking) the assignment menu that was previously created.



- b. Click the settings button located in the upper right corner of the assignment menu display. Then click (select) Define rubric.

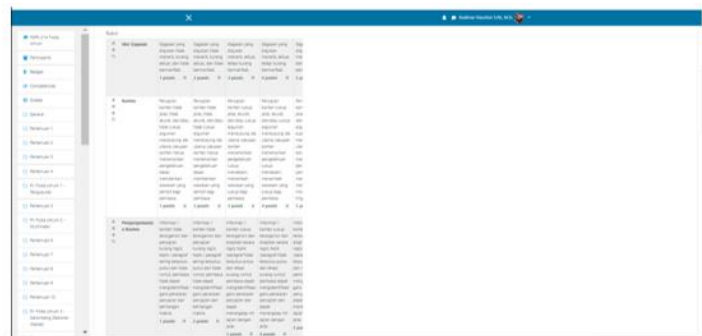
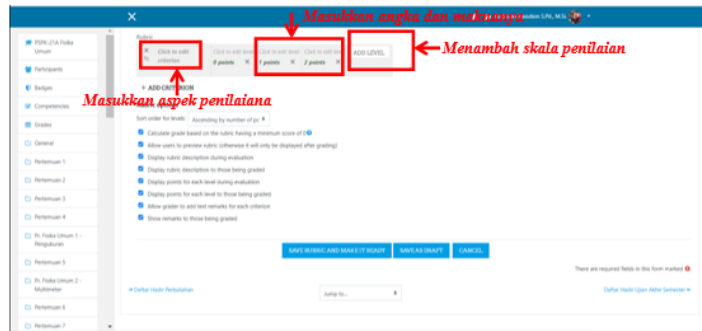


- c. Set the name of the rubric in the Name column. Create a rubric description in the Description column if needed.

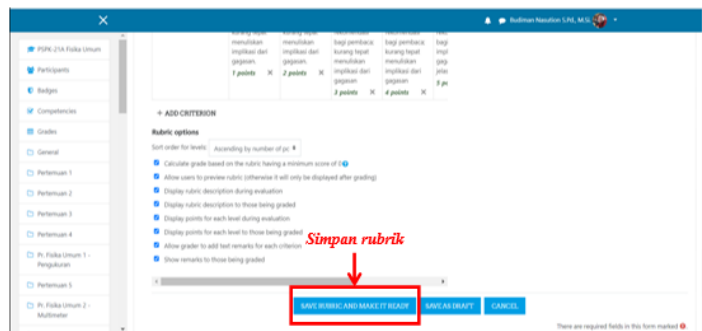


- d. Input the rubric components in the Rubric facility. Click click to edit criterion to enter the assessed aspects, then type the type of criteria or aspects to be assessed. Click Click to edit level for and Point to set the

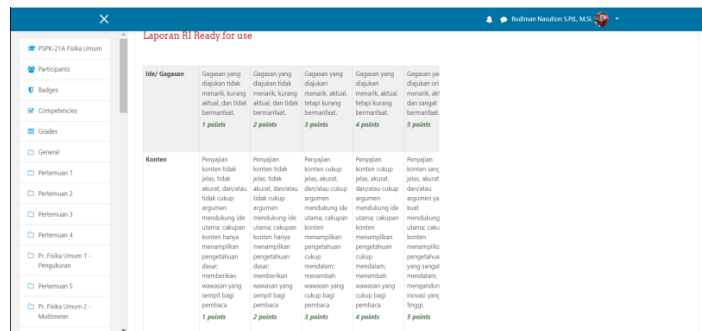
rating scale, enter the meaning of the number on Click to edit level and enter the scale or number in Point. If you want to add a rating scale, click Add Level.



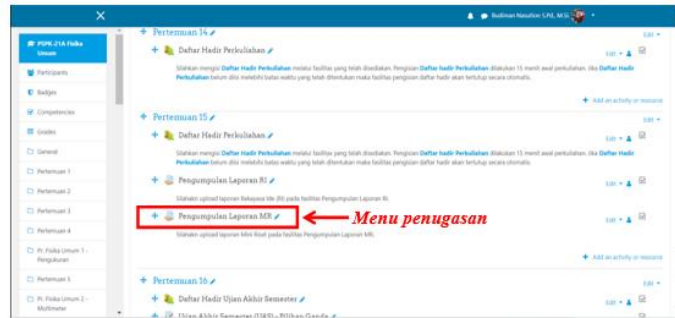
e. Save the rubric that has been created by clicking on the Save rubric button and make it ready.



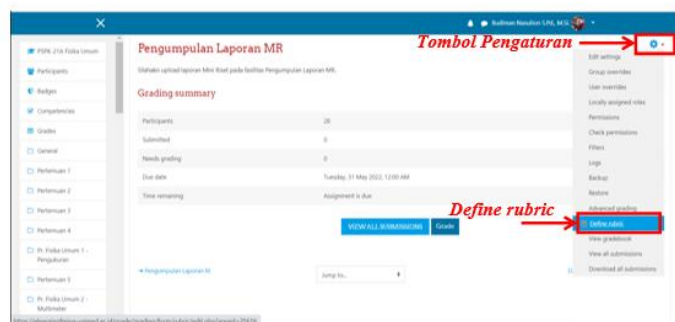
f. The scoring rubric is ready to use.



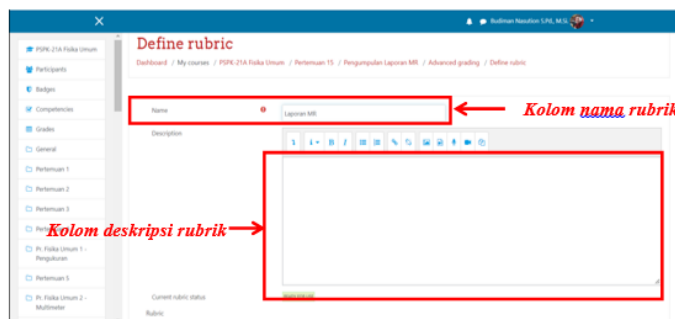
- 3) Making a Mini Research assessment rubric:
 - a. To create a Mini Research assessment rubric at SIPDA, it begins by opening (clicking) the assignment menu that has been created previously.



- b. Click the settings button located in the upper right corner of the assignment menu display. Then click (select) Define rubric.



- c. Set the name of the rubric in the Name column. Create a rubric description in the Description column if needed.

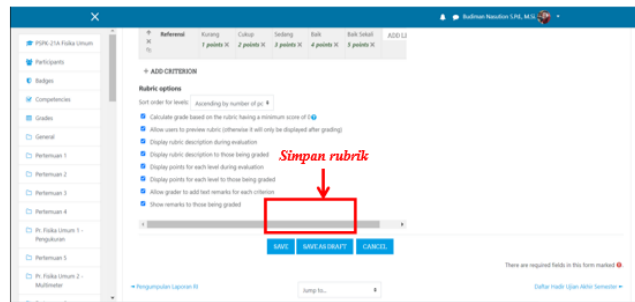


- d. Input the rubric components in the Rubric facility. Click click to edit criterion to enter the assessed aspects, then type the type of criteria or aspects to be assessed. Click Click to edit level for and Point to set the rating scale, enter the meaning of the number on Click to edit level and enter the scale or number in Point. If you want to add a rating scale, click Add Level.

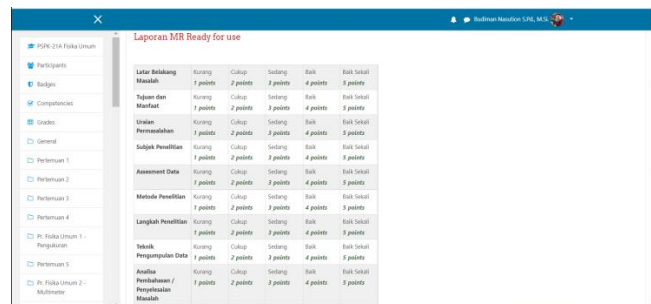




e. Save the rubric that has been created by clicking on the Save rubric button and make it ready.



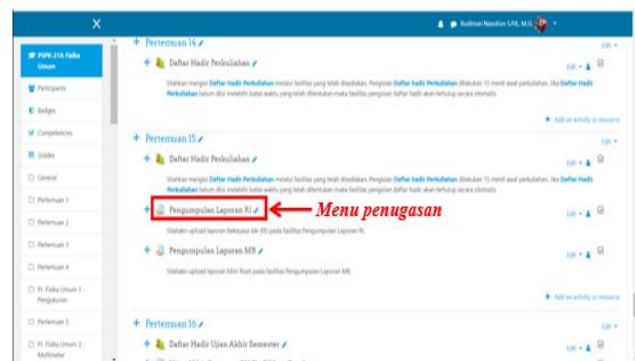
f. The scoring rubric is ready to use.



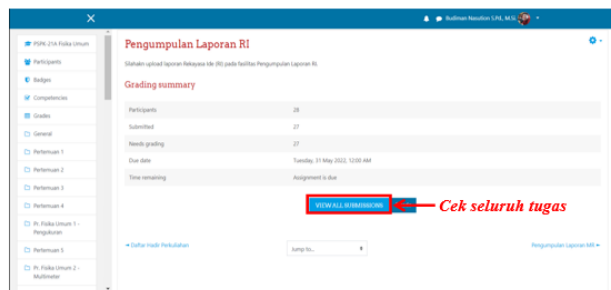
4) Assessment Process With Rubric

After the assessment rubric has been successfully inputted, then the scoring system can be run. The following is an Idea Engineering assessment process using an assessment rubric:

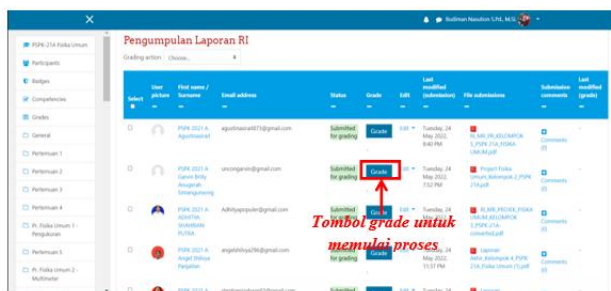
a. To conduct an assessment on SIPDA begins by opening (clicking) the assignment menu which has been equipped with the previous rubric.



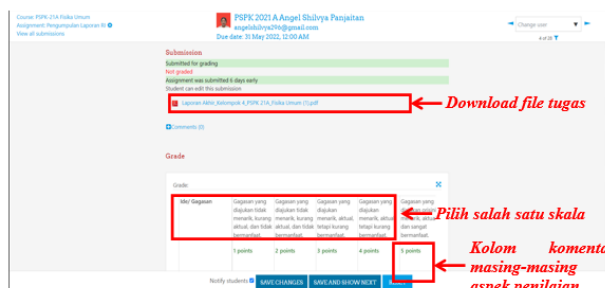
b. Click the View all submissions button to view all assignments uploaded by students.



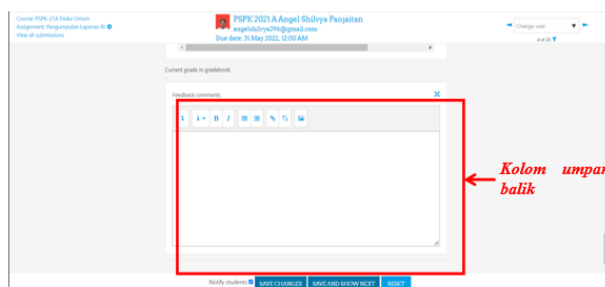
c. Click the Grade button to start the grading process.



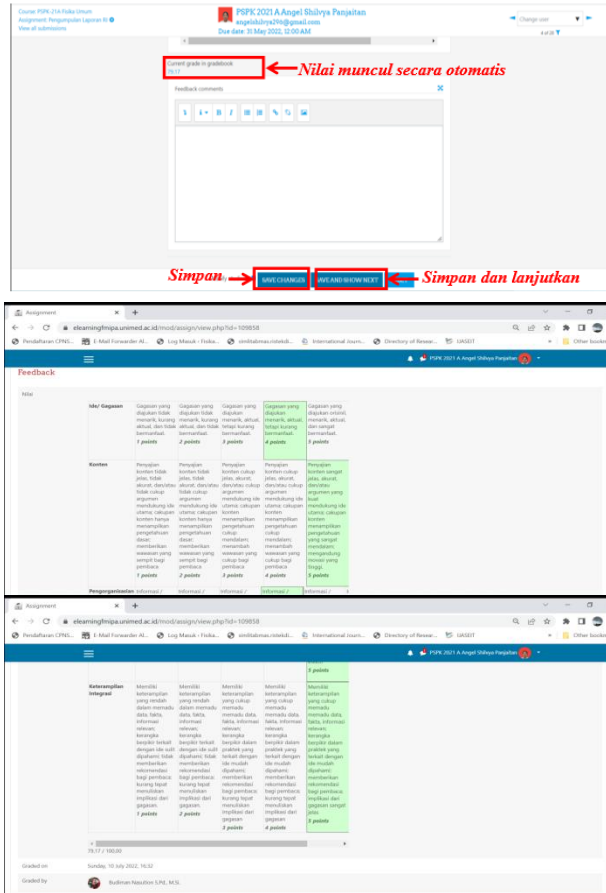
d. Click the file that appears to download the assignment file that has been uploaded by the student. Perform the assessment process by clicking on one of the scales on each aspect of the assessment until all aspects of the assessment are filled. Enter comments in the comments column provided on each aspect of the assessment (if needed).



e. Enter feedback on student assignments in the Feedback comments column.



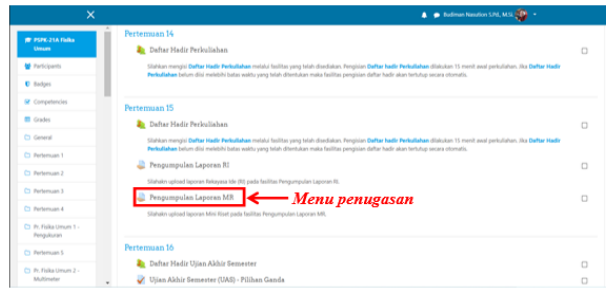
f. Click the Save changes button to complete the assessment and view the final score. Grades will automatically appear on the display and on the student account. If you want to continue the assessment to the next student, it can be done by clicking the Save and show next button.



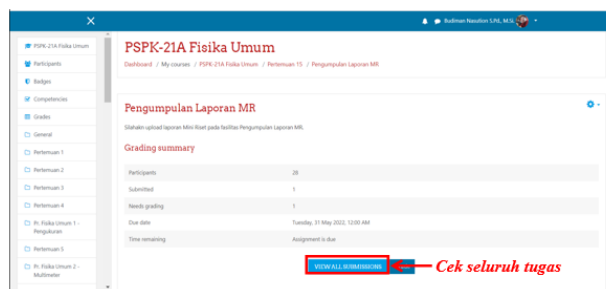
5) Mini Research Assessment Process

The following is the Mini Research assessment process using an assessment rubric:

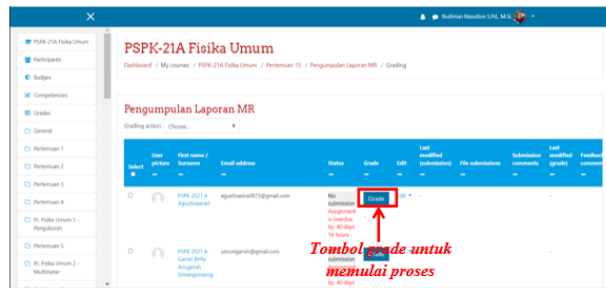
- a. To conduct an assessment on SIPDA begins by opening (clicking) the assignment menu which has been equipped with the previous rubric.



- b. Click the View all submissions button to view all assignments uploaded by students



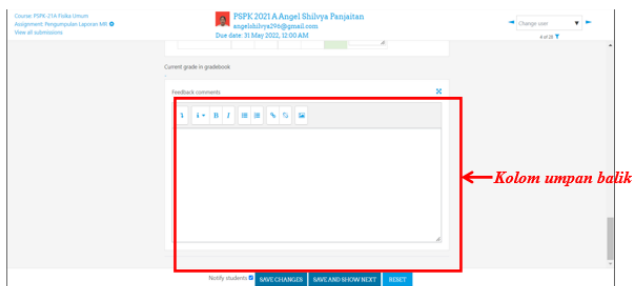
c. Click the Grade button to start the grading process.



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e. Enter feedback on student assignments in the Feedback comments column.

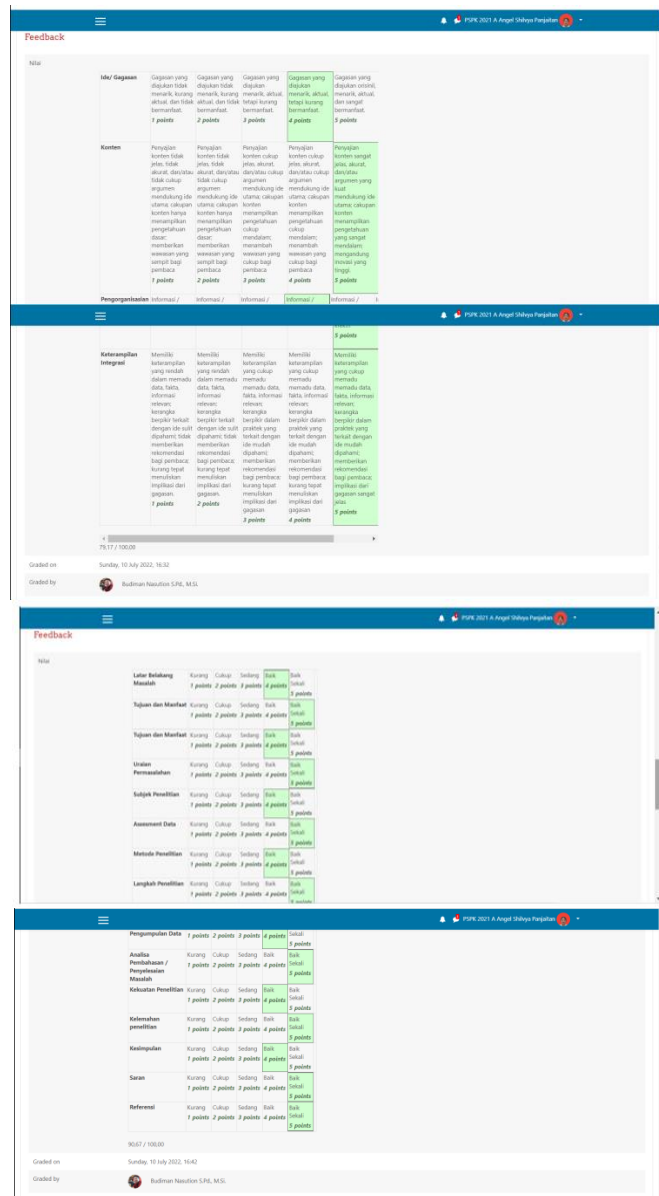


f. Click the Save changes button to complete the assessment and view the final score. Grades will automatically appear on the display and on the student account. If you want to continue the assessment to the next student, it can be done by clicking the Save and show next button.



6) Viewing Assignments

The system has been able to run and successfully process student assignment assessments. Furthermore, students can see the value of the system. The following is a display of the results of the Idea Engineering and Mini Research assessment on student SIPDA accounts:



Summative Evaluation

At this stage, the feasibility test of the Idea Engineering and Mini Research assessment product is carried out by experts. The results of the feasibility test and the summary of the test results of the Idea Engineering assessment product are shown in Table 5 and Table 6 below:

Table 5. Feasibility Test Results (Idea Engineering)

| No. | Indicator | Rating result | | |
|-----|---------------------------|---------------|-------------|------------|
| | | Validator 1 | Validator 2 | Percentage |
| 1 | Functionality of features | 5 | 5 | 100% |
| 2 | Complete features | 3 | 4 | 70% |
| 3 | Ease of use | 5 | 5 | 100% |

| | | | | |
|-------------|--------------------------------------|----|----|-------|
| 4 | System access speed | 4 | 4 | 80% |
| 5 | Page access speed | 4 | 4 | 80% |
| 6 | System usage efficiency | 4 | 4 | 80% |
| 7 | Effective use of the system | 5 | 5 | 100% |
| 8 | Score Accuracy | 4 | 4 | 80% |
| 9 | Usefulness in the assessment process | 5 | 5 | 100% |
| Total Score | | 39 | 40 | 87.8% |

Table 6. Summary of Test Results (Idea Engineering)

| No | Validator | Score | Percentage | Category |
|--------------------|-------------|-------|------------|-----------|
| 1. | Validator 1 | 39 | 86.7% | Very good |
| 2. | Validator 2 | 40 | 88.9% | Very good |
| Average Percentage | | | 87.8% | Very good |

Based on Table 6, it can be seen that the average percentage of the feasibility assessment from the validator for the Idea Engineering assessment product is 87.8% in the Very Good category. From the analysis of the scores of all indicators, it is known that the indicators that get the maximum score are the indicators of the functionality of the features, the ease of use of the effectiveness of using the system and the usefulness of the assessment process, which means that the features in this scoring system function well so as to provide convenience in the process of assessing the Idea Engineering task.

The results of the feasibility test and the summary of the results of the Mini Research assessment product testing are shown in Table 7 and Table 8 below:

Table 7. Feasibility Test Results (Mini Research)

| No. | Indicator | Rating result | | |
|-------------|--------------------------------------|---------------|-------------|------------|
| | | Validator 1 | Validator 2 | Percentage |
| 1 | Functionality of features | 4 | 4 | 80% |
| 2 | Complete features | 3 | 3 | 60% |
| 3 | Ease of use | 5 | 5 | 100% |
| 4 | System access speed | 4 | 4 | 80% |
| 5 | Page access speed | 4 | 4 | 80% |
| 6 | System usage efficiency | 4 | 4 | 80% |
| 7 | Effective use of the system | 3 | 3 | 90% |
| 8 | Score Accuracy | 4 | 4 | 80% |
| 9 | Usefulness in the assessment process | 5 | 5 | 100% |
| Total Score | | 36 | 36 | 80% |

Table 8. Summary of Test Results (Mini Research)

| No | Validator | Score | Percentage | Category |
|--------------------|-------------|-------|------------|-----------|
| 1. | Validator 1 | 36 | 80% | Very good |
| 2. | Validator 2 | 36 | 80% | Very good |
| Average Percentage | | | 80% | Very good |

Based on Table 8, it can be seen that the average percentage of the feasibility assessment from the validator for the Mini Research assessment product is 80% with the Very Good category. From the analysis of the scores of all indicators, it is known that the indicators that get the maximum score are the indicators of ease of use and usefulness in the assessment process. The indicator that gets the lowest score is the completeness of features because specifically for Mini Research assignments, validators provide input to add features to the assessment of the research process because the research process is an important part of the Mini Research task. Based on the results of the two assignments, namely Idea Engineering and Mini Research, all features are functioning properly so that

they can be used for the assessment process. Students can work on assignments with clear procedures and receive direct, objective and transparent assessments and reflections. It can be concluded that this assessment model provides benefits for the process of assessing student assignments.

4. Conclusion

The conclusion of this study is based on the findings of the research data, the systematic presentation is carried out by taking into account the research objectives that have been formulated. The conclusions obtained are:

- a. CBT-based assessment model has been designed for Idea Engineering and Mini Research assignments
- b. Product feasibility testing obtained an average percentage for Idea Engineering of 87.8% in the Very Good category and for Mini Research by 80% in the Very Good category. From the analysis of the score, the indicators that get the maximum score are the indicators of the functionality of the features, the ease of use of the effectiveness of using the system and the usefulness of the assessment process, which means that the features of this scoring system function well so as to provide convenience in the process of assessing the tasks of Idea Engineering and Mini Research. The indicator that gets the lowest score is the completeness of features because specifically for Mini Research assignments, validators provide input to add features to the assessment of the research process because the research process is an important part of the Mini Research task.

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