
Development of Test Instrument To Asses Critical Thinking Skills Using Moodle

Tumpal Sinurat¹, Sabani²

¹ Universitas Negeri Medan, Medan 20113, Indonesia

Email: Leosinurat1@gmail.com

Abstract

This research aims to develop critical thinking baset test instrument on Sound Material Using E-Learning, test the feasibility of the instrument and determine the level of students' critical thinking. The research was designed with the ADDIE Learning Design Model and was carried out at SMA Negeri 3 Medan with the subject of class XI students in the MIA program. The initial stages of this research are Analysis, the next stage is Design, then Develop stage by conducting product trials in small and large groups, and the last stage is Implement with evaluation at each step, the last stage is the distribution of instruments carried out within the scope of SMA Country 3 Medan. The results showed that the test instrument based on Critical Thinking Skills On Sound Material Using E-Learning the sound wave material developed by the researcher had met the criteria worthy of being used as a sound wave material learning outcome test instrument. The feasibility of this test instrument was based on validity and reliability tests, from validity test, from 20 questions obtained 7 valid questions. For the large group reliability test, the value of 0.72 is included in the feasible category. It can be concluded that the questions developed by researchers can be used as a measuring tool for students' cognitive knowledge and can be well received by students..

Keywords: Critical Thinking Skills, E-Learning.ADDIE

In the PISA 2018 issue, Indonesia was ranked below which was considered very low, in reading ranks, Indonesia was ranked 72 out of 77 countries, Mathematical Ranking was ranked 71 out of 77 and ranked 71 out of 80 in the science section. this is one of the problems that occur in Indonesia that needs to be considered.

Learning becomes a procedure used by educators in building students' thinking abilities and adding understanding in new knowledge such as efforts in mastering a concept in learning. The ability to think is divided into two, namely basic thinking skills and higher level thinking skills, basic level thinking skills only on things that are general in nature, such as memorizing, remembering to repeat the information that has been obtained. Instead the ability to think at a high level from problem solving to making decisions. In making decisions to solve problems correctly students are expected to be able to have critical and creative thinking skills.

Higher Level Thinking Skills as Critical and Creative Thinking John Dewey argued that critical thinking is essentially as an active process, where one thinks things deeply, asking questions, finding relevant information rather than waiting for information passively (Fisher, 2009).

Critical thinking is a process in which all knowledge and skills are mobilized in solving problems that arise, making decisions, analyzing all assumptions that arise and conducting

investigations or research based on data and information that has been obtained to produce the desired information or conclusions.

Critical thinking is no longer new in the world of education. Critical thinking is a procedure of thinking that has reasons and emphasizes in making decisions about what needs to be trusted and carried out in the evaluation. Critical thinking is an indicator of success in learning where critical thinking in learning is a cognitive process so students can identify, analyze and evaluate. Critical thinking can also raise many important questions and problems to formulate and assess information in a relevant and open-minded way. In the process of learning, critical thinking becomes a necessity that needs to be maintained and developed.

METHOD

This research has been conducted at SMA Negeri 3 Medan which is located Jl. Budi Kemasyarakatan No.3, Pulo Brayan Kota, Kec. Medan Barat, North Sumatra. The research was carried out in the even semester of the 2020/2021 school year. The population in this study were all students of class XI MIA Academic Year 2020/2021. The sample in this study consisted of 36 people.

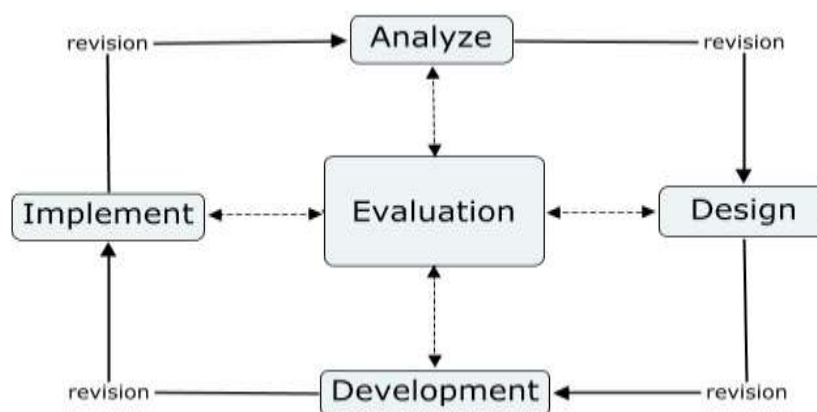


Figure.1 ADDIE Develeopment process

The Development Model used in this research is ADDIE Learning Design Model (*Analysis- Design- Develop - Implement - Evaluate*) which is combined according to the development research steps recommended by *Borg* and *Gall* on the basis that the model is suitable for developing instructional model products / learning is on target, effective and dynamic and is very helpful in the development of learning for teachers.

RESULT AND DISCUSSION

Research Result

This study was conducted to analyze the quality of objective test items for conceptual knowledge on Mechanical Waves at SMA Negeri 3 Medan, based on qualitative analysis covering aspects of the material, construction, and language and based on quantitative analysis covering validity, reliability, level of difficulty and discriminating Power. This research is a research and development based on the ADDIE model (Analysis, Design, Development, Implement, Evaluate)

1. Analysis Stage

Analysis stage is the most important phase in this process. When instructional designers do the analysis phase before creating the plan, developing, or even implementing, they really save huge amount of courses, effort, and time. In order to carry out the analysis phase we have to analyze four things, like we have to analyze the learners (where they are at, their skills and needs, etc.), develop an instructional analysis (to provide the necessary steps and present opportunities to learn and use new information in an instruction), create instructional goals (aimed at specifying the end desired result), and analysis's learning objectives (how to measure the attainment of goals). That means you have to be clear about your goals and where you want your learners to be.

2. Design Stage

Design, Contains activities to make designs for products that have been set. According to analysis that were conducted before researcher conclude that we make a problem design according to Lesson plan

Rubric assessment must meet the following criteria. In the answer question, it is known that a maximum score of 10% will be obtained, if the wrong unit is given a 10% penalty. Small penalties are given to provide relief for students to answer questions. Teachers must avoid the guilt of punishment and generosity. That is, they must not be too strict or too lenient in their standards of judgment. So the scoring for the essay is 10% known Question and 90% answers With a 10% score reduction penalty if there is an error in the use of units. The complete Rubric can be seen in Attachment 18.

3. Development Stage

The selection of 7 questions given to students from 20 questions that have been designed is chosen based on the scope of indicators that have been discussed with expert lecturers. The researcher chose the 7 questions to be used as an instrument to assess the level of students' critical thinking skills. Based on the results of the validation of the expert team of lecturers, it was found

that 7 items developed were declared valid. As for a little input from the expert team of lecturers so that the instruments developed are even better. Based on the results of the validation using the Karl Pearson product moment correlation formula, it was found that the 7 items developed were declared valid with the presentation for small-scale classes, namely: {0.76 ; 0.76 ; 0.70 ; 0.81 ; 0.86 ; 0.70 ; 0.07}. In the aspect of reliability, scores for small-scale classes are in the range: {0.7}, meaning that reliability is in the High category. the level of difficulty, it was found that of the 7 questions that were tested on small-scale classes, they were in the range: {0,3; 0.55 ; 0.3 ; 0.32 ; 0.6 ; 0.375 ; 0.03 } . So it was obtained from small-scale classes that 71% of the questions were in the medium category, 29% of the questions were in the easy category and no questions were in the difficult category. Judging from the Discriminating Power of questions, in the small class group, data were obtained with scores in the range of {0.3; 0.55 ; 0.3 ; 0.32 ; 0.6 ; 0.375 ; 0.06 } . So that the data obtained in the small class 57% have Discriminating Power, 28% have good Discriminating Power and 14% have poor Discriminating Power.

Based on the results of the analysis of the small-scale test conducted on 8 students, the researcher concluded that question number 7 was invalid so it was not suitable for large-scale tests. The researcher decided to change question number 7 so that the indicators and sub-indicators remain valuable

4. Implementaion Stage

The 7 question after declared valid in small scale then implemented to Moodle E-Learning, These questions have an answer with an error of 0.1 so that a value close to the original answer will be considered correct, for example question number 1 which has an answer of 0.994s, but if a student answers 1s then the answer will be considered correct by the system, thus facilitating automatic assessment.

After passing the analysis and development stage, the critical thinking test is given to students and the level of critical thinking ability is assessed, the results can be seen in the following diagram :

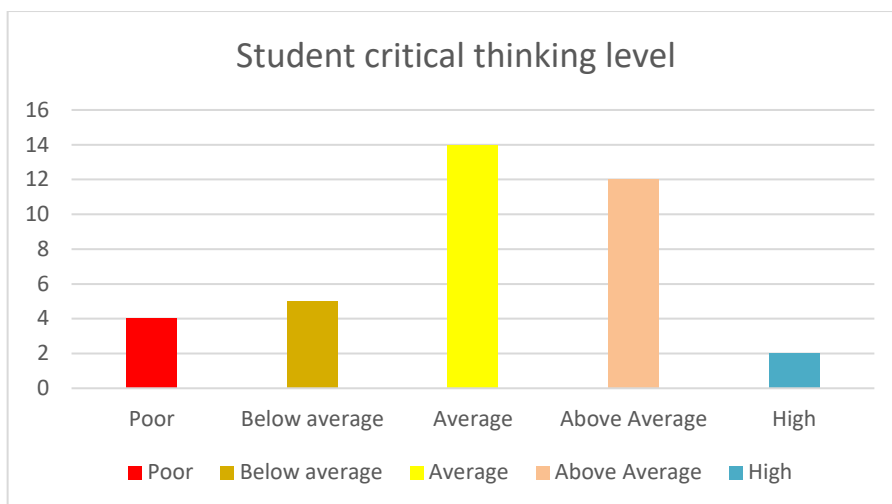


Figure.2 Critical thinking level result

In the diagram above, there are 4 students with very low critical thinking abilities, 5 students with low critical thinking abilities, 14 students with medium critical thinking abilities, 12 students with high critical thinking abilities and 2 very high critical thinking abilities.

Based on the analysis conducted by the researcher on the items in the large-scale test, the questions that were tested were valid. Reliability test results also show high reliability results, The level of difficulty also includes moderate, easy and difficult questions. Different power is also considered good and nothing is low.

Discussion

Comparison with other research

After conducting research there are comparison with other research with similar topic.

The critical thinking ability of the Pilot Project Junior High School students in Yogyakarta City is in the very high, high, medium, low and very low categories, respectively 6.82%, 19.09%, 24.55%, 34.09% and 15.45% . This situation means that the students of the Yogyakarta City Pilot Project Junior High School have critical thinking abilities, mostly in the low and very low categories reaching 49.55%, followed by the high and very high categories 25.91% and the medium category 24.55%. (naomi:2016)

The profile of students' critical thinking skills based on each indicator that with high criteria that is in the aspects of elementary clarification and Basic Support 45 students obtained with a percentage of 54%(Hartanto 2019)

The critical thinking ability of the SMA N 3 Medan City is in the very high, high, medium, low and very low categories, respectively 10.81%, 13.51%, 37.84%, 32.43% and 5.41%

In conducting this research, it is undeniable that there are many obstacles experienced by researchers. Some of the obstacles faced by researchers when conducting this research, such as difficulty in doing questions because they forgot the material. So that researchers must review the material before students work on the problem. In addition, another obstacle faced was the difficulty of conducting the class so that students worked on the questions in a calm state and were able to work on the questions correctly. This is caused by the unfamiliarity of students in dealing with and working on *HOTS* questions. So, students have difficulty in understanding the questions and students are not conducive because they always ask about the questions in the questions. Therefore, researchers must guide and lead students in understanding the sentence questions and interpret each question item in the problem so that they can do it correctly and precisely. As well as obstacles that are also experienced by researchers, namely not all students participate and contribute in answering questions according to their own abilities. It is undeniable and unavoidable that there is cooperation between students in working on the *HOTS* Critical thinking questions given. This causes the level of difficulty and distinguishing power of the test instrument to be affected by the similarity of students in answering questions.

CONCLUSION

The conclusion of this research according to the research result data, Systematic presentation is done according to the research purpose that have been formulated. The conclusion that have been obtained is as follows :

- Test instrument have been made that based on E-learning on sound material, the test in developed using ADDIE method, where the step include Analyze, Design, Develop, Implement and Evaluate
- The test instument that have been developed have fullfiled the requirement of good test intrument include validity and item analysis. Means the test instrument is feasible to test the critical thinking skills on E-learning, and able to train student critical thinking skill.
- Validity were declared valid with presentations for large-scale classes, namely: {0.74; 0.76 ; 0.63 ; 0.72 ; 0.77 ; 0.44 ; 0.22 }. the reliability scores obtained from large-scale classes are in the range of {0.72} with reliability being in the high category.
- Dificulty level obtained in the range of: {0.71; 0.57 ; 0.57 ; 0.44 ; 0.50 ; 0.5 ; 0.3 } obtained 72% of the questions are in the medium category, 14% of the questions are in the difficult category and 14% of the questions are in the easy category. As for the Discriminating power data obtained with scores in the range of {0.39; 0.46 ; 0.35 ; 0.24 ; 0.36 ; 0.15 ; 0.12 }. So that

the data obtained in large classes 72% of questions have Discriminating Power, 14% questions have good Discriminating Power and 14% questions have poor Discriminating Power.

- The process of converting essay questions into question type questions in Moodle consists of several steps, namely:
 - Move all questions to Moodle
 - enter the results and units for each answer
 - Determine the value of each Answer and unit error
- The result of critical thinking test is 9 student with high level thinking skill, 9 with low level thinking skills and 9 with Low level critical thinking skill.

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