Development of the Field Analysis and Laboratory Learning Model to Improve Critical Thinking of Senior High School Students

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Abstract. The learning model must be innovative in the 21st century. One important component in the 21st century is critical thinking skills. The learning model requires innovation, both learning outside the classroom and in the laboratory. The development of field analysis and laboratory learning models provides two feasible learning models for learning in the field and learning in the laboratory. Meaningful Investigation Laboratory (MIL) learning models and Real Quest Outdoor Learning learning models are solutions for learning models based on field analysts and laboratories that can enhance critical thinking skills. The research method uses the Nieveen research design. The results of the validation of the MIL learning model and the validation of the learning instrument are 92.5% and are categorized valid. There is an increase in critical thinking skills after using the MIL learning model. These post-test results are higher than pretest with N-gain value is 0.76 and categorized as high criteria. The response of students who use the MIL learning model is 84.52% positive responses and categorized very well. The result of REQOL learning from obtained in REQOL learning in the form of validity, effectiveness, and student response criteria. ReQOL learning model is declared valid by experts with a validation value of 88.7%, and effective for practicing critical thinking skills with a high effectiveness category of 0.75, student responses to learning are very good with a value of 85%. So that the MIL and ReQOL learning model can be used as an innovative model that can be used by teachers to practice students’ critical thinking skills.

1. Introduction

Learning era of globalization students are required to have a variety of skills to become a successful personal life, so that teachers are expected to prepare the learning so that students can master the various skills according to the demands in the era of the 21st century [1]. US-based Partnership for 21st Century Skills (P21), identifying the skills required in the 21st century is "The 4Cs"-communication, collaboration, critical thinking, and creativity. Learning curriculum in 2013 to encourage optimal physical and mental activity of students, so that learning is active (Active learning) and train students to have the ability to think is needed on learning 21st century, one of which is of critical thinking skills [2].

Critical thinking skills are one of the high order thinking skills that are important possessed by students in the 21st century [3]. The demand for learning innovation in the 21st century is growing as a result of
advances in science and technology. In this century, the change of philosophy of learning from the paradigm of transition to student-centered class activities [4-5]. Physics learning tends to be done in classroom rather than outside the classroom. Students will feel bored when monotonous learning is done in class. Physics learning can be done based laboratory so that it is not only monotonous in the classroom. Learning integrated with a laboratory increase student collaboration [6]. This condition will trigger the students to study, work and take responsibility seriously to achieve the goals [2]. So the integrated learning with a laboratory can increase collaboration and effective for scientific experiment. Therefore, it is necessary to renew the learning model in the laboratory.

Based on previous research entitled Analysis of 21st Century Skills of Pre-service Physics Teachers and Middle School Physics Teachers in Position in East Java obtained results that tend not to provide detailed results on 21st Century skills. In line with the direction of KeRis 21st Century Science Teaching Model (21st Century STM) about the development of learning models, in order to get a clear picture of 21st Century skills in detail, especially students' critical thinking skills, the researcher will develop a model that is able to improve critical thinking skills.

The most important 21st century learning skills for students is critical thinking skills [7]. Critical thinking is a way of assessing statements' and reasonable reflective thinking focused on deciding what to believe or do [8]. According to Muftahroyin [9], critical thinking is a process that involves mental operations such as induction deduction, classification, evaluation, and reasoning. So critical thinking is a mental process for analyzing or evaluating information. Critical thinking skills in Java in three years still relatively low, showed that of several studies: 1) Research at two high schools in Malang with 115 respondents were chosen randomly, obtained 86.6% of students enter the category of critical thinking ability is low [10]. 2) Research on the two high schools in Bandung obtained 72% in the poor category and only 28% of the total students in both categories [11], 3) Research analysis of critical thinking skills physics performed in 11 high school all Yogyakarta Special region 2 school obtained in the low category, 7 low category schools, and 2 high school category [12], 4) Research at two high schools in Magetan showed students' critical thinking skills by 52.28% with less category and 63.94% category enough [13]. From several studies in the last 3 years, high school students' critical thinking skills in Java is still relatively low. One of the main factors that lead to a lack of critical thinking skills students are learning model used by teachers in classroom teaching [14], so it needs to be a design study model capable to train critical thinking skills to learners.

The learning model leads to a specific learning approach, including its objectives, steps (syntax), environment and management system [15]. The learning model has elements of syntax, social systems, reaction principles, support systems, instructional impacts and indirectly impacts [16]. The learning model is used by teachers during the learning process to create a pleasant learning atmosphere and motivate the students [15,17]. So, the learning model is a systematic framework to achieve the learning objectives and motivate the students in learning.

Physics learning really needs something interesting that attracts students to the material learning before entering into the main substance. This is important because the character of physics material is difficult to learn, so that the initial precondition is needed to minimize student bored. Students’ interest can be built by giving phenomenon related to daily facts around students. The facts presentation related to daily phenomenon will be meaningful to students [18]. Physics learning should involve the experimental activities to synchronize and prove the concepts. The nature of physics learning in the form of processes and products can be developed by studying natural phenomenon [19]. Studying natural phenomenon in learning physics can be developed with experimental activities. One important substance in learning is the emergence of the substance of student retention. Retention is the ability to memorize the knowledge which is one of the important aspects in learning and can be improved by doing exercises [20].
Problems in learning Physics in schools requires learning activities that involve high-level thinking, especially critical thinking in solving it. Thus, they need situations that can solve problems by creating a supportive environment to solve critical physics problems. This situation can be overcome by implementing field and laboratory activities in learning, because field and laboratory activities can facilitate learning that triggers critical thinking. According to Bandura in sociocognitive theory that a person can easily learn through observation and imitate other people's behavior or modeling. Based on these theories so that critical thinking skills can be mastered by students, it is necessary to do with a suitable learning model as a concrete example.

Many learning models that are considered suitable for growing students' critical thinking skills include the Problem Based Learning (PBL) model [15]. PBL (Problem Based Learning) is intended to develop high-level thinking skills which in this case are critical thinking skills. The form of problem-based learning is able to encourage collaboration in completing tasks, encourage observation and dialogue with others so that students can gradually have the observed role, and involve students in their own choice of inquiry, which enables them to interpret and explain real-world phenomena and build about that phenomenon. Problem-Based Learning triggers students to solve complex and unclear problems [21], students work collaboratively to share information, evaluate and give each other criticism when solving problems. However, the collaborative work that is developed does not require that the results of the collaborative work are the product of critical thinking [22]. The PBL model refers to student activities that lead students to think critically but the model has not shown explicitly how students play a role in the exploration of critical thinking. These models have been carried out to obtain critical thinking results, but in its implementation there are still some weaknesses. The model in general still implements some of the indicators of critical thinking so that it cannot yet be used to practice critical thinking skills to the full. Referring to these learning models and their weaknesses, it is necessary to develop a learning model that is able to optimally increase students' critical thinking skills [3,23].

The Field Analysis and Laboratory learning model is able to develop students' critical thinking skills because the model provides the widest possible space in initiatives and actions by creating an adequate learning environment for students. Based on the analysis of the objectives of the learning model, and from previous studies there are no steps that specifically arouse critical thinking skills with students' Field Analysis and Laboratory activities that are in accordance with the objectives of the model.

Based on the description above, the students' critical thinking skills in learning will be carried out in the field (outside the classroom) and in the laboratory by observing aspects of critical thinking which are the realization of constructivist teaching views by creating a model. The efforts made are developing a learning model of Field and Laboratory Analysis by referring to the two previous models and the opinions of experts resulting from the development of learning models outside the classroom and learning in the laboratory which are applied to improve critical thinking skills in Physics learning.

The formulation of the problem in this study are 1) How is the validity of the learning model developed that can improve the critical thinking skills of high school students? 2) How is the practicality of the developed learning model that can improve the critical thinking skills of high school students? 3) How is the effectiveness of the learning model developed that can improve the critical thinking skills of high school students? 4) How to improve students' critical thinking skills through the application of Field Analysis and Laboratory learning models developed?

2. Method
This type of research is development research (Research Design) oriented to product development [24-25] states that Research Design is a research method used to produce certain products and gather the effectiveness of the products produced. The product produced is a prototype model of learning to improve students' critical thinking skills. Development research conducted aims to develop a Field Analysis and
Laboratory learning model as a valid, practical, and effective product [26]. Development of analytical learning models results in Meaningful Investigation Laboratory (MIL) learning models and the development of field analysis learning models result in learning models of Real Quest Outdoor Learning (ReQOL). The development of this Learning Model aims to develop the MIL (Meaningful Investigation Laboratory) and ReQOL (Real Quest Outdoor Learning) learning models for physics learning in high schools that are in accordance with the suggestions of development products that are valid, practical, and effective.

The research is carried out by adapting the stages of model development according to Plomp and Reeves as shown in Figure 2 Model development steps according to Reeves Model [27], namely: 1) Identify and analyze problems by researchers & practitioners in collaboration, 2) Development of prototype solutions: informed by state-of-the-art theory, existing design principals & technology innovation, 3) Iterative cycles of testing & refinement of solutions in practice, 4) Reflection to produce 'design principles' & enhance implementation solutions in practice, the stages of which are shown in Figure 1 below:

![Figure 1. Design Research Model Reeves [27]](image)

Step 1: Identify and analyze problems by researchers & practitioners in collaboration
In this step, researchers identify problems related to learning theory, critical thinking, and problem solving. Problem identification is based on literature or theory, and site visits. In this step, the researcher conducts a literature and theory study by studying the study to be studied.

Step 2: Development of prototype solutions: informed by state-of-the-art theory, existing design principals & technology innovation. In step 2, the research development undertaken is "Development of a sequence of prototypes that will be tried out and revised on the basis of formative evaluations. Early prototypes can be just paper-based for which the formative evaluation takes place via expert judgments [28], which is the development of a number of prototype learning model components and learning device components are trialled and revised based on formative evaluation results.

Step 3: Iterative cycles of testing & refinement of solutions in practice In step 3, the model implementation will be carried out with a limited trial in one class to obtain a prototype of a revised learning model (Prototype 1I) with the following characteristics: a) the validity of the model and the validity of the supporting devices of the model; b) practicality of the model which includes the implementation of learning models in the classroom, and the obstacles faced; c) the effectiveness of the model which includes critical thinking skills and student activities and student responses to the implementation of learning models [28]. The trial design is used to test the prototype that has been developed.
Step 4: Reflection to produce 'design principles' & enhance solution implementation in practice

In step 4, reflection to produce design principles and improve implementation of practical solutions. The researcher writes the entire study to support the analysis, then specifies the design principles and articulates the relationship with the established frame of mind. Prototype II, a model that has been revised and validated by experts will then be implemented in a broad test in schools in different classes using one group pretest-posttest design.

Research respondents were students in high school. The top 6 districts around Jember, namely Lumajang, Bondowoso, Situbondo, Jember, Banyuwangi and Probolinggo. Data collection techniques are used to obtain materials that are relevant, accurate, and can be used appropriately - in accordance with research objectives. Data collection techniques used in this study are: (1) documentation, (2) observations, (3) tests, (4) questionnaires, and (5) interviews. Validity data was obtained from FGD activities, practicality data was obtained from the implementation of learning and effectiveness data was obtained from the results of tests conducted on student. The data analysis technique used is qualitative quantitative descriptive analysis. Quantitative descriptive analysis is used to manage the results of the preliminary trial model development that will be done. While qualitative descriptive analysis is used to define quantitative data and categorize into certain classifications.

Before testing the learning model and learning instruments must be validated lecturers from Jember University. Aspects raised in the validation instrument include supporting theory, model structure and desired learning outcomes. Expert validation with expert validation indicators is then presented with the formula:

\[
\text{Percentage value} = \frac{\sum n}{\sum N} \times 100\%
\]

Explanation:
\(n\) : number of values obtained
\(N\) : maximum number of values

After getting the percentage value then the validity level is categorized according to Table 1

| Percentage   | Validity Category | Explanation                     |
|--------------|-------------------|---------------------------------|
| 80% - 100%   | Very Valid        | Very good to use                |
| 61% - 80%    | Valid             | May be used with minor revisions|
| 41% - 60%    | Valid enough      | Good to use                     |
| 21% - 41%    | Deficient Valid   | May be used with major revisions|
| 0 – 20%      | Invalid           | Cannot be used                  |

After the learning model and learning materials included the valid category, a limited trial can be carried out on the developed model. The analysis of critical thinking used refers to the analysis of the level of critical thinking. The critical thinking indicator used refers to the critical thinking indicator developed by Ennis. The critical thinking indicator aspects developed by Ennis (2011) include: 1) Elementary clarification; 2) The basic for decision; 3) Inference; 4) Advanced clarification; 5) Strategies and tactics. The results of students' critical thinking skills aim to determine the effectiveness of the MIL learning model that has been given. The average pretest and post test results aim to find the formulated N-gain value:

\[
g = \frac{s_f-s_i}{s_{max}-s_i}
\]
Explanation:
\( g \) = gain
\( S_f \) = Post-test average value
\( S_i \) = Pre-test average value
\( S_{\text{max}} \) = The highest score obtained by students

According to Hake (1998), are divided into three categories which are explained in Table 2.

| Coefficient | Criteria          |
|-------------|-------------------|
| 0,70 ≤ normalized gain | High |
| 0,30 ≤ normalized gain < 0,70 | Medium |
| normalized gain < 0,3 | Low |

In addition to student responses needed to know the practicality of the learning model. Students responses in the learning model can be formulated as follows:

\[
\% R_s = \frac{A}{N} \times 100\%
\]

Explanation:
\( R_s \) : Percentage of students responses
\( A \) : Proportion of students who choose yes or no
\( N \) : Number of students who filled out the questionnaire

Furthermore, percentage of students responses categorized by the criteria in Table 3.

| Percentage of Student Responses | Student Response Criteria |
|---------------------------------|---------------------------|
| 0 – 20                          | Not good                  |
| 21 – 40                         | Less good                 |
| 41 – 60                         | Enough                    |
| 61 – 80                         | Well                      |
| 81 – 100                        | Very good                 |

3. Results and Discussions

3.1 Development of Field Analysis and Laboratory Learning Models

This research is a research development that produces a product in the form of a new learning model, namely the MIL learning model and the REQOL learning Model with reference to the research model development of Nieveen et al. [28]. The stages of learning activities in the MIL learning model are a combination of the strengths and weaknesses of the Problem Based Learning (PBL) learning model and the Student Team Achievement Division (STAD) learning model. MIL learning model is illustrated in Figure 2.
Figure 2. Concept map of MIL learning model

Table 4. Syntax of the MIL model [24]

| MIL learning model phase | MIL learning model activities |
|--------------------------|------------------------------|
| **Precondition**         | Students are given problems regarding physical contextual phenomena so that goals are clear and meaningful; Students are given questions related to problems that have been seen together. Students are guided to hypothesize related questions related to contextual phenomena around students given by the teacher. Students do the simple experiments as related material to increase interest in the material. |
| **Investigation**        | Students collaborate and conduct experiments to answer hypotheses that have been made; Students experiment according to the student worksheet and collect data collaboratively; After taking data, students analyze the data obtained which will later be reported in the group reports |
| **Report**               | Students make group reports. Each group comes to the front of the class to present the results of investigation; Other groups who do not come to the front of the class can respond or ask the group that present in front of the class. Students get reinforcement from the teacher on the results of class discussions that have been presented by each group. If there are still incorrect answers the teacher can correct the hypothesis answer. |
| **Reinforcement**        | Students get reinforcement from critical quiz. Questions directly discussed at that time. |
| **Reflection**           | Students get a reflection of learning that they have done. Students and teachers make conclusions at the end of learning. |
REQOL (Real Quest Outdoor Learning) Model
The learning model ReQOL (Real Quest Outdoor Learning) is a blend of learning model Problem Based Learning (PBL) and Learning Model of Mind Mapping, presented by Outdoor Learning approach, and there are indicators of skills to collaborate in it. Outdoor Learning approach provides a real learning experience in accordance with the environment around the student, and the students can easily collaborate to solve the problems around it. Syntax learning model ReQOL (Real Quest Outdoor Learning) as presented in Figure 3 and Table 5 below.

![Figure 3. Stage of Syntax of ReQOL Learning Model](image)

| Syntax       | Student activity                                      | Teacher activity                                      |
|--------------|------------------------------------------------------|------------------------------------------------------|
| Phase 1     | Given the previous material                         | Reviewing previous material relating to the material to be studied |
| orienting    | Understanding the problems kontestual given by the teacher | Presents a problem kontestual                        |
| (Introduction of contextual issues on the students) | Creating a temporary answer of prior knowledge       | Motivate students                                     |
| Phase 2     | Preparing search activity (investigation techniques)  | Accompanying the students both individually and collectively in the process of preparing and prospecting activities in the wild |
| questing    | Conducting searches in the outdoors (troubleshooting) |                                                     |
| (Search for answers in the Outdoor on a given issue) | Contribute in preparing and conducting the search (contribution) |                                                     |
|             | Cooperating with group members in the search for a solution in the wild (in collaboration) |                                                     |
|             | Managing time in search activity (time management)   |                                                     |
| Phase 3     | Analyze your data with the findings of the group members | Accompanying the students individually or in groups to analyze and create a concept map search results |
| mapping     | Together with members of the group make a concept map results |                                                     |
| (Attach results in the form of a concept map)      |                                                     |                                                     |
| Phase 4     | Delivering results in the other group members        | Penyampain guide this discussion results              |
| Sharing     |                                                     |                                                     |

Table 5. Syntax of ReQOL Learning Model [24]
Syntax | Student activity | Teacher activity
---|---|---
(Communicating results) | Discussion actively during the process of delivering the results of discussions | Provide feedback to students

Phase 5 Evaluating (Evaluating learning activities) | Listening to the feedback submitted by teachers | Encourage students to make inferences
Together teachers make learning conclusion | Assign the task of test item evaluation | The task in the form of test item evaluation

3.2 Validation MIL and REQOL Learning Model
Validation of the Meaningful Investigation Laboratory (MIL) learning model is validated to reduce errors in the data collection process. The validation results of MIL learning model and learning instruments are presented in Table 6.

Table 6. Validation Results of MIL Learning Model and Learning Instruments

| No | Validation | Validation Results |
|---|---|---|
| 1. | MIL learning model | 91.67% Very Valid |
| 2. | Learning instruments | 93.33% Very Valid |
| Average of validation | 92.50% Very Valid |

The results of the validation of the MIL learning model by the lecturers showed a validation the average percentage is 91.67%, based on the validation criteria is valid. And the results of the validation of the instruments learning model by the lecturers showed a validation the average percentage is 93.33%, based on the validation criteria is valid. Average of validation is 92.5%, based on the validation criteria is valid. Based on the results of the validation of the MIL learning model and instruments learning instruments categorized as valid and can be used in physics learning in senior high school. ReQOL Learning Model validation was conducted to see the validity of the learning model ReQOL before tested field, validation is performed by an expert on ReQOL learning model along with the device. The results of the model validation and learning devices are presented in Table 7.

Table 7. Results of Model Validation and Learning Tools

| No. | Validation sheet | Results Validation Expert |
|---|---|---|
| 1. | Validation of Model | 91.6% Very Valid |
| 2. | Validation of learning Tool | 88.8% Very Valid |
| Total | | 90.2% Very Valid |

From Table 7 above the mean values obtained for model validation percentage of 91.6% belong to the very valid criteria. Validation of the device obtained an average value of percentage of 88.8% belong to the very valid criteria. Validation total percentage obtained a mean value of 90.2% belong to the very valid criteria. Based on the results of expert validation has been done on ReQOL learning models and learning models ReQOL device can proceed to the stage of field trials.
3.3 Critical Thinking Skills in MIL and ReQOL Learning Model

The ability critical thinking skills has increased using the MIL learning model on fluid physic material. The N-gain value of students’ critical thinking skills using the MIL learning model is shown in Table 8. While the graph of students’ critical thinking skills using the MIL learning model is shown in Figure 4.

Table 8. N-Gain Values of Students’ Critical Thinking Skills using MIL Learning Models

| Indicators of Critical Thinking | Average Pretest | Average Posttest | N-Gain | Criteria |
|--------------------------------|-----------------|------------------|--------|----------|
| Elementary clarification       | 62.5            | 84.8             | 0.76   | high     |
| The basic for decision         | 64.4            | 82.6             | 0.77   | high     |
| Inference                      | 60.8            | 80.5             | 0.78   | high     |
| Advance clarification          | 62.8            | 84.2             | 0.79   | high     |
| Strategies and tactics         | 65.8            | 80.2             | 0.71   | high     |
| Average                        | 63.22           | 82.46            | 0.76   | high     |

Figure 4. Graphic Critical Thinking Skills of Students Using the MIL Learning Model

Based on the N-gain of students' critical thinking skills using the MIL learning model on the elementary clarification indicator is 0.76, basic for decision indicator is 0.77, inference indicator is 0.78, advanced clarification indicator is 0.79, and strategies and tactics indicator is 0.76. The mean N-gain of all indicators of students' critical thinking skills using MIL learning models is 0.76. Criteria for N-gain critical thinking ability of students using MIL learning models on elementary clarification indicator is categorized as high, basic for decision indicator is categorized as high, inference indicator is categorized as high, advanced clarification indicator is categorized as high, and strategies and tactics indicator is categorized as high. The mean N-gain of all indicators of students' critical thinking skills using MIL learning model is categorized high.

After using the MIL learning model there was an increase due to innovation from monotonous learning in the classroom to the laboratory based renewable learning. It also supported by the characteristics of learning physics that must be integrated with the laboratory. Laboratory based learning
can increase student collaboration so that there is a high interest in participating in learning activities. In MIL learning model is more meaningful because it links new information to relevant concepts contained in students cognitive structure. This concept explains that each student has a cognitive structure that determines the ability of students to handle various ideas and various knowledge. According to Ausubel [32] meaningful learning is marked by the occurrence of relationships between aspects, concepts, information or new situations with relevant components in the cognitive structure of students. The learning activities with the MIL learning model become meaningful because the teacher explores the concepts students have and helps them harmoniously integrate these concepts with new knowledge.

Critical thinking skills of students be obtained through tests about critical thinking skills before and after the learning model pemberlajaran ReQOL on the material grade 10 high school straight motion. Small-scale trials conducted to determine the effectiveness of the learning model ReQOL to improve high school students’ critical thinking skills, from experiments conducted criteria values obtained N-Gain increase is as shown in Table 9 below.

![Table 9. Values of N-Gain Critical Thinking Skills](image)

| Inikator Critical Thinking | Pretest | Post Test | N Gain | Criteria |
|---------------------------|---------|-----------|--------|----------|
| Elementary clarification  | 30.7    | 76.5      | 0.77   | High     |
| The basic for decision    | 35.5    | 78.8      | 0.74   | High     |
| inference                 | 48.3    | 79.4      | 0.69   | Medium   |
| Advance clarification     | 38.5    | 78.8      | 0.78   | High     |
| Strategies and tactics    | 43.8    | 83.2      | 0.77   | High     |
| **Total N-Gain**          | **39.4**| **79.3**  | **0.75**| High     |

![Figure 5. Pre-test and Post-test Critical Thinking Skills](image)

Based on data obtained critical thinking skills Elementary clarification indicator get N-Gain values 0.77 categorized high criteria. The basic for decision indicators get N-Gain values 0.74 N categorized high criteria. Inference indicator get N-Gain values 0.69 were classified criteria. Indicators Advance clarification obtained N-Gain value of 0.78 relatively high criteria. Strategies and tactics Indicators N-
Gain value obtained relatively high criteria 0.77. The total value of the N-Gain critical thinking skills acquired by students in the amount of 0.75 relatively high criterion, so that the model can be said to be effective ReQOL to improve high school students' critical thinking skills.

An increase in critical thinking skills after learning because students' critical thinking skills (Critical Thinking Skill) covers every step in the learning model ReQOL. Phase 1 orienting, can train critical thinking indicators Elementary Clarification, namely by focusing on the problems of the students, guiding students to ask and answer questions. Phase 2 Questing, can train critical thinking indicators The Basic for Decision, namely to train students to observe the answer by conducting an investigation. Phase 3 Mapping, can train critical thinking indicators Inference, which trains students summed up the results of observation. Stage 4 Sharing, can train critical thinking indicators Advance Clarification, namely jasmine students provide further explanation in the activities of the class discussion. Stage 5 Evaluating,

3.4 Student Responses to the MIL and REQOL Learning Model
Students responses use MIL learning model on static fluid material are shown in Table 10.

Table 10. Students Responses Use MIL Learning Model

| No | Question                                                                 | Percentage positive responses |
|----|--------------------------------------------------------------------------|-------------------------------|
| 1  | At the beginning of the learning activity, the teacher's explanation attracts attention. | 83.87%                        |
| 2  | Motivation creates enthusiasm for learning.                               | 87.10%                        |
| 3  | The learning process is very interesting.                                 | 87.10%                        |
| 4  | I was motivated by the questions in the beginning of learning            | 80.65%                        |
| 5  | I can better understand the material presented with the experiment       | 83.87%                        |
| 6  | Teachers always provide assistance to students if they have difficulty in learning. | 90.32%                        |
| 7  | Give time for discussions, presentations and other learning activities is in accordance with needs. | 80.65%                        |
| 8  | The teacher gives the opportunity to ask all students about material that they do not understand. | 80.65%                        |
| 9  | The teacher guides students to make conclusions on learning material.     | 83.87%                        |
| 10 | I understand the physics and was motivated by the practice questions.     | 87.10%                        |
|    | **Average Percentage**                                                   | **84.52%**                   |

Based on the results of student responses use MIL learning model on fluid learning materials get a positive responses with the 84.52% and categorized very good. In learning activities students are very enthusiastic, while use the MIL learning model. Interaction between students and students as well as students and teachers occurs in learning activities use MIL learning model. Because of this interaction can increase the understanding of learning material provided. The response is a response to students' learning by ReQOL models. Student response data obtained through a questionnaire given to students after learning ReQOL models. So we get the response data as shown in Table 11.

Table 11. Response Student Learning Rodel ReQOL

| No. | Question                                                                 | Answering Yes |
|-----|--------------------------------------------------------------------------|---------------|
| 1   | At the beginning of the learning activities, teacher's explanation to my attention. | 72.7%         |
| 2   | Motivation delivered stirs my spirit to learn.                           | 72.7%         |
| 3   | Just learning process was very interesting.                              | 90.9%         |
4. Conclusion

The MIL learning model was developed from demand for learning innovation in the 21st century. MIL learning model has syntax that is precondition, investigation, report, reinforcement, and reflection. The MIL learning model has a social system, the principle of reaction, a support system, instructional impact, and indirect impact. The results validation of MIL learning models and validation learning instruments is 92.5% and categorized as valid. There is an increase in students' critical thinking skills after using the MIL learning model is increase with an N-gain value is 0.76 and categorized as high criteria. The critical thinking skills in the MIL learning model developed from every syntax. Critical thinking skills can be developed from: 1) Critical questions in precondition syntax, 2) Scientific experiment with critical thinking student workshhet in investigation syntax, 3) Reporting the results of investigations in critical class discussions in report syntax, 4) Reinforcement quiz are critical questions and analytical problems in the reinforcement syntax, and 5) Critical reflection from teachers to students and make conclusions together in reflection syntax. Students responses use MIL learning model is 84.52% and categorized very good.

ReQOL learning model has a syntax that is Orienting, Questing, Mapping, Sharing and Evaluating. The learning model ReQOLmemiliki social system, the principle of reaction, support systems, instructional impact, and the impact of accompaniment. Critical thinking skills in the learning model ReQOL accompany any learning syntax. From the results of expert validation study model ReQOL acquire 90.2% of expert validation value with very valid criteria and can be used in learning activities. The results of field trials to measure the effectiveness of the learning model ReQOL in improving critical thinking skills with a 0.75 and categorized into high N-Gain criteria, ReQOL learning model can be said effective to improve high school students' critical thinking skills. Students' response to learning using learning model ReQOL by 77.25% and categorized into good response category. So that ReQOL learning model can be used by teachers as one of the models that is fun for the students and also able to train the students' critical thinking skills in learning activities.
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