The Influence of outdoor learning models on critical thinking ability

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Abstract. This study aims to: (1) Knowing model of outdoor learning subject specific pedagogy that is feasible to use (2) Knowing the effect of outdoor learning model on critical thinking ability of Students. This study used quasi-experimental. Subjects in this study were X MIA 4 and X MIA 5 Sleman 1 State Senior High School registered as students in the 2017/2018 school year. Sampling in this study used purposive sampling technique based on certain criteria. Class X MIA 5 was an experimental class using experiment-based outdoor learning models while class X MIA 4 was a control class taught using conventional models. Data collection techniques used questions related to critical thinking skills. The instrument used was test of critical thinking skill which 5 indicators and 8 sub indicator. Learning tools developed were lesson plans, student worksheet, and critical thinking assessment instruments. Before being applied, learning tools were validated by experts to measure their feasibility. Measurement of whether or not there is influence of the model application on critical thinking skills is used t-test. The results of this study (1) the quality of learning devices of outdoor learning model according to expert material assessment were very good categories, (2) outdoor learning models effectively applied to upgrade critical thinking ability.

1. Introduction
The theme of the 2013 curriculum development is a curriculum that can produce Indonesian people who are productive, creative, innovative, effective through strengthening integrated attitudes, skills and knowledge. In connection with this, the 2013 curriculum applies a scientific approach in the learning process [1]. Learning with the scientific approach is designed so that students actively construct concepts, laws or principles through observing stages (to identify or find problems), formulate problems, propose or formulate hypotheses, collect data with various techniques, analyze data, draw conclusions and communicate concepts, laws or principles that are "discovered" [2]. Learning objectives with a scientific approach are based on the advantages of a scientific approach. Some learning objectives with a scientific approach include to shape students' ability to solve a problem systematically. In line with the objectives of the 2013 curriculum, according to BNSP in 2010 the educational paradigm in the 21st century contained several competencies and / or expertise that must be possessed by HR in the 21st century including critical thinking skills and Critical Thinking and Problem Solving Skills. This is in accordance with Minister of Education Regulation No. 20 of 2016 concerning Competency Standards for Primary and Secondary Education Graduates use it in learning technical, detailed, specific, complex, contextual and conditional knowledge regarding science, technology, art, and culture related to the surrounding community and natural environment, nation, country, region regional, and international. Also aligned with the objectives of physics subjects that Physics subjects are intended as a vehicle to
foster thinking skills that are useful for solving problems in everyday life [3]. Demands to produce human resources that are in line with ideal educational goals are not easy. In physics learning activities in class, many problems are encountered. Some of the problems that arise are the use of learning that is still conventional and not contextual [4]. In a study found as many as 88% of students revealed the lecture method is often used in the process of learning physics [5]. According to the theory, learning that is still teacher-oriented as the center, this will make students become passive and lacking in problem-solving abilities.

Several studies reveal that on average students experience difficulties in solving problems in modern physics lectures that require students to think critically and systematically [3]. Students stated that 32% of the suit was to solve problems in the problem, 26% had difficulty in understanding concepts and equations, 18% had difficulty applying the equation to the problem, 17% had difficulty in analyzing images and graphics, and 7% had difficulty in inferring the material being studied [5].

From the explanation above, a strategy is needed in learning physics. Selection of learning models and methods is needed in order to improve the ability of students. For this reason, this paper will discuss the influence of learning models on students' abilities, especially critical thinking skills.

Outdoor learning refers more to experience and environmental education that greatly influences the intelligence of students and can foster curiosity, care for the environment, and build bridges between theory and reality in solving problems [6-7].

Learning that is done outside the classroom can help overcome boredom or boredom of students. When students feel bored or bored with learning, it will be difficult for students to capture the teacher's explanation and understand the material presented. However, learning outside the classroom must be controlled and controlled so that learning objectives are still achieved and pleasant learning is also created.

The effectiveness of Cooley is based on: "The studies included in this review may be effective in developing individuals' groupwork skills, improving existing student groups in terms of how effectively they work together, improving student attitudes towards group work, and providing a more integrated environment within higher education "[8]. This expression shows that the application of outdoor learning in learning can improve students' ability to work with groups. Students are familiarized in group work so that students are accustomed to working with others in an environment.

Being in a different learning environment provides new insights and experiences [9]. Observations can be done together or individually, when done together there will be interactions between group members to solve a problem. In addition to the learning experience, students also learn to work together and help each other positively in groups [9-10].

Learning with Outdoor learning is very effective for character development, student insight, and increasing knowledge, because learners are invited to be closer to the real learning resources, namely nature and the surrounding environment [11]. The concept of learning from nature is observing phenomena in real terms from the environment and utilizing what is available in nature as a learning resource so that it will increase students' learning experience [12-14].

Each learning model has its own characteristics seen from the learning syntax, also seen from other elements, namely the social system, the principle of reaction, the support system, the environmental system, the instructional impact, and the effects of accompaniment. From the explanation above, the syntax of the outdoor learning model through experiment can be seen in Table 1 presents the Syntax of Outdoor Learning Model through Experiment.

| No | The Stage of Outdoor learning | Description of the stage of outdoor learning |
|----|--------------------------------|---------------------------------------------|
| 1  | Briefing Phase                | The teacher presents the questions, perceptions, and material to be studied |
| 2  | Guiding students out of class | The teacher guides students out of the classroom and directs the experiment |
Learning activities in teams

3. Students conduct experiments in groups according to the student worksheet guidelines.

4. Students present the results of the experiment.

5. The Teacher's Appreciation presents rewards for the groups who presented well. The teacher then provides an explanation and affirmation of the learning material.

The ability to think critically becomes one of the main topics in research in the field of physics education in the 21st century. The role of critical thinking in the learning process is in order to develop and improve the quality of education at all levels and all students [15]. Critical thinking can also be interpreted as not expecting someone to be deceived. So according to Emir explained that critical thinking is not only thinking, but also thinking about things that are effective for self-development [16]. Critical thinking skills according to Nitko & Brookhart were identified into five categories, namely: a) basic clarification, b) basic support, c) concluded, d) advanced clarification, e) strategy and tactics [17].

In the 21st century the ability or ability that must be possessed by students in facing the challenges of the times is critical thinking [18]. Critical thinking generally involves analyzing problem identifications and assumptions. The practice of critical thinking requires analysis of how arguments and thoughts are constructed to produce formulas or conclusions [19]. The ability to think critically guides their behavior and develops their beliefs. The third psychological aspect of critical thinking is related to metacognition, which refers to knowledge, awareness, and control of one's thoughts [20]. Critical thinking skill is one of the internal factors that affect learning outcomes [21]. Critical thinking capability can be studied and developed [22].

In this development study, the critical thinking indicators examined are in Table 2 Indicators of Critical Thinking Ability.

| No | Category | Indicator | Sub Indicator |
|----|----------|-----------|---------------|
| 1  | Doing clarification | Focus on the question | Focus on the problem and the context |
|    |          | Analyze arguments | Identify the reasons contained in the argument |
| 2  | Assess basic support | Assess source credibility | Consider evidence seeking procedures |
| 3  | Making Conclusions | Making deductive conclusions | Using logical conditions |
|    |          | Making deductive conclusions | Using patterns in tables or graphs to make conclusions |
| 4  | Conduct advanced clarification | Assess definitions | Know the content validity of a definition |
|    |          | Identifying assumptions | Identifying assumptions needed by a particular condition |
| 5  | Implementing strategies and tactics in solving problems | Taking action decisions | Formulating alternative solutions |

2. Methods
Subjects in this study were X MIA 4 and X MIA 5 Sleman 1 State Senior High School registered as students in the 2017/2018 school year. X MIA 5 is 28 students while XI MIA 4 is 28 students. Sampling in this study uses purposive sampling technique based on certain criteria. Class X MIA 5 is an experimental class using experiment-based outdoor learning models while class X MIA 4 is a control class taught using conventional models. Data collection techniques use questions related to critical thinking skills. Learning tools developed are lesson plans, student worksheet, and critical thinking
assessment instruments. Before being applied, learning tools are validated by experts to measure their feasibility. Syllabus and lesson plans are declared valid and worth using with revisions according to the validator’s suggestion. Some suggestions for improvement of the syllabus are related to the operational verbs used in indicators of student achievement. Capability achievements in the indicators must be the same or even above basic competencies. Input related to material and concept map of the relationship between collisions, the law of conservation of momentum, and the law of conservation of energy. Determination of assessment criteria for learning media that have been developed, is based on criteria.

### Table 3. Range Percentage and Criteria

| No  | Interval          | Criteria       |
|-----|-------------------|----------------|
| 1.  | 80% < skor ≤ 100% | Very good      |
| 2.  | 60% < skor ≤ 80%  | Good           |
| 3.  | 40% < skor ≤ 60%  | Pretty good    |
| 4.  | 20% < skor ≤ 40%  | Not good       |
| 5.  | 0% < skor ≤ 20%   | Very not good  |

Measurement of whether or not there is influence of the model application on critical thinking skills using statistical tests t. This effectiveness analysis uses independent sample T test technique using SPSS 21.

The hypothesis proposed are: (1) Ho: there is no difference between the average ability to critique the implementation class and the control class, (2) Ha: there is a difference between the average ability to critique the implementation class and the control class. The basis for decision making is: if the significance value > 0.05, then Ho is accepted and Ha is rejected. Whereas if the significance value is < 0.05, then Ho is rejected and Ha is accepted.

### 3. Results and Discussion

Material analysis by experts produces concept analysis. Concept analysis is the basis for developing lesson plans, student worksheet and assessment instruments.

The material has been analysed and validated through forum group discussion (FGD), which is used as the basis for making learning tools. The following are the results of the validation of the learning tool in the form of lesson plans, student worksheet, and an instrument for assessing critical thinking skills.

Lesson plans validation score is 71 out of a maximum score of 80. If converted to a scale of 100 percent, it produces a value of 88.75%. The results are very good criteria. Some revisions that must be made are the writing of learning objectives that do not meet the standards namely there are elements of A, B, C, and D. motivation and apperception need to be revised. besides, the syntax of outdoor learning and the stages of the scientific approach used in innovation must be seen in the learning stages in the lesson plan.

Student worksheet is declared valid and feasible to use with revisions according to the validator's suggestion. The lesson plans validation score is 59 of the maximum score of 64. If converted on a 100 percent scale it produces a value of 92.18%. The results are very good criteria. The suggestion of the student worksheet revision from the validator is that the adjustment of the syntax of the model and the stages of the scientific approach must appear on the student worksheet. Besides that, input related to packaging that is too monotonous or boring.

The results of validation of critical thinking assessment instruments are feasible to use with revisions. The validation score of the instrument for all items is above 80%. It can be concluded that the questions have very good criteria. The revision of the critical thinking assessment instrument is a minor revision in the question script section.

In the results above the results of the effectiveness of the learning test with Independent t-test on learning outcomes of students compared with the control class. Statistically it is obtained that there is a difference between the average class of modeling and the control class. The following Table 4 means students’ critical thinking skills.
Table 4. Average Results of Critical Thinking Ability

| Class     | The Number of Students | Value Average Critical Thinking Ability |
|-----------|------------------------|-----------------------------------------|
| Experiment| 31                     | 62.29                                   |
| Control   | 28                     | 46.54                                   |

4. Conclusion

The quality of the physics learning device of the outdoor learning model based on experiment according to expert judgment has a very good category, the tools developed are lesson plans, student worksheet, and critical thinking assessment instruments. The learning model uses a experiment-based outdoor learning model effectively applied to the experimental class. This result is shown by the average value of the experimental class is higher than the control class. This is corroborated statistically by having a significance which shows the influence of the use of outdoor learning models on critical thinking skills. Students' initial critical thinking skills are measured. So that the resulting data will show an increase between the experimental and control classes.

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