Effectiveness of edmodo to improve senior high school students’ creative thinking skills in momentum and impulse topics

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Abstract. The study was aimed to investigate the effectiveness of e-learning-based innovative learning set employing Edmodo to improve the senior high school student’s creative thinking in momentum and impulse learning material. It applied an experimental method with one group pretest-posttest design. The study was conducted in Integrated Senior High School Wira Bhakti Gorontalo by having 20 students of the class of X IPA 2 as respondents. It was a research and development type using research stages by Jerold F. Kemp consisting of determining general instructional goal, analyzing student’s characteristics, determining specific instructional goals, determining learning materials, determining the pre-test, determining teaching and learning strategies, media, and sources, coordinating the supporting facilities, and evaluating (post-test). The developed learning set was syllabus, lesson plan, learning material, student’s worksheet, and test of creative thinking ability as well as an appropriate assessment instrument. Data analysis result revealed that there was an improvement of student’s creative thinking ability proved by the average value of N-Gain for 0.70 in the high category. Based on the data analysis, it can be concluded that an e-learning-based innovative learning set employing Edmodo was effective to improve the senior high school student’s creative thinking in momentum and impulse learning material.

1. Introduction
Education is a whole structural unit as an atmosphere to create valuable individuals from the aspect of science and technology and faith and piety that will be useful for the future. A school as an institution that implements education becomes a complete system in achieving goals of the education itself. All elements of educational level from elementary school to university implement the education in order to create the best individuals for the Nation’s future.

Learning is the collaboration between regular teaching and learning to study or to investigate material in order to gain information and to create change for those who do not have the knowledge to have knowledge. One of the ways is through physics learning in both Junior High School and Senior High Schools. Physics learning is one of the difficult subjects at each educational level. The difficulty makes the student’s outcomes in physics subject are low. Even though, after learning physics students are expected to not only be able to master the concepts (basic thinking skills) but other abilities too [1]. If it is reviewed from the aspect of motivation and interest, many students love to learn physics, although many of them also dislike it. This case demands the teacher to be more innovative in developing the activities in physics learning in order to be favoured by students. The important
elements in learning are learning set applied by the teacher in teaching practices. The Regulation of The Ministry of Education and Culture Number 65 of 2013 concerning Standard Process of Elementary School and Junior High School stated that the arrangement of the learning set is a part of a learning plan. The learning plan is designed in the form of a syllabus and lesson plan referring to content standards. Besides, in the learning plan, the preparation of media and learning sources, assessment instruments, and learning scenarios are also conducted. By having a complete and clear learning set, it is expected the learning process can be implemented based on the goals.

Learning set is all equipment that will become the references for a teacher in performing teaching and learning practices either in the classroom or out of the classroom. The learning set is a collection of learning sources that allow students and teachers in learning activities [2]. The learning set includes Lesson Plan, Student’s Worksheet, Teacher Book, Student Book, and test of learning achievement. The learning set involves all teacher and student activities as well as learning media and materials that will be used in the learning process. A set of learning from the very beginning to the end of class is clearly covered in the learning set.

Currently, the technology is rapidly developed and without any positive control to encounter it, which is also expected from education [3]. From the observation that has been conducted, about 60% of students have already had personal computers or laptops. The percentage of gadget/Android usage among them is almost 100%. This case is directly proportional to their knowledge of technology, for example, the use of the internet. The high intensity of the use of the internet affects their authorization of technology development. Yet, from a different point of view, the development of technology is considered bringing damage to student’s achievement in school. This paradigm appears because many student’s learning achievements and outcomes decrease due to their uncontrolled activities in utilizing technology. It is proved by observation result, which shows that the intensity of laptop/gadget usage connected with the internet is preferred to access the social media and online game rather than to access the learning material. Without realizing it, if it is continuously used, internet usage will influence the student’s learning achievement significantly. One of the ways to reduce the negative impact of internet use is by maximizing the e-learning to support the learning in school.

The most important element is to stimulate and to direct the students to study [4]. However, in this era with the rapid development of technology, there are still some teachers who implement less creative ways to teach, for example, books or lecturing. Even though the learning set has covered certain learning model and media, but not all learning set is conducted appropriately. Therefore, developing a learning set that is proper to be used in current development needs to be conducted in order for a teacher to be creative in managing the classroom and students become creative in following the learning practices [5]. Hence, it is expected to affect the increase of creative thinking ability in physics concepts because creative thinking is one of the important components of 21st-century learning that needs to be had and improve [6].

The development of the learning set, which is considered as an alternative is e-learning because it is appropriate for the development of technology. The biggest expectation is that the development of technology can influence the development of education significantly to the student’s success. Through the utilization of Edmodo, the learning material and teacher’s assessment system to the student’s learning achievement can be synchronized in e-learning media. The less attractive learning process of physics can create boredom to follow the learning process. Therefore, it influences the student’s learning achievement significantly. There is no need to concern about the schools with a lack of internet connection, because, currently, the internet connection has achieved the remote area through procurements from the school operational assistance. Using e-learning media, the students can access the learning material, particularly the physics material whenever and wherever they want. The online assessment can be done by the teacher objectively to each student. E-Learning is a transformation of the learning process in the school or university to be a digital form learning process bridged by internet connection. Broadly, e-learning is indicated as the learning process by employing the assistance of electronics, especially computers [7].
Other than to create interesting learning, this media can be the additional learning at home and can create the student’s creativity in either individual or group learning. It is better if the technology development becomes a support for students to improve their learning outcomes and achievement. Therefore, the technology can be trusted as a driving force for education success.

Based on the previous explanation, there is a need to develop physics learning media to create a learning atmosphere that is interesting, not monotonous, and creating high learning motivation of students which is appropriate with the current development of technology. Therefore, the researcher is motivated to conduct the research concerning e-learning-based innovative learning set utilizing Edmodo that aims to create the senior high school student’s creative thinking skills in momentum and impulse learning material.

2. Methods
This research applied the experimental method with one group pretest-posttest design. The research site was in Integrated Senior High School Wira Bhakti Gorontalo by having 20 students of the class of X IPA 2. It was a research and development type using research stages consisting of determining general instructional goal, analyzing student’s characteristics, determining specific instructional goals, determining learning materials, determining the pre-test, determining teaching and learning strategies, media, and sources, coordinating the supporting facilities, and evaluating (post-test). This design consisted of one group, and the research process was conducted in three stages: 1) conducting pre-test; 2) implementing treatment (X), and ; 3) conducting post-test [8]. The design can be observed in the following Figure 1:

![Figure 1. Research Design One Group Pretest Posttest Design](image)

$O_1$ is pretest on experimental class, $X$ is treatment on blended learning (the collaboration of traditional learning and online-based learning), and $O_2$ is post-test on experimental class [9]. The analysis of the effectiveness of the learning set is obtained based on the analysis of creative thinking ability on students. In order to find out the improvement of student’s learning achievement through e-learning collaborated with Edmodo, the N-gain analysis is obtained. The formulation to calculate the N-gain ($g$) value can be observed as follows:

$$N \text{- gain} = \frac{\text{posttest score} - \text{pretest score}}{\text{maximum possible score} - \text{pretest score}}$$

(1)

The obtained N-gain value is interpreted using Hake formula [10], which can be observed in Table 1.

| No. | Value ($g$) | Classification |
|-----|-------------|----------------|
| 1   | $g > 0.7$   | High           |
| 2   | $0.3 \leq g \leq 0.7$ | Small         |
| 3   | $g < 0.3$   | Large          |

3. Result and Discussion
Test of learning achievement was one of the particular things to verify the effectiveness of the learning set. The test given to 20 students was a creative thinking test in essay form consisting of 12 items after treatment was given. Before providing treatment, the researcher gave evaluation (post-test) to students to investigate the increase of student’s learning achievement to the learning process that had been conducted. The learning set was considered effective if the test result of student’s learning
achievement improved from the previous test [11]. The result of the average pre-test, post-test, and normalized gain (N-Gain) is presented in Table 2.

| Table 2. Student’s Learning Achievement Result |
|-----------------------------------------------|
| Value Average                  | N-gain | Criteria |
| Pretest 26.56                  | 0.70   | Small    |
| Posttest 78.13                 |        |          |

Table 2 shows the average value of the increase in creative thinking results for 20 students. The average value of pre-test is 26.56%, and after treatment, it increases as many as 51.57% to become 78.13%. The classical completeness percentage of the critical thinking ability of students is 85% in the good category. The average overall value of the influence of the use of e-learning utilizing Edmodo toward the increase of student’s learning achievement using N-Gain (g) is 0.70 in moderate criteria. The numbers of students who obtain the score above 75 based on the minimum passing grade standard are 17 students, while those who obtained the score under 75 are 3 students. Therefore, this research concludes that blended learning can improve student’s cognitive learning. The result is appropriate to the previous research that shows the high effectiveness in implementing e-learning by having a significance level at 0.05 [12]. The previous study also shows that the effective product to be used as a supplement in learning with normality gain for 0.35 fulfilling the moderate criteria [13]. Another research also reveals that the discovery of learning with the assistance of Edmodo e-learning is higher than discovery learning [14]. Besides, another previous study obtains t_{count} for 5.43, which is higher than t_{critical} for 1.99 with a significance level of 5%. The normality gain test shows that the average result of the post-test improves for 0.57 and 0.52 in moderate criteria in the experimental and control class. This research exposes that the achievement of the psychometric and affective indicator according to descriptive analysis, the average value of the experimental class is better than the control class. Based on the determination coefficient analysis result, this research contributes to improving students’ learning achievement for 12.60% [14].

More clearly, it can be observed in Figure 2, which shows the average value of the student’s creative thinking learning achievement.

![Figure 2. Result of Creative Thinking Learning](image)

4. Conclusion
Based on the findings and discussion, it can be concluded that an e-learning-based innovative learning set employing Edmodo was effective to improve the student’s creative thinking in momentum and impulse learning material at Integrated Senior High School Wira Bhakti Gorontalo, class of X IPA 2. Hence, the developed learning set becomes one of the learning model alternatives.
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