Create an interactive video about alternative energy sources from fruits to optimize student creativity

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Abstract. Creativity is a skill that must be sharpened in the era of Society 5.0. The purpose of this study was to describe students' creativity in making interactive videos about alternative energy sources from plants. The subjects in this study were students of the Physics Education Study Program taking Energy Physics courses. The study was conducted in the even semester of 2019/2010. This study employed an analytical descriptive study. The instrument used was the student's creativity observation sheet. The results of the study have shown that the mean results of observations of student creativity are 3.22. Thus, it can be concluded that students' creativity in making interactive videos about alternative energy sources from plants is in a relatively good category. It is necessary to re-examine what the next effort is to increase student creativity.

1. Introduction
Creativity is a skill that must be sharpened in the era of Society 5.0. In the current era of information and globalization, creativity is a skill that is indispensable for students to be able to deal with changing circumstances or challenges in an ever-developing life [1–3]. Creativity is associated with a person's ability to look for various alternatives in the form of thoughts, problem approaches, or activities [4]. Ideas and activities will continue to flow throughout the life of creative people. Creative students never lose their minds to generate new ideas or exciting activities related to the physics lessons they have received.

Creativity is often referred to as divergent thinking skills[5]. This means that creativity describes thinking skills that can produce varied and different answers from those that have been there before[6]. The ability to think critically, creatively, and productively is classified as high-level competencies and can be seen as a continuation of basic learning competencies. The ability to think creatively helps find many possible answers to a problem, emphasizing the quantity, efficiency and variety of answers [7,8]. Perkins (1984) (Costa, 1985) describes six indicators of creativity, namely: (1) Attention to aesthetics; (2) Attention to purpose; (3) Mobility; (4) Working at the edge of one's competence; (5) Objectivity; (6) Intrinsic Motivation.

The development of science and technology in the field of education, which is an electronic media-oriented education system [10]. One way to grow the creativity of students in line with these developments is through making learning videos [11]. The use of instructional video media is a variety of media in learning models that are practical and attractive. Learning media can increase creativity in learning [12].

Learning videos that can be used as a practical learning resource because learning videos are able to show real concepts, can display learning procedures / structured and also material developed accordingly...
By making a learning video in which explains some simple experiments with tools obtained from everyday life [11–14]. Learning videos are an attraction that students are interested in, learning becomes more concrete, not monotonous, not boring and finally able to improve students’ understanding of a concept [15].

In the Energy Physics course, there is a sub that discusses alternative energy from fruits. From here we learn together how to make it, then students make an interactive video about it. To get the best score, students must optimize their creativity. This research will focus on describing students’ creativity in making interactive videos about alternative energy sources from fruits.

2. Method

The subjects in this study were 15 students of the Physics Education Study Program taking Energy Physics courses. This was held in the even semester of 2019/2020. This is an analytical descriptive study in line with the research purpose which is to describe students' creativity in making interactive videos about alternative energy sources from plants. The instrument used was the student's creativity observation sheet indicators of creativity used are: (1) Attention to aesthetics; (2) Attention to purpose; (3) Mobility; (4) Working at the edge of one's competence; (5) Objectivity; (6) Intrinsic Motivation. Each indicator in the score analysis then determined the mean of the overall student creativity score. The results of creativity displayed in the form of tables and diagrams. Student creativity was categorized into categories: very good, good, quite good, poor and not good based on the following table.

Table 1. Student Creativity Criteria

| Score       | Criteria     |
|-------------|--------------|
| 4.2 < X ≤ 5 | Very Good    |
| 3.4 < X ≤ 4.2 | Good      |
| 2.6 < X ≤ 3.4 | Quite Good |
| 1.8 < X ≤ 2.6 | Poor       |
| 1 < X ≤ 1.8  | Not Good     |

3. Result and Discussion

The indicators of creativity used in this study are: (1) Attention to aesthetics; (2) Attention to purpose; (3) Mobility; (4) Working at the edge of one's competence; (5) Objectivity; (6) Intrinsic Motivation. Table 2 shows the mean score of each student creativity indicator. The results of the study have shown that the mean results of observations of student creativity are 3.22. It can be categorized that student creativity is good enough. These results are still not maximal in terms of creativity.

Table 2. Student Creativity Results

| Indicators                      | Average of Score | Category   |
|--------------------------------|------------------|------------|
| Attention to aesthetics        | 3.27             | Quite Good |
| Attention to purpose           | 3.00             | Quite Good |
| Mobility                       | 3.27             | Quite Good |
| Working at the edge of one's competence | 3.20 | Quite Good |
| Objectivity                    | 3.47             | Good       |
| Intrinsic Motivation           | 3.13             | Quite Good |
| Total                          | 3.22             | Quite Good |

The first indicator is attention to aesthetic [9]. This shows that people who have high creative thinking skills will appreciate the quality of an object. When they create or modify something, creative people will try to improve the quality from the most basic aspects to become something very interesting [16]. Figure 1 shows the percentage diagram of the observed creativity criteria regarding attention to aesthetic.
Figure 1. Percentage of attention to aesthetic indicators

The second indicator is attention to purpose [9]. This shows that highly creative people were not separated from basic concepts and principles depending on their goals. Creative people will still understand the nature of a problem and understand the standards for a solution. They did not create something without clear criteria. They will critically evaluate their creation to suit their purpose. The approach used in creating objects that ready to be changed based on the learning goal. Figure 2 shows a percentage diagram of the observed creativity criteria regarding attention to the learning goal.

Figure 2. Percentage of attention to purpose indicator

The third indicator is mobility [9]. The ability to think creatively is related to mobility, which is fluency or fluency in the mind to express ideas. When a difficulty arises, creative people can change a problem to be more abstract or more concrete. In addition, creative people can make a problem general or become more specific depending on their thought patterns. Figure 3 shows the percentage diagram of the observed creativity criteria regarding student mobility.

Figure 3. Mobility Indicator Percentage

The fourth indicator is Working at the edge of one's competence [9]. The ability to think creatively will work more than someone's competence and even himself. High standards will be maintained so that their creative thinking skills will continue to increase. They will not give in to confusion, uncertainty, or risk. They will think creatively to solve confusion [2] creative thinking, get certainty from uncertainty, and dare to take the risks from the various solutions they create. Creative people will not be subject to
failure; they will be interested and challenged to fix that failure. Figure 4 shows the percentage diagram of the creativity criteria that have been observed regarding Working at the edge of one's competence.

![Figure 4 Percentage of indicators working at the edge of one's competence](image)

The fifth indicator is objectivity [9]. Creative thinking ability can be measured from a person's objectivity to objects. Creative people observed a problem and its solution from various points of view [5]. They evaluate their creation at each stage from start to finish from multiple perspectives. The ideas will be described practically and theoretically and try to seek criticism of their ideas. Figure 5 shows the percentage diagram of the observed creativity criteria regarding student objectivity.

![Figure 5. Percentage of objectivity indicators](image)

The last indicator is intrinsic motivation [9]. Figure 6 shows the percentage diagram. The diagram of the observed creativity criteria regarding students' intrinsic motivation. Creative thinking ability reflected in one's cause. Creative people feel that they have to choose what and how to do, not determined by others or depending on the opportunity [17]. Finding what they have to do is more valuable in itself than just meeting demand. People who have intrinsic motivation will enjoy activities related to exploring their ideas to create an object.

![Figure 6. Percentage of Intrinsic Motivation Indicators](image)

4. Conclusion
It can be concluded that the creativity of students in making interactive videos about alternative energy sources from plants is in the quite creative category. This method is deemed not optimal in optimizing
student creativity. This method does not make students’ creativity in the very high category. It is necessary to re-examine what the next effort is to increase student creativity. Further research is needed to determine better methods of increasing student creativity.

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