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## Interactive multimedia-based learning to improve students' creative thinking skills

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**ABSTRACT:** Interactive multimedia is very useful because it is able to create student-centered teaching and learning activities. The collaboration of creative thinking and interactive multimedia-based learning not only enables students to think using multiple scientific disciplines, but also provides for their intellectual needs and development of effectiveness. This research will discuss the development of interactive multimedia-based learning to improve students' creative thinking skills on culinary business management courses. This research applied quantitative descriptive methodology. The research subjects were ten students of Diploma III in the Home Economics department in the Engineering Faculty of UNESA in 2013. The research instrument used was the creative thinking skills test. The test used students' worksheets which contain some issues of creative thinking skills indicators such as: (1) fluency, (2) flexibility, and (3) novelty. Data analysis techniques used a normalized-gain (N-gain) formula. The results showed that the students' creative thinking skills score in post-test improved by 0.33 points after interactive multimedia-based learning had been applied during teaching and learning activities. The improvement of the post-test score by 0.33 points was categorized as 'Mediocre'.

### 1 INTRODUCTION

Education is an essential role for the development of a country as a good quality education will create high-quality human resources. Indonesian Law No. 20 in 2003 (Depdiknas, 2003, Ch. 3), in respect of the National Education System, states that 'national education aims to develop learners' potency thus they are able to become a human with some personalities such as faithful, devoted, noble, healthy, knowledgeable, skillful, creative, independent, democratic have high responsibility'.

Based on the goal and vision of the Home Economics Department in UNESA, the students are required to master some basic competencies in several courses. The culinary business management course is categorized into working skill courses and contains some theories and practices. This course is quite complex because of its connection to other courses. Thus, it requires multidimensional abilities.

One of the solutions to solving that problem is to develop an attractive learning media that would draw students' attention. An interactive multimedia utilizing computer software may provide the answer for that problem. Multimedia-based learning is a learning activity which utilizes computers to create and combine any text, graphic, audio,

video, or animation. The process of creating interactive multimedia uses links and tools to enable users to navigate, interact, create, and communicate (Rusman, 2012).

Therefore, effective learning activities can be achieved through the use of interactive multimedia-based learning especially for students in the culinary business management course. It is relevant for Setemen (2005) who stated that the application of interactive multimedia-based learning to teach students of culinary business management is very effective for the improvement of students' scores. The use of interactive multimedia in teaching and learning activities is very useful to create student-centered learning activities.

Creative thinking, using the implementation of interactive multimedia-based learning, can help students to think using multidisciplinary perspectives. It also helps to support the students' intellectual skill and development of effectiveness so they are more ready to manage their working life (Rolling & Adams, 2003). Warsita (2008) also added that interactive multimedia can help students to study faster. Students who have fast-thinking ability can learn optimally, while students with average ability are still able to understand the concepts.

Based on those facts, lecturers should be more active in developing other learning models to

improve students' scores in creative thinking skills. Silver (1997) stated that to assess creative thinking in children and adults the Torrance Test of Creative Thinking (TTCT) must be applied.

Three important components of creative thinking skills assessment in TTCT are: (1) fluency (the total number of ideas in responding to an order), (2) flexibility (some changes approach in responding to a command), and (3) novelty (originality of ideas in responding to a command). This is similar to Haylock (1997), who gave examples of creative thinking skills criteria: (1) fluency (total number of responses), (2) flexibility (total number of differing responses), and (3) originality (the uniqueness of the response).

This research uses the rubric assessment which focuses on three creative thinking criteria or indicators, that is, flexibility, fluency and novelty, which are adapted to measure students' thinking ability (Siswono, 2007). One of the ways to improve creative thinking skills is the use of an interactive multimedia-based learning model.

Furthermore, Mettas and Constantinou (2007) stated that problem-based learning can help teachers to solve their problems. Riyanto (2010) added that problem-based learning is designed to develop students' ability to solve problems. So the researchers used problem-based learning because it provides authentic material or issues which are close to students' reality (Nur, 2008).

The culinary business management course requires students to have complex thinking, hence problem-based and interactive multimedia-based learning is implemented as it is effective in improving students' thinking ability.

## 2 RESEARCH METHOD

This research aims to establish the improvement of students' creative thinking skills. The learning activities used problem-based and interactive multimedia-based learning. The research subjects were ten students from the Home Economics department in the Engineering Faculty of UNESA in 2013. The instrument of creative thinking test used to measure the students' creative skills was the students' score for cognitive processing.

The students' creative thinking test used an essay test. The assessment rubric used the Torrance Test of Creative Thinking, adapted from Silver (1997). The rubric used three components to assess the students' creative thinking skills, namely, (1) fluency, (2) flexibility, and (3) novelty. Data analysis determined the improvement of students' creative thinking skills with the pre- and post-tests.

Students' creative thinking skills will be categorized as 'improved' if the result of the post-test

average score is higher than the pre-test average score, since the post-test is administered after the implementation of interactive multimedia-based learning activities (Novianti, 2011).

Rating for creative thinking tests was based on the formula of Siswono (2007):

$$\text{Total score} = (3 \times \text{Novelty}) + (2 \times \text{Flexibility}) + (1 \times \text{Fluency}) \quad (1)$$

There are a total of five questions, so the maximum possible rating according to this formula is  $(5 \times 3) + (5 \times 2) + (5 \times 1) = 30$ .

Thus:

1. The students will get 1 point if they fulfill the fluency component, and 0 if they do not fulfill it.
2. The students will get 2 points if they fulfill the flexibility component, and 0 if they do not fulfill it.
3. The students will get 3 points if they fulfill the novelty component, and 0 if they do not fulfill it.

The novelty component is granted three points because this component is the most important and it is the main feature of the assessment of a product. A creative product must be different from the others. The next most important point is the flexibility component. It is important because it shows the productivity of an idea in completing the task. The last point is the fluency component. It is placed in last position because it shows the students' fluency in producing different ideas, and it is based on the required way of completing the task. (Novianti, 2011).

The pre-test and post-test scores of this adapted test are analyzed by calculating the mean, using the gain calculation given by Hake's formula (Savinem & Scott, 2002):

$$(g) = \frac{S_{\text{post}} - S_{\text{pre}}}{S_{\text{max}} - S_{\text{pre}}} \quad (2)$$

Then, the score of gain calculation is categorized into certain criteria with the interval gain factor. Its interval gain criteria is shown in Table 1.

Table 1. Criteria of gain interval factor.

| No. | Gain interval factor  | Criteria |
|-----|-----------------------|----------|
| 1   | $g < 0.3$             | Low      |
| 2   | $0.3 \leq g \leq 0.7$ | Mediocre |
| 3   | $g \geq 0.7$          | High     |

Source: Savinem & Scott, 2002.

### 3 RESULTS AND DISCUSSION

This research aimed to determine the improvement of students' creative thinking skills. To test the students' improvement of creative thinking skills, both pre- and post-tests were administered to them before and after learning activities. The test itself is an essay and interactive multimedia-based test.

The creative thinking skills criteria of Diploma III students of culinary business management in 2013 were categorized in terms of fluency, flexibility, and novelty, as shown in Table 2.

The calculation of the creative thinking skills scores of Diploma III culinary business management students is shown in Table 3.

The average pre-test score of creative thinking skills for Diploma III culinary business students in 2013 before they were taught using interactive multimedia-based learning was 4.80. Their average post-test score of creative thinking skill increased to 13.30. So, the average of the normalized-gain score (N-gain) was 0.33; it was categorized into 'Mediocre' level.

The research findings showed that the interactive multimedia-based learning which was developed by the researcher was only able to improve the students' thinking skills up to a mediocre level. It happened because during learning activity students were asked to answer some question based on given allocation time and plan. In addition, students also had to answer essay test in pre-test and post-test, which obliged them to use creative thinking skills.

Table 2. The calculation of students' creative thinking skills scores in pre-test and post-test.

| No.            | Pre-test scores |     |     | Total pre-test | Post-test scores |     |     | Total post-test |
|----------------|-----------------|-----|-----|----------------|------------------|-----|-----|-----------------|
|                | K1*             | K2* | K3* |                | K1*              | K2* | K3* |                 |
| 1              | 3               | 0   | 0   | 3              | 5                | 5   | 0   | 15              |
| 2              | 5               | 1   | 0   | 7              | 5                | 3   | 0   | 11              |
| 3              | 5               | 1   | 0   | 7              | 5                | 4   | 0   | 13              |
| 4              | 4               | 0   | 0   | 4              | 5                | 5   | 2   | 21              |
| 5              | 4               | 0   | 0   | 4              | 5                | 5   | 1   | 18              |
| 6              | 5               | 1   | 0   | 7              | 5                | 4   | 0   | 13              |
| 7              | 3               | 0   | 0   | 3              | 5                | 5   | 0   | 15              |
| 8              | 3               | 0   | 0   | 3              | 5                | 2   | 0   | 9               |
| 9              | 5               | 0   | 0   | 5              | 5                | 2   | 0   | 9               |
| 10             | 5               | 0   | 0   | 5              | 5                | 2   | 0   | 9               |
| Total          | 42              | 3   | 0   | 48             | 50               | 37  | 3   | 133             |
| Percentage (%) | 84              | 6   | 0   | 16             | 100              | 74  | 6   | 44.3            |

Note:

\*K1 = Fluency;

\*K2 = Flexibility;

\*K3 = Novelty.

Table 3. The calculation of creative thinking skills scores of Diploma III culinary business management students.

| No.            | Students' creative thinking scores |           | N-gain | Criteria |
|----------------|------------------------------------|-----------|--------|----------|
|                | Pre-test                           | Post-test |        |          |
| 1              | 3                                  | 15        | 0.4    | Mediocre |
| 2              | 7                                  | 11        | 0.2    | Low      |
| 3              | 7                                  | 13        | 0.3    | Mediocre |
| 4              | 4                                  | 21        | 0.7    | High     |
| 5              | 4                                  | 18        | 0.5    | Mediocre |
| 6              | 7                                  | 13        | 0.3    | Mediocre |
| 7              | 3                                  | 15        | 0.4    | Mediocre |
| 8              | 3                                  | 9         | 0.2    | Low      |
| 9              | 5                                  | 9         | 0.2    | Low      |
| 10             | 5                                  | 9         | 0.2    | Low      |
| Average scores | 4.80                               | 13.30     | 0.33   |          |

Note: (Maximum score = 30).

Ruggiero, in Siswono (2009), stated that thinking is a mental activity used to formulate or solve a problem, make a decision, or simply to answer curiosity. It means that when someone formulates and solves a problem, or when they try to understand something they have actually had 'thinking' activity.

Creative thinking can also be called 'a process' when someone brings up a new idea. The new idea could be a combination of previous ideas which have never been discovered before (Infinite Innovations Ltd, 2001). During learning activity, there are many learning strategies and learning models which can be developed to help students understand the material and improve their scores. One of them is a problem-based learning model using interactive multimedia.

### 4 CONCLUSION

The results showed that the post-test score of students' creative thinking skills after the implementation of interactive multimedia-based learning had improved to 0.33, which falls into the 'Mediocre' category.

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