Analysis of basic electronics 2 textbook reviewed from the aspects of creative thinking in the Physics Department of FMIPA UNP Padang

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Abstract. This study aims to determine the development of the ability to think creatively in basic electronic textbook 2 used in the physics department of the FMIPA, UNP Padang. This research is a descriptive study that aims to obtain information about the development of creative thinking skills in the two textbooks used. Data collection uses analysis instruments, aspects of creative thinking. The results showed that the book used has facilitated aspects of creative thinking of its College students. The ability to think creatively facilitated includes fluency with an average of 35.79%, flexibility with an average of 20.30%, originality with a mean of 12.21% and elaboration with an average of 31.70%. But the textbook used is not optimal in facilitating the development of college students' creative thinking abilities.

1. Introduction
The low level of creative thinking of scholars/college students in Indonesia is something that should be of particular concern in the world of education. Amtiningsih [1] states the average creative thinking ability of students is around 25.5%, including the category of less creative. This causes the ability to think the high level of students is also low, and the result is the lowest Human Development Index (HDI) of Indonesia, which in 2017 ranked 113 out of 188 countries in the world[2].

Quality human resources can only be realized through quality education. Efforts to improve the quality of education are things that must always be improved so that it can improve the quality of human resources of the Indonesian nation. According to law number 20 article 3 of 2003 concerning the education system states. National education functions, among others, to develop the potential of students to become knowledgeable, capable, creative and innovative human beings.

The National Education System states that national education aims to develop the potential of students to become human beings who believe and fear God Almighty, capable, creative and independent. So in learning, activities students must be facilitated and motivated to develop thinking skills through the concepts and principles of physics from various natural events and solve problems both qualitatively and quantitatively. One of the thinking skills to solve problems and various phenomena in daily life is creative thinking skills. To be able to achieve this, the learning needs to be facilitated with good learning resources. Textbooks are one source of learning that contains a description of the material to be studied by scholars/college students.
Textbooks play an important role in learning, the availability of quality textbooks will support the success of student learning. Textbooks are used by students to understand the learning material, almost 90% of learning activities use textbooks. Likewise, learning activities carried out by the teacher, also using textbooks. Stake and Easley, 1978; Weiss, 1989 concluded that 90% of science teachers use 90% of their learning time by using textbooks [3]. So that students can develop their thinking skills, especially creative thinking abilities, a textbook is needed that can facilitate the development of creative thinking abilities. Textbooks used in basic electronics courses 2: Electronic Theory and Its Applications. Volume 2 and. Basic Electronic 2: Components, Circuits, and Applications.

The development of teaching materials to support the ability of creative thinking has been carried out by Wahyuni R and Hufri (2018)[4], Johan WO, Hufri (2018)[5] and Irani S, et al (2018) [6] who have developed physics teaching materials to improve high school students' creative thinking skills. In this study, the basic electronics textbook 2 analyzed was used in the Department of Physics FMIPA UNP Padang from the aspect of developing students' creative thinking abilities. Gardner in Wayan Suastra [7], said that to face the challenges of the future (towards the generation of 2045) which is increasingly complex requires five thoughts for the future (five minds for the future) which includes: disciplined thoughts, synthesizing thoughts, thoughts of creation, thoughts of respect, and ethical thoughts. Furthermore, Tilaar [8] said that globalization must be "countered" by developing creativity and entrepreneurship through transformative critical pedagogy in national education. So learning physics must be able to give birth to students who can foster the ability to think logically, critical thinking and creative thinking.

The sensitivity of creative thinking can be measured by indicators determined by experts, according to Torrance[9] the ability to think creatively is divided into three things, including: 1. Fluency, which is generating lots of ideas in various categories/fields. 2. Originality, which is having new ideas to solve problems. 3. elaboration, which is having the ability to solve the problem in detail. Creative thinking is an activity of thinking to emerge creativity in students are thinking to produce something new for him. LTSIN[10] states that "a person's idea of creative thinking has at least one of the characteristics of: a. The idea did not exist before b. Already in another place, it's just that he doesn't know c. He discovered a new process for doing something d. It applies processes that already exist in different areas e. He developed a way to see things from a different perspective. Of the five characteristics of creative thinking, students can find new ideas or perfect existing ideas. Guilford in Munandar[11] states the ability to think creatively includes 4 aspects include: fluency, flexyibility, originality, dan elaboration. According to Moma[12] explains "The characteristics possessed in creative thinking skills can be seen in Table 1.

| Characteristics of Aspects of Creative Thinking [12] |
|------------------------------------------------------|
| **The aspects of creative thinking**                  |
| **Fluency**                                           |
| • Sparking many ideas on issues                       |
| • Providing a lot of answers in a question             |
| • Working faster and do more than others               |
| **Flexyibility**                                     |
| • Generating variations in the idea of solving a problem or answering a question |
| • analyzing problem from a different perspective.     |
| **Originality**                                       |
| • Generating variations in the idea of solving a problem or answering a question |
| • analyzing problem from a different perspective.     |
| **Elaboration**                                       |
| • Developing or enriching other people's ideas        |
| • Adding, organizing, or detailing an idea so that it can improve the quality of the idea |

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| **Originality**                                               |
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| **Elaboration**                                               |
| • Developing or enriching other people's ideas                |
| • Adding, organizing, or detailing an idea so that it can improve the quality of the idea |
Furthermore, Torrance (1979)[13] describes the process of creative thinking including fluency, referring to the production of a large number of ideas or alternative solutions to a problem with keywords including comparing, changing, calculating, determining, identifying, matching, matching. Flexibility refers to the production of ideas that demonstrate various possibilities or realms of thought involving the ability to see things from different points of view, to use many different approaches or strategies. keywords include changing, demonstrating, differentiating, employing, extrapolating, interpreting, interpreting, predicting. Elaboration is the process of improving ideas by giving more detail. Additional detail and clarity increase interest in, and understanding of, the topic. With the key, among others, Assess, criticize, determine, evaluate, assess, measure, choose, and test. Originality is the production of ideas that are unique or unusual. This involves synthesizing or putting information about a topic back together in new ways. The keywords include making, designing, producing, integrating, modifying, rearranging, reconstructing, re-visioning.

So learning activities must be able to facilitate students to be able to express many ideas in the activities carried out by students in the form of questions or answers. In a given problem, students must be able to create ideas that vary so that each student's thinking has a different answer. Students can provide identical ideas according to the ideas developed by students to solve a problem so that creative thinking ability.

This research was conducted to analyze aspects of developing creative thinking ability in basic electronics textbook 2 in the Department of Physics FMIPA UNP Padang.

2. Research Methods
This type of research is descriptive research. The population and sample of this study were all material in 2 basic electronic textbooks used in the physics department of FMIPA UNP Padang. The instruments used were arranged according to Guilford, Moma, and Torrance.

Data collection techniques using book analysis instruments that contain statements of aspects of creative thinking. Data collection procedures include:

a. Selection of textbooks,
b. The selected textbook is basic electronics textbook 2 include Electronic Theory and Its Application Volume 2, and Basic Electronics 2: Components, Circuits, and Applications
c. Taking samples,
d. Samples were taken by total sampling technique, namely by analyzing all chapters in the book being analyzed
e. Data collection,
f. Data obtained through material analysis of all chapters in the book by analyzing each paragraph and matching it with the indicators of creative thinking that is on the analysis instrument sheet.

Next, calculate the appearance of the indicator of creative thinking. Data analysis techniques used in this study are:

a. Determine the percentage of content of aspects of creative thinking.
b. Summing the emergence of 4 aspects of the indicator of creative thinking, each aspect are fluency, flexibility, originality, and elaboration.

Furthermore, calculate the percentage of indicators appearing aspect of creative thinking for each category in each book analyzed.

\[
\text{Percentage} = \frac{\text{number of indicators per category}}{\text{total indicator number}} \times 100\% \tag{1}
\]

To determine the agreement coefficient, namely tolerance of differences in observations, an observation reliability testing technique is used (Arikunto, 2002)[14] Reliability is used to assess the consistency of two appraisers in assessing through a checklist that produces nominal data.

a. Data obtained in the form of scores from researchers and analysts after giving a checklist on the analysis sheet indicators of aspects of creative thinking.
b. Then calculate the percentage of agreement using the formula proposed by Grinnell [15]

\[ KK = \frac{2S}{N_1 + N_2} \]  

(2)

c. Data is recapitulated in a recapitulation table with details of the reliability, quality criteria based on the provisions of Altman D.G [16] include,

- < 0.2 : bad Agreement,
- 0.20 – 0.40 : fair agreement,
- 0.41-0.60 : moderate agreement,
- 0.61- 0.80 : good agreement,
- 0.81-1.00 : very good agreement.

According to Rochaety [17] that the coefficient of 0.6 is a minimum requirement that is considered to have a safe point in determining the reliability of instruments and is generally widely used in research.

3. Results and Discussion

The results of the analysis of customization using instruments of aspects of creative thinking, obtained the coefficient of agreement between the two observers, namely for each chapter in the books A and B are shown in Table 2.

| Chapter | Book A | Criteria | Chapter | Book B | Criteria |
|---------|--------|----------|---------|--------|----------|
| Chapter.1 | 0.92 | very good | Chapter.9 | 0.96 | very good |
| Chapter.2 | 0.96 | very good | Chapter.10 | 0.92 | very good |
| Chapter.3 | 0.88 | very good | Chapter.11 | 1.00 | very good |
| Chapter.4 | 0.96 | very good | Chapter.12 | 0.84 | very good |
| Chapter.5 | 0.72 | good | Chapter.13 | 0.84 | very good |
| Chapter.6 | 0.80 | very good | | | |
| Chapter.7 | 0.96 | very good | | | |
| Chapter.8 | 0.88 | very good | | | |
| Chapter.9 | 0.88 | very good | | | |
| Chapter.10 | 0.76 | very good | | | |
| Chapter.11 | 0.80 | very good | | | |

From Table 2, it is found that the criteria for agreement between the two observers for the two books in each chapter are in good and excellent criteria. So the instrument used has a value of obedience he above 0, 6 as required.

Further for the analysis of the creative thinking aspects of each book can be seen in the following images:
The results show that the book used in the basic electronics course 2 in the Department of Physics FMIPA UNP Padang has facilitated aspects of students' creative thinking, this is seen in Figure 1, Figure 2, and Figure 3. Facilitated creative thinking aspects include fluency with an average of 35.79%, flexibility with an average of 20, 30%, originality with a mean of 12.21% and elaboration...
with an average of 31.70%. But the textbook used is not optimal in facilitating the development of students’ creative thinking.

So learning activities must be able to facilitate students to be able to express many ideas in the activities carried out by students in the form of questions or answers. In a given problem, students must be able to create ideas that vary so that each student's thinking has a different answer. Students are able to provide identical ideas according to the ideas developed by students in order to solve a problem so that the ability to think creatively.

The ability of creative thinking is the ability of students to understand problems and find solutions with varied strategies or methods. So students are required to be able to understand a variety of methods and strategies in order to create something new, so they can develop their thinking skills. So, the process of creative thinking can support students’ creative thinking abilities.

4. Conclusion
Based on the analysis conducted on the basic electronics textbook 2 in the Physics Department of FMIPA UNP Padang, it was found that both books had aspects of the ability to think creatively. Namely: fluency, flexibility, originality, and elaboration. But the textbook has not been maximized in facilitating the development of students' creative thinking abilities.

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