

## Development of Flip book-Based Interactive Learning Media to Improving Understanding of Statistical Material Concepts

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| <b>Corresponding author:</b>  | <b>Abstract</b>   |
| Siti Masrifah<br>smrifah12@gmail.com  | This study aims to produce learning media that are practical and effective as well as to increase understanding of the concept of statistics material for class VIII students at Junior High School.  |
| <b>Keywords:</b><br>interactive Learning;<br>flipbook; statistics<br>material | The research method used the Research & Development (R&D) model with the concept of ADDIE (Analyst, Design, Development, Implementation and Evaluation. Data analysis techniques used validity tests, practicality tests, effectiveness tests and statistical tests t tests. The results showed that learning media were stated to be practical and effective based on student assessments with an average practicality result of 3.69 or 92% with very practical qualifications and could be used without revision and effectiveness test results with a value greater than 75% with an effective qualification used for Class VIII students. Furthermore, learning media was stated to be able to increase the understanding of statistical material concepts for Class VIII students which was shown statistically through a t test with a P value of $0.000 < \alpha 5\%$ so that it was stated that learning media was able to increase students' understanding of statistical concepts. |

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### INTRODUCTION

The urgency of interactive learning is increasingly needed today, this is because interactive learning has several advantages, as conveyed by Afifah et al. (2022) that interactive learning is a learning approach that provides two-way communication, so that students will be directly involved in the learning material and can strengthen their critical thinking and problem-solving skills using a much more holistic learning approach. In addition, interactive learning will involve students more directly in lessons that can help students improve communication skills with fellow students and teachers.

Referring to the explanation of the previous paragraph, it is known that interactive learning can be used as a way to make it easier for students to understand learning material, so learning media that can present interactive learning is needed. Currently there are several interactive learning media, Putri et al. (2020) stating that one of the learning media that can be used in interactive learning is flipbooks, this is because flipbooks are able to provide space for students to understand directly the learning material through the visual aspects presented in flipbooks. Furthermore according to Febriani & Maritasari (2015) Interactive learning can also be developed from animation media because animation media can provide the effect

of visualizing movement and object characteristics so that students can be more easily understood by students.

Flipbook and animation media have their own advantages, but the accuracy of using learning media depends on the grade level and learning material to be delivered to students. Animation media is more for lower-level students with material related to understanding motion, while flipbooks are more effective for upper-level students because they require an understanding of digital operations, then the advantage of other flipbooks is that they can combine aspects of animation and audio in it. This is also in line with delivery Putri et al. (2020) that one of the learning media that can be developed to create interactive learning is through the development of digital-based learning media in the form of flipbooks, this is because through flipbooks it can regulate interaction between students regularly, for example by adding simulations that involve students in activities or problems, which require them to cooperate with teammates in solving problems.

The use of flipbooks as an interactive learning medium can also be applied in mathematics subjects, this is because in mathematics it takes activeness from students in the process of identifying and solving problems. Aspects of identification and problem solving, for example in statistical material with various problems that must be solved through understanding problems and problem solving patterns. However, the understanding of statistical concepts is poorly understood by students who consider that statistical problems and concepts have no relation to the process of solving problems in real life. This is in accordance with the delivery of Setyorini et al. (2017) which states that students often find it difficult to understand statistical concepts that are abstract in explaining the characteristics of problem solving.

Student difficulties as conveyed in empirical studies by Setyorini et al. (2017) also occurs in learning mathematics statistical material in grade VIII students at SMP PGRI 01 Ngajum, it is known from the results of interviews delivered by mathematics teachers at SMP PGRI 01 Ngajum that students often have difficulty in understanding statistical concepts which often emphasize aspects of abstraction and require a deductive approach, which is an approach that tries to describe the core of the problem in sequence. Referring to the results of the interview, it is known that the research gap in this study is a problem at the research location, namely at Junior High School PGRI 01 Ngajum in the form of student weaknesses in understanding problems in statistical problems and difficulties in solving problems in questions.

The research gap is then tried to be resolved through the use of interactive statistical learning media, the concept refers to the results of empirical studies conducted by Fitri et al. (2021) With the results of the study, it is known that interactive learning media is able to improve the quality of student learning with a significant increase in learning outcomes compared to before the use of interactive learning media. Through reference to the empirical study, this study focused on developing interactive media for students at SMP PGRI 01 Ngajum so that students can easily understand statistical concepts and can describe solving statistical problems systematically.

In addition, the need for the development of learning media at SMP PGRI 01 Ngajum is also known from the results of initial interviews with mathematics

teachers at SMP PGRI 01 Ngajum that the learning media used is still in the form of conventional learning media, especially in statistical material which is more about the application of practice questions rather than empirical problems directly related to students. The purpose of this study is to produce practical and effective learning media for grade VIII students at SMP PGRI 01 Ngajum and increase understanding of statistical material concepts for grade VIII students at SMP PGRI 01 Ngajum. This research will later use an interactive approach that was tried through experiments to grade VIII students of SMP PGRI 01 Ngajum in the hope that students can understand the statistical material.

## RESEARCH METHOD

The type of research used in this research is the type of research and development or commonly referred to as Research & Development (R&D) using the ADDIE approach, the use of the model approach or ADDIE approach is a series of development activities consisting of 1) Analyst, 2) Design, 3) Development, 4) Implementation, and 5) Evaluation.

This research was carried out on February 6 to 10, 2023 at SMP PGRI 01 Ngajum. The data used in this study was collected in three ways, namely through interviews, questionnaires and tests. The instruments used are interviews with teachers, interviews with students, validation questionnaires for media experts, material experts, linguists, teacher response questionnaires, student responses and tests.

Data analysis techniques in this study are divided into three aspects, namely the validity aspect, the effectiveness aspect and the practicality aspect.

### 1) Validity analysis

The scoring result will then use the formula loaded by Irmawati et al. (2017) through the following equation:

$$V_p = \frac{T_{se}}{T_{sh}} \times 100\%$$

Information :

V<sub>p</sub> : Validity by experts

T<sub>Se</sub> : Total empirical score

T<sub>Sh</sub> : Total Maximum Score

Furthermore, to find out whether the learning media in the form of a developed flipbook is feasible or not, validity criteria are used as outlined in the following table.

Table 1. Validity Criteria

| Value (%)                 | Qualification | Decision    |
|---------------------------|---------------|-------------|
| 85 ≤ V <sub>p</sub> ≤ 100 | Very decent   | No revision |
| 70 ≤ V <sub>p</sub> < 85  | Decent        | No revision |
| 50 ≤ V <sub>p</sub> < 70  | Less viable   | Revision    |
| 1 ≤ V <sub>p</sub> < 50   | Not worth it  | Revision    |

Source: Akbar (2013) in Irmawati et al. (2017)

### 2) Effectiveness analysis

The effectiveness aspect is carried out by assessing several aspects according to Mawaddah & Anisah (2015) namely understanding the problem,

planning strategies, solving problems and checking again with the following formula:

$$N = \frac{\text{Score obtained}}{\text{Skor maximal}} \times 100\%$$

Then the average is calculated and the average percentage is calculated using the formula as conveyed by Auliya & Lazim (2020) through the following equation:

$$P = \frac{\sum S_n}{K} \times 100\%$$

Information :

- P : Percentage  
 $\sum S_n$  : Number of scores  
 K : Maximum number of scores

The average percentages will be classified by category in the following table.

Table 2. Effectiveness Criteria

| Interval (%)            | Category         |
|-------------------------|------------------|
| $81,25 \leq P < 100,00$ | Highly Effective |
| $62,50 \leq P < 81,25$  | effective        |
| $43,75 \leq P < 62,50$  | Less effective   |
| $25,00 \leq P < 43,75$  | Ineffective      |

Source: Auliya & Lazim (2020)

### 3) Practicality analysis

The steps in the practicality analysis in this study are to calculate the practicality of flipbook media based on the formula submitted by Auliya & Lazim (2020) as follows.

$$P = \frac{TS}{S_{max}} \times 100\%$$

Information:

- P : Practicality test  
 TS : Total score obtained  
 Smax : Maximum score

After the practicality is carried out, it is compared with the following practicality criteria:

Table 3. Practicality Criteria

| Value (%)               | Category                          |
|-------------------------|-----------------------------------|
| $81,25 \leq P \leq 100$ | Very practical (without revision) |
| $62,50 \leq P < 81,25$  | Quite practical (minor revisions) |
| $43,75 \leq P < 62,50$  | Impractical (unusable)            |
| $25 \leq P < 43,75$     | Very impractical (unusable)       |

Source: Auliya & Lazim (2020).

## RESULTS AND DISCUSSION

### Practical and Effective Learning Media

Making practical and effective learning media is carried out by analyzing media needs through interviews with teachers of Mathematics subjects at SMP PGRI 01 Ngajum which is known that the teachers of mathematics subjects at SMP

PGRI 01 Ngajum asked to develop statistical material in grade VIII, this is because the material has not been taught in grade VIII so it is still possible to develop media in even semesters. As for class IX, it cannot be used as a research subject because it is so that they are more focused on facing graduation exams with learning media that have been prepared by the school.

Based on the results of the analysis of learning media needs, it is known that one of the weaknesses of the learning media currently used is the absence of an interactive approach in the application of learning media, this has an impact on students' understanding of slow subject matter. Therefore, efforts to develop learning materials carried out in this study strive to optimize interactive aspects in the learning media of statistical material. This is in accordance with references from Nurdyansyah & Fahyuni (2016) that in order for students to understand the subject matter well, a contextual approach is needed by relating the subject matter to everyday life, so that students can quickly identify phenomena or objects that were previously known in their daily lives with the subject matter.

Learning media design consists of the initial parts, namely the outer cover, inner cover, preface, table of contents, list of images, basic competencies and learning objectives, student activities and learning concept maps. Furthermore, the contents are in the form of CHAPTER I Introduction, CHAPTER II Data Centering Measures and CHAPTER III Closing. As well as the final section consisting of post test evaluation questions, bibliography, author identity and back cover.

The design in the developed learning media is arranged systematically, as conveyed by Magdalena et al. (2020) That in learning media can be referred to materials or learning modules that are compiled completely and systematically sourced from the educational principles of teachers and students, the systematic use of learning media means arranged in order so as to make it easier for students to understand the material contained in the learning media. After the learning media design is prepared, a media feasibility test is carried out which is described in the following table.

Table 4. Due Diligence Results

| Aspect             | Score | Qualification |
|--------------------|-------|---------------|
| Material           | 93%   | Very decent   |
| Media              | 91%   | Very decent   |
| Language           | 96%   | Very decent   |
| Teacher's Response | 93%   | Very decent   |
| Average            | 93%   | Very decent   |

Overall, the results in the validity test show valid results from all validity tests both from media validity tests, material validity tests and language validity tests. To test that the media produced in this study is practical to use, a practicality test was carried out which was assessed based on the results of the responses of grade VIII students at SMP PGRI 01 Ngajum which are described in the following table.

Table 5. Practicality Aspect

| Indicator              | Percentage | Qualification  |
|------------------------|------------|----------------|
| Functions and Benefits | 93%        | Very practical |
| Program Presentation   | 92%        | Very practical |

|                         |     |                |
|-------------------------|-----|----------------|
| Language and Typography | 93% | Very practical |
| Average                 | 92% | Very practical |

The assessment of student responses to the developed learning media shows average results that are in the category of very practical to use. This is in accordance with the delivery of Zunaidah & Amin (2016) which states that the development of learning media in the material aspect must pay attention to several aspects including the accuracy of the material and the media contains supporting material in learning, and learning media must be aligned with all other elements in learning, including learning objectives, assessments, and activities.

In addition to practicality testing, this study is also seen from the aspect of effectiveness carried out by looking at the way students answer post test questions, some assessment indicators in the aspect of effectiveness are related to understanding the problem, planning strategies, solving problems and checking again. The results in this aspect of effectiveness are described in the following table.

Table 6. Effectiveness Aspect

| Indicator                 | Percentage | Qualification  |
|---------------------------|------------|----------------|
| Understanding the Problem | 79%        | Effective      |
| Strategy Planning         | 74%        | Effective      |
| Troubleshooting           | 86%        | Very effective |
| Recheck                   | 76%        | Effective      |
| Average                   | 79%        | Effective      |

The need for optimization of strategy planning in learning media is conveyed by Sukmadinata (2017) that in the development of learning media, it is necessary to have the right strategy or method in accordance with the ability of students to understand learning problems and materials, these strategies can be applied in learning media by providing important points referred to from interviews related to the needs of innovative learning media.

### Increased Understanding of Statistical Material Concepts

Efforts to improve the understanding of the concept of statistical material for grade VIII students at SMP PGRI 01 Ngajum are carried out with stages of application of learning media starting with preliminary activities for 20 minutes in the form of prayers before starting the lesson, initial explanation of flipbook media, how to use learning media. The next stage is to conduct a pre-test and convey related to the competencies to be learned.

The implementation stage is also carried out by filling out a pre-test to assess the initial ability of students before using flipbook learning media for further comparison with post test results after using flipbook media to be tested from the aspect of increasing the value of the test results. The description of the comparison results using paired sample t test is shown in the following table.

Table 7. T Test Results

| Group     | Average | P <sub>Value</sub> | Information |
|-----------|---------|--------------------|-------------|
| Pre Test  | 49,47   | 0,000              | Significant |
| Post Test | 86,32   |                    |             |

There is a significant increase in understanding of students in understanding statistical material using flipbook learning media related to the delivery of Suryani et al. (2015) that the use of digital flipbooks will provide convenience for students because students have better access to material and the use of technology will help students more effectively understand learning materials to be more visually appealing .

In addition to referring to the results of the t test between the pre-test and the post-test, the results of the analysis of understanding statistical concepts using flipbook learning media for grade VIII students at SMP PGRI 01 Ngajum are also strengthened by the way students answer the questions, the largest percentage results in the aspect of planning and writing answers correctly and correctly shows that students in addition to understanding statistical concepts, students are also able to apply this understanding to solve problems, this is in accordance with the statement Irawan et al. (2020) which states that the growth of students' cognitive levels can be a reference in the development of educational modules including the development of innovative learning media, student cognitive improvement can be supported by educational media that match the age growth of junior high school students.

## **CONCLUSION**

Based on the results and discussions presented in the development of flipbook-based interactive learning media in improving the understanding of statistical material concepts in grade VIII students at SMP PGRI 01 Ngajum, it can be concluded that (1) Learning media for Class VIII students at SMP PGRI 01 Ngajum is declared practical and effective based on student assessment with an average result of practicality of 3.69 or 92% with very practical qualifications and can be used without revision and effectiveness test results with a value greater than 75% with effective qualifications used for Class VIII students at SMP PGRI 01 Ngajum, (2) Learning media is able to increase the understanding of statistical material concepts in Class VIII students at SMP PGRI 01 Ngajum which is shown statistically through t tests with a P value of  $0.000 < \alpha 5\%$  so that it is stated that learning media can increase students' understanding of statistical concepts.

The suggestions in this study refer to the results and discussions in the development of flipbook-based interactive learning media in increasing understanding of the concept of statistical material in grade VIII students at SMP PGRI 01 Ngajum, some of these suggestions are (a) Practical suggestions are devoted to teachers and schools at SMP PGRI 01 Ngajum which refer to the results of the t test that the use of digital flipbook-based learning media can increase student knowledge, it is recommended to develop media gradually, especially on some material that requires an interactive and contextual approach, one of which is in mathematics subjects, (b) Theoretical suggestions are devoted to the next researcher who refers to the results of the effectiveness evaluation that strategy planning in answering questions is still not optimal, so it is recommended to the next researcher who wants to do Development of flipbook learning media to pay attention to aspects of strategy planning with special topics in student activities.

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