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# The Development of Snakes and Ladders Game-Based Learning Media on the Topic of Vibrations and Waves Using Google Slides for Junior High School Students

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**KATA KUNCI**
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**ABSTRAK**. The topic of Vibrations and waves is considered challenging for students. The subject must be delivered with good strategies and supported by good learning media. The purpose of this study is to develop an alternative learning media based on the classic Snakes and Ladders game using Google Slide for the topic of Vibrations and Waves at junior high school level. The development steps of the media were adapted from the design model of Alessi and Trollip, which consists of three stages, including (1) planning, (2) design, (3) development. In the development phase, six reviewers participated in the product evaluation. Three of them are as media experts and the others are as material experts. After evaluating the product, reviewers provided remarks and scores for each evaluation aspect. Overall, the product received an 86.87% score for the media aspect and a 92.06% score for material aspect, both categorized as very feasible. These results indicate that the Snakes and Ladders game-based learning media on the topic of Vibrations and Waves using Google Slides is very feasible for use in the teaching and learning process for junior high school students.

## 1. Introduction

Although it is still rare to find studies that explicitly state that Physics is difficult, many researchers have revealed that students consider Physics to be one of the difficult subjects (Ekici 2016; Wangchuk et al., 2023; Erinosho, 2013; Angell et al., 2004). Generally, the difficulty in understanding physics is caused by several reasons, including some abstract concepts where some of the concepts studied in physics cannot be directly observed (Musliman & Kasman, 2022), so students need to imagine them. The involvement of mathematics with its various terms and formulas adds a challenge to students in studying physics itself, where students must be able to understand these mathematical expressions and then connect them with physical phenomena in the real world. Therefore, to achieve the curriculum that has been arranged, hard work is needed both from the students' side and from the teachers' side. Students need to review the lessons themselves after coming home from school. Meanwhile, teachers need to apply interesting and appropriate learning models and strategies according to the age and characteristics of the students they teach. In addition, teachers also need to prepare and provide interesting and easy-to-understand learning media for each material that will be delivered.

Learning media are everything used to deliver messages or learning materials to stimulate students' thoughts, interests, and feelings in learning activities. Media is also a communication tool used in the teaching and learning process to provide information in the form of teaching materials from teachers to students so that students are more interested in participating in learning activities (Usep Kustiawan, 2016). The use of media in the learning process is one way to make learning better and more directed. The function of media in learning is as a channel of information from teachers to students, so that students will be more interested in studying the material. The right media can increase students' interest and understanding (Evy Maya Stefany, 2015).

Like students in general, students at SMPN 8 Banda Aceh also experience difficulties in understanding physics subjects. This was discovered when the researcher conducted observations at SMPN 8 Banda Aceh. After conducting interviews with several physics teachers at the school, they stated that many factors can cause students' low understanding of physics, both internal and external factors. These factors can even influence each other. One of the external factors faced by teachers is the lack of interesting learning media that can explain the material easily and accurately. As found at the school, teachers have only been using textbooks and some simple practical modules developed by the teachers. Therefore, to help students, especially at SMPN 8 Banda Aceh, the researcher thinks it is necessary to conduct a research for developing learning media. From the discussions with the teachers, the researcher also obtained some information, so the researcher concluded that it is necessary to develop one of the learning media for ninth-grade students of SMPN 8 Banda Aceh on the topic of vibrations and waves.

Considering that middle school students still intensely enjoy activities in the form of games, the researcher tried to apply a game format into the learning media in the form of a snakes and ladders game. Several previous researchers have successfully applied this game into learning media for students at other schools and on different subjects, such as in the studies by Erma Novitasari et al. (2013), Syifa Jamilah Purnama (2021), and Indah Kurnia Pratiwi et al. (2018). The learning media in the form of a snakes and ladders game was designed using the online application Google Slides. This learning media was developed to facilitate teachers and students in conducting evaluations during the learning process.

## 2. Methods

2.1 The Development Stages

The type of research used in this study is research and development (R&D), which is a research method to develop or validate products used in research or learning (Sugiono, 2019). The development model used is the Allesi and Trollip model. This model is suitable for the development of electronic learning media. The stages of the Allesi and Trollip model include planning, design, and development.

The planning stage is the initial phase of this research. In this phase, the researcher defined the scope of the study and then determined and collected resources. The second stage is the design stage. The design stage is a technique to facilitate a creative approach to the project and includes the look, feel, and flow of the program to be developed. In this phase, the researcher developed initial content ideas, then created flowcharts and storyboards. The other stage, which is the third stage, is the development stage. In this phase, the researcher completed the product that was initiated in the previous two stages, as well as supplemented it with additional documents such as supporting material documents and technical guidelines. Then, an alpha test was conducted and revisions were made based on feedback from the validators.

Alpha testing is a validation process conducted by media experts and content experts to assess the quality and suitability of the learning evaluation media developed. The validation sheets' results are used as a reference for revising the media and content. The learning evaluation media product in the form of a game that has been validated and revised can be declared ready for implementation.

2.2 Data Collection Techniques

After the media was designed, alpha testing was conducted. Alpha testing involved 6 validators who are qualified as experts, namely 3 content experts and 3 media experts. The data obtained consist of quantitative and qualitative data. Quantitative data were obtained from questionnaires that were then converted into numbers or quantities, while qualitative data were obtained from comments and suggestions from all validators, which were then collected to be used as references in revising the media or product. Questionnaire sheets for content experts and media experts were built based on the guidelines from Ahmad Tanzeh (2009), as seen in Table 1 and Table 2.

**Table 1. Guidelines for material validation**

| No. | Aspect | Indicators |
|---|---|---|
| 1. | Curriculum Aspect | Alignment of learning with Competency Standards |
| | | Selection of indicators and objectives |
| 2. | Presentation of Evaluation Questions Aspect | Concept alignment |
| | | Organized evaluation questions |
| | | Question difficulty level |
| 3. | Evaluation Aspect | Alignment of evaluation and objectives |
| | | Alignment of evaluation and concepts |
| 4. | Linguistic Aspect | Language use |
| | | Language suitability |
| | | Easy-to-understand sentences |

**Table 2. Guidelines for media validation**

| No. | Aspects | Indicators |
|---|---|---|
| 1. | Display Quality Aspect | Learning media display |
| | | Presentation of the initial display |

| | | |
|---|---|---|
| | | Clarity of material in the media |
| | | Proportion suitability of images |
| 2. | Learning Media Operation Aspect | Ease of operation |
| 3. | Implement Ability Aspect | Applicable |
| 4. | Interface Aspect | User friendly |

Assessment of the development of learning media by experts (validators) is in the form of a Likert scale consisting of four categories, namely Very Good (SB), Good (B), Poor (K), Very Poor (SK). The data obtained from the alpha test for media and content categories were then analyzed to determine their validity level using the following percentage formula:

$$\bar{X} = \frac{\sum x}{N}$$

explanation:

$\bar{X}$ = Average validation (assessment) score from expert
ΣX = Total validation (assessment) score from expert
N = Number of questions

From the average score data given by the validators, the feasibility percentage of the resulting media is calculated using the formula:

$$\text{Feasibility Percentage} = \frac{Overall\ Average\ Score}{Highest\ Rating\ Score} \text{ x } 100\ \%$$

The results of media development, which initially had quantitative scores value, were then converted into qualitative data.

**Table 3.** Criteria for Media and Material Feasibility

| Percentage | Qualification | Feedback |
|---|---|---|
| 78% -100 % | Very feasible | Media can be used without revision. |
| 52% - 77% | Feasible | Media can be used with minor revisions. |
| 26 % - 51 % | Feasible enough | Media needs to be revised and reviewed before use |
| 0 % - 25 % | Less feasible | Media needs to be completely revised before use. |

Source**: (Oktaviara dan Pahlevi, 2019)**

## 3. Results and Discussion

The product developed from this research is a learning media for student evaluation in the form of a snakes and ladders game on the topic of vibration and wave, designed for 9th-grade middle school students, utilizing Google Slides. The evaluation results from the validators include various suggestions for improving both the content and the media, ranging from images, colors, to layout. Additionally, they provided assessments of the feasibility, revealing the level of suitability of the learning media produced. The content expert assessment was conducted to determine the quality of the presentation of evaluation questions and evaluations presented in the Google Slides learning media in the form of a snakes and ladders game on the

topic of vibration and wave at the middle school level. Below is the data on the validation results by the content experts.

**Table 4.** Data from validation by material experts

| Aspects | Indicators | Scores from Material Experts | | | Total Scores from Experts | ∑ Scores per Aspect | Average Score | Percentage of Feasibility | Qualification |
|---|---|---|---|---|---|---|---|---|---|
| | | E1 | E2 | E3 | | | | | |
| Curriculum Aspect | 1 | 4 | 4 | 3 | 11 | 22 | 3,67 | 91,75 % | Very Feasible |
| | 2 | 4 | 4 | 3 | 11 | | | | |
| Presentation of Evaluation Questions Aspect | 1 | 4 | 4 | 4 | 12 | 36 | 4,00 | 100% | Very Feasible |
| | 2 | 4 | 4 | 4 | 12 | | | | |
| | 3 | 4 | 4 | 4 | 12 | | | | |
| Evaluation Aspect | 1 | 4 | 3 | 3 | 11 | 21 | 3,50 | 87,5% | Very Feasible |
| | 2 | 2 | 4 | 4 | 10 | | | | |
| Linguistic Aspect | 1 | 3 | 3 | 4 | 10 | 32 | 3,56 | 89 % | Very Feasible |
| | 2 | 3 | 3 | 4 | 10 | | | | |
| | 3 | 4 | 4 | 4 | 12 | | | | |
| **Total Scores** | | | | | | **111** | **3,68** | **92,06 %** | |

*Remarks: E1, E2, and E3 are Expert 1, Expert 2, Expert 3 respectively.*

According to the validation data from material experts in the Table 2 above, the assessment of the materials used in the learning media on the subject of vibrations and waves for junior high school level obtained an overall score of 92.06%, qualifying as highly feasible. Hence, the materials used in the Google Slides-based learning media in the form of a snakes and ladders game are very feasible for use with revisions according to suggestions. The scores obtained from the curriculum aspect received a percentage of 91.75% with the qualification criteria of highly feasible, the presentation of evaluation questions aspect received a percentage of 100% with the criteria of highly feasible, the evaluation aspect received a percentage of 87.5% with the criteria of highly feasible, and the linguistic aspect received a percentage of 89% with the criteria of highly feasible.

Then, the assessment by media experts can be seen in table 5 which aims to determine the feasibility of the Google Slides-based learning media in the form of a snakes and ladders game from the aspects of display quality, learning media engineering, feasibility, and interface.

**Table 5.** Data from validation by media experts

| Aspects | Indicators | Scores from Media Experts | | | Total Scores from Experts | ∑ Scores per Aspect | Average Score | Percentage of Feasibility | Qualification |
|---|---|---|---|---|---|---|---|---|---|
| | | E1 | E2 | E3 | | | | | |
| Display Quality Aspect | 1 | 4 | 3 | 4 | 11 | 42 | 3,5 | 87,5 % | Very Feasible |
| | 2 | 4 | 3 | 4 | 11 | | | | |
| | 3 | 4 | 3 | 4 | 11 | | | | |
| | 4 | 3 | 3 | 3 | 9 | | | | |
| Learning Media Operation Aspect | 1 | 4 | 3 | 4 | 11 | 21 | 3,5 | 87,5 % | Very Feasible |
| | 2 | 3 | 3 | 4 | 10 | | | | |
| Implement ability Aspect | 1 | 4 | 3 | 4 | 11 | 21 | 3,5 | 87,5 % | Very Feasible |
| | 2 | 3 | 3 | 4 | 10 | | | | |
| Interface Aspect | 1 | 4 | 3 | 4 | 11 | 31 | 3,4 | 85 % | Very Feasible |
| | 2 | 3 | 3 | 4 | 10 | | | | |
| | 3 | 3 | 3 | 4 | 10 | | | | |
| **Total Scores** | | | | | | **115** | **3,47** | **86,87 %** | |

*Remarks: E1, E2, and E3 are Expert 1, Expert 2, Expert 3 respectively.*

According to the validation data from media experts in Table 4 above, the results indicate that the feasibility of the Google Slides-based learning media in the form of a snakes and ladders game for the topic of vibrations and waves at the middle school (SMP/MTs) level overall achieved a score of 86.87%, with a classification of very feasible. From the aspect of display quality, it received a score of 87.5%, classified as very feasible. The aspect of learning media operation received a score of 87.5%, also classified as very feasible. The aspect of implement ability received a score of 87.5%, classified as very feasible, and the final aspect, the interface, received a score of 85%, also classified as very feasible.

From the assessment by material expert validators of the Google Slides-based learning media in the form of a snakes and ladders game for the topic of vibrations and waves at the middle school (SMP/MTs) level, each aspect can be seen in the material expert diagram in Figure 1. The analysis of data obtained from material experts in the figure 1 shows that the feasibility of the Google Slides-based learning media in the form of a snakes and ladders game for the topic of vibrations and waves at the middle school (SMP/MTs) level, which was developed, received an overall average score of 86.87%, falling within the qualification of very feasible. While the results of the assessment by media experts on the Google Slides-based learning media in the form of a snakes and ladders game for the topic of vibrations and waves at the middle school (SMP/MTs) level for each aspect can be seen in Table 5 above and are presented again in Figure 2. The data obtained from the media expert validators in Figure 2 shows that the feasibility of the Google Slides-based learning media in the form of a snakes and ladders game for the topic of vibrations and waves at the middle school (SMP/MTs) level, which was developed, received an overall average score of 92.06%, falling within the qualification of very feasible.

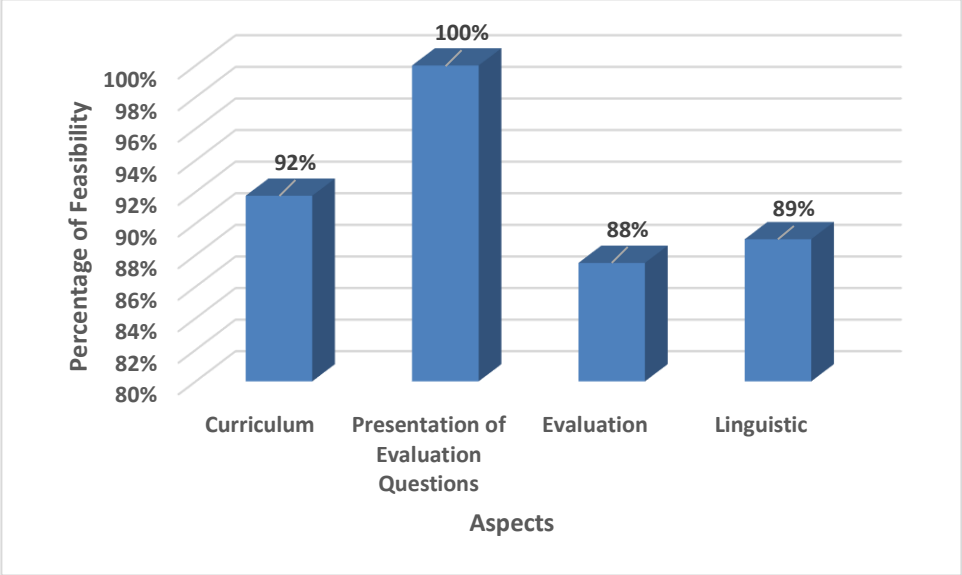


**Figure 1.** Validation by Material Experts

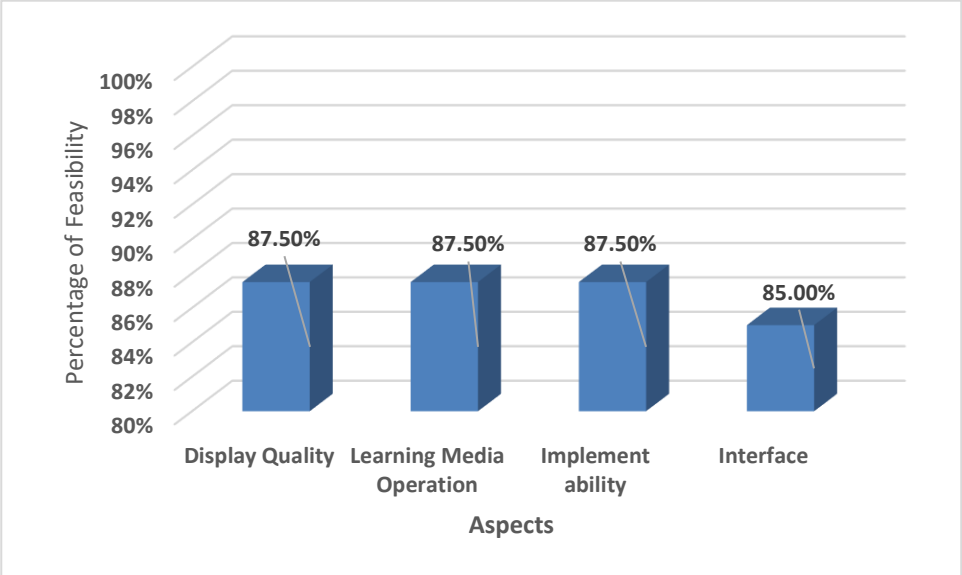


**Figure 2.** Validation by Media Experts

The results of the research on the Google Slides-based learning media in the form of a snakes and ladders game for the topic of vibrations and waves at the middle school (SMP/MTs) level align with previous research conducted by **Fitriana (2008)**, titled "*Pengembangan Media Permainan Ular Tangga Terintergrasi Asmaul Husna Pada Pembelajaran Tematik*." The results of the study showed a feasibility percentage of 92% from subject matter experts, 90% from media experts, and 92% from students. Therefore, the assessments by

subject matter experts and media experts on the feasibility of the developed learning media indicate that the learning media is suitable for use.

## 4. Conclusion

Based on the results of the development of the Google Slides-based learning evaluation media conducted by the researcher, it can be concluded that the design of the Google Slides media in the form of a snakes and ladders game for the topic of vibrations and waves at the middle school (SMP/MTs) level was carried out through three stages: analysis, design, and development, which then resulted in learning media in the form of an evaluation game. Furthermore, the assessment of the feasibility of the Google Slides-based learning evaluation media in the form of a snakes and ladders game for the topic of vibrations and waves at the middle school (SMP/MTs) level is categorized as highly feasible, where the validation results by media experts obtained an average score of 86.87% and the validation results by subject matter experts obtained an average score of 92.06%. Therefore, it can be stated that the Google Slides media in the form of a snakes and ladders game for the topic of vibrations and waves at the middle school (SMP/MTs) level is highly suitable for use as evaluation media in learning activities.

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### Author Contributions

NF collected data, analysed the data, and wrote the original manuscript. MAW analysed data and wrote the revised manuscript. SN supervised the research outcomes.

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