

# Development of Student Worksheets Assisted by Powtoon Media on Elasticity and Hooke's Law to Improve Student Learning Outcomes

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**Abstract:** This research is a type of development research (Research and Development). with the aim of knowing the quality (Validity, Practicality, and effectiveness) of student worksheets assisted by Powtoon media on the material Elasticity and Hooke's Law. This research is a type of development research that refers to 4-D Model development research consisting of four development stages, namely Defining, Designing, Developing, and Disseminating. After being validated by 3 validators, a limited trial was carried out by 36 class XI participants at SMA Negeri 1 Kabila. Data collection techniques in this research used expert validation sheets, teacher and student response questionnaires, and student learning outcome tests. The research results show that validation is in the "valid" category. The practicality of students' worksheets assisted by Powtoon media can be seen from the results of the implementation of learning in class, and teachers and students show the category "very well implemented." It can be concluded that the worksheet for students developed with the help of Powtoon media has met the criteria of being valid, practical, and effective so that it is suitable for use in physics learning at school. The difference between this research and research conducted by researchers lies in the media used, the materials used, and the location studied. Another difference is that researchers only use 3 stages in the four-D model, namely define, design, and develop.

**Keywords:** Development; Powtoon Media; Student Worksheets.

## Introduction

Education is the main factor in the formation of the human person. All parties highly expect the presence of a quality educational institution. Education is the most critical aspect of producing human resources. With advanced education, we can advance the nation and state. Everyone has the right to receive a decent education. Therefore, education is essential for everyone to realize the ideals of the nation and state in accordance with the contents of the 1945 Constitution. The problem that is often faced in the world of education is a weak learning process. The process of teaching and learning activities in the classroom is more directed at children's ability to understand the subject matter. Meanwhile, the theory learned by students lacks application in everyday life. Moreover, natural science concepts, especially in the field of physics, are essential due to the complexity of physics concepts.

Physics is a branch of science that has an extensive reach, studying the behavior and structure of matter. Physics is the study of natural phenomena, both qualitatively and quantitatively, using mathematics. In another sense, physics is one of the fields of study contained in the physics curriculum. It is essential to be taught in formal schools because it is closely related to natural phenomena, which are helpful in solving problems in everyday life [1].

Learning will run well if it is supported by assistance and practical learning resources. One of the learning alternatives used by teachers is Student

worksheets. Apart from being able to improve the quality of students' learning, student worksheets can also help students get information about the concepts they will learn through experiments. Student worksheets is a printed teaching material in the form of sheets of paper containing summary material and instructions for implementing learning tasks that must be carried out by students, which refer to the essential competencies that must be achieved [2]. Student worksheets is printed teaching material that contains instructions and activity steps to complete something [3].

Through the use of student worksheets, students will gain direct experience through the practical activities they carry out. student worksheets are printed teaching materials that contain guides that students can use to develop their abilities [4]. Learning with student worksheets gets a good response from students [5]. This is because the use of student worksheets is exciting and can arouse students' interest and motivation. One way to support learning progress in terms of developing student worksheets is to help with effective and efficient learning videos using Powtoon videos. powtoon is an online web application that can be used to create presentations with exciting animation features, including handwriting animation, cartoon animation, apparent transition effects, and straightforward timeline settings. Almost all features can be accessed on one screen, which makes Powtoon easy to use in the process of creating a display. The Powtoon application can be accessed by anyone, including teachers and students [6].

## How to Cite:

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Based on the results of observations made by researchers at SMAN 1 Kabila school and interviews with physics teacher Elvin Sapali S.Pd, during the learning process, they only provided materials in the form of photocopies of the material as learning media for students to study. This makes learning in the classroom less effective. According to one Student's confession, when the learning was taking place, the subject teacher only provided photocopies of the material, so they were less interested and felt bored with the learning.

Based on these problems, the author is interested in conducting research with the title Developing Student Worksheets with the help of Powtoon media to improve student learning outcomes. This research aims to see the level of validity of student worksheets assisted by Powtoon media, which were developed on the topic of elasticity and Hooke's law to improve student learning outcomes.

**Research Methods**

This research is a type of development research (Research and Development). This research uses a 4-D development model. This research was carried out at SMA N 1 Kabila, Jl. Sawah Besar, Oluhuto, District. Bone Bolango, Gorontalo Province for 2 months. Research Instruments are one of the tools used to measure natural and social phenomena. The instruments used in this research are validation sheets, practicality, and effectiveness.

**Validity**

Validation is carried out by providing a validation instrument to the validator to see whether or not the learning Implementation that will be developed is valid. Validation of student worksheets assisted by Powtoon media is analyzed using the formula:

$$X = \frac{\sum x}{n} \quad [2]$$

Information:

X = Average value

$\sum x$  = The total number of validator answers

n = number of validators

To determine the level of validity it can be seen in the following table:

**Table 1.** Validity Criteria

Interval	Assessment criteria	Information
3.6 < P < 4	Very valid	It can be used without revision
2.6 < P < 3.5	Valid	It can be used with revisions
1.6 < P < 2.5	Not valid	It cannot use many revisions yet
1 < P < 1.5	Invalid	It is not yet usable and still requires revision

**Practicality**

1. Learning Implementation Observation Sheet

The learning implementation observation sheet is used to see an overview of the learning implementation of student worksheets that have been developed with the help of Powtoon Media. This observation data was obtained through the learning implementation observation worksheet instrument to evaluate the learning that occurs in the classroom. Learning tools are said to be practical if teachers and students consider the learning tools to be easy to use and in accordance with the researcher's plans. Implementation of student worksheet assisted by Powtoon media was analyzed using the formula:

$$\% \text{ Implementation} = \frac{\text{steps taken}}{\text{Total implementation of the plan}} \times 100\% \quad [7]$$

To determine the level of implementation, it can be seen in the following table:

**Table 2.** Learning Implementation Criteria

Presentase %	Criteria
80-100	Very Executed
66-79	Done
56-65	Done
40-55	Less Implemented
30-39	Very Less Implemented

2. Student Questionnaire

The questionnaire sheet is used to see students' responses or responses in implementing learning using student worksheets assisted by Powtoon media that have been developed. So, it can be seen whether the Implementation is practical or not to be used in the learning process. The student worksheet response questionnaire using the developed Powtoon media was analyzed using a Likert scale. Each meeting item uses a grading Likert scale from very positive to very harmful in the form of, among others:

SS = Strongly Agree

S = Agree

R = Doubtful

Ts = Disagree

STS = Strongly Disagree

**Table 3.** Likert Scale

Position statement	SS	S	R	TS	STS
Positive statement	5	4	3	2	1
Negative Statements	1	2	3	4	5

**Effectiveness**

Determining the effectiveness of student worksheets assisted by Powtoon media is obtained in two ways, namely through observation and tests.

1. Student Activity Observation Worksheet

Observing student activities uses an activity observation sheet. Observation sheets are used during

learning. Student activity sheets are used to see student activity in the learning process, such as formulating problems, designing experiments, collecting data, and making conclusions. In participating in learning for three meetings, the results of observations of student activities were analyzed using the formula [8]:

$$\% \text{ Students's Activity (PA)} = \frac{\text{Score (A)}}{\text{Score Maximum (N)}} \times 100\%$$

Information:

- PA: Student Activities
- A: Total score obtained
- N: Maximum score

Assessment of student activities is carried out by trying the average total score obtained using the criteria in the table below:

**Table 4.** Criteria for Student Activeness

Score Range	Interpretation
86 % - 100 %	Very good
76 % - 85 %	Good
66 % - 75 %	Enough
56 % - 65 %	Not enough
0 % - 55 %	Very less

[8]

## 2. Learning outcomes test

Analysis of learning outcomes can be obtained by calculating tests to determine the completeness of each Student by analyzing individually or in groups. Learning outcome data includes pretest and posttest, where you will see an increase in student learning outcomes before and after following the teaching and learning process using the learning tools that have been developed in comparison completeness. Data on learning outcomes in the cognitive domain are carried out against normalized gain scores in learning. The normalized gain score is the comparison of the actual average gain with the maximum average. The actual gain score is the gain score obtained by students, while the maximum gain score is the highest gain score that students may obtain. To get the n-gain value from the concept understanding score, use the following equation [9].

$$g = \frac{\% \text{ Skor post} - \text{skor pre}}{100 - \% \text{ skor pre}}$$

Information:

- g = gain increased ability to understand concepts
- s pre = the average score of the Student's initial test
- s post = Student's final average score

The obtained N-gain values are then interpreted based on the table:

**Table 5.** N-Gain Test Criteria

Score	Criteria
$(<g>\leq 0.7$	High
$0.3 < (g) < 0.7$	Medium
$(<g><0.3$	Low

[9]

## Results and Discussion

### Validity

In this research, validation was carried out to see the level of validity of the student worksheets developed. Three experts or validators carry out validation. The product validated in this stage is the student worksheet (LKPD). To produce an LKPD that is valid to use, it cannot be separated from experts/validators who have provided corrections and suggestions on the results of the LKPD design assisted by Powtoon media (draft 1) that has been made (revised validation results).

The results of the LKPD validation in this development research are as follows. Validation of student worksheets (LKPD) assisted by Powtoon media was carried out by looking at several aspects. The aspects to be considered are content construction, readability, language, and appearance. The results of student worksheet validation can be seen in Table 2 below:

**Table 6.** Validation of Student Worksheets

Validator	Overall Validator Average	Overall Validator Average	Criteria
Validator I	3		
Validator II	3,1	3,0	Valid
Validator III	3		

Table 6 shows that the average validation value is 3.0, which is in the valid category ( $2.6 < p < 3.5$ ). The assessment results from the three validators show that the LKPD assisted by the developed Powtoon media is good and can be used with slight revisions. Three validators carry out the learning outcomes test (THB) by looking at several aspects. The aspects to pay attention to are content construction, readability, and language. The results of the study results test (THB) are shown in Table 7 below:

**Table 7.** Learning Outcome Test Validation

Validator	Overall Validator Average	Overall Validator Average	Criteria
Validator I	3,5		
Validator II	3,5	3,4	Valid
Validator III	3,3		

A validation valid instrument is an instrument that is truly appropriate for measuring what is to be measured or can be said to be valid, namely the extent to which a measuring instrument is appropriate in measuring data, in other words, whether the measuring instrument used can measure something that is being measured [10].

### Practicality

#### 1. Results of Learning Implementation Data Analysis

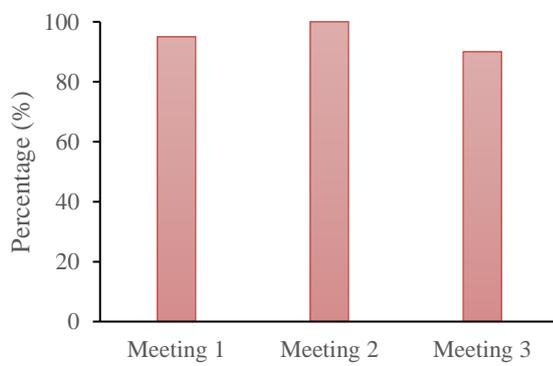
This learning implementation data is used to determine the practicality of a student worksheet that is developed. The results of the analysis of learning implementation showed that the average percentage of

learning implementation in 3 meetings can be seen in the following table:

**Table 8.** Percentage of Learning Implementation

Meeting	Percentage	Criteria
1	95	Very Executed
2	100	Very Executed
3	90	Very Executed
Average	95	Very Executed

Based on Table 8, it can be seen that the average percentage achievement of learning implementation during 3 meetings at SMA N 1 Kabila is 95%. This shows that the implementation of learning is in the category of "very implemented." Researchers can conclude that learning with the LKPD developed is classified as very practical. This shows that learning is in accordance with the learning implementation plan (RPP).



**Figure 1.** Percentage of meeting implementation

Figure 1 shows the percentage of implementation of learning carried out in 3 meetings, reaching the criteria of very successful implementation with an average score of 95% based on the criteria [7].

2. Results of Student Response Questionnaire Data Analysis

The three (3) indicators contained in the student response questionnaire sheet consist of negative and

**Table 9.** Student Response Questionnaire Results

Indicator	Strongly agree	Agree	Doubtful	Disagree	Strongly Disagree
1	24%	60%	11%	4%	0%
2	51%	23%	19%	6%	0%
3	38%	24%	17%	3%	0%

3. Results of Teacher Response Questionnaire Data Analysis

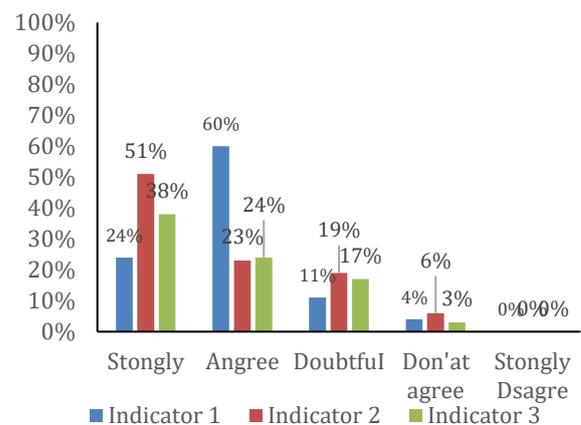
The teacher questionnaire sheet was given after the learning process for 3 meetings. The aim was to see the teacher's response to the practicality of the device using the problem-based learning model. There are 3 indicators

**Tabel 10.** Hasil Angket Respon Guru

Indicator	Strongly agree	Agree	Doubtful	Disagree	Strongly Disagree
Lesson plan	65%	35%	0%	0%	0%
Student worksheet	79%	21%	0%	0%	0%
Learning outcome	69%	31%	0%	0%	0%

positive statements presented on a Likert scale, namely responses to students' opinions using LKPD assisted by Powtoon media in learning, the effectiveness of using LKPD assisted by Powtoon media, and student learning outcomes after taking part in learning using LKPD assisted by Powtoon media. Student response data was obtained through a student questionnaire at SMA N 1 Kabila with a total of 36 students consisting of 20 items.

Based on Table 9, the average achievement of student responses at SMA N 1 Kabila is towards the development of student worksheets (LKPD) assisted by Powtoon Media containing practical requirements so that they can be used in learning with an average student response reaching 84.85%. The percentage of student responses to the questionnaire is also shown in Figure 2.



**Figure 2.** Student Response Questionnaire Test

Based on figure 2 which shows the results of the student response questionnaire towards the development of media-assisted student worksheets (LKPD) Powtoon that shows that students respond the most positive adapted Student worksheets assisted by Powtoon media, So it can be concluded that the learning device has met the requirements. Practicality is based on student responses and can be used in learning [11].

contained in the teacher response questionnaire, including RPP, LKPD, and learning outcomes test (attachment). Then, the 3 indicators are described in a table with 48 statements with a score for each statement using a Likert scale. The data results from teacher responses are presented in the table 10.

The percentage of teacher response questionnaires is also shown in Figure 3.

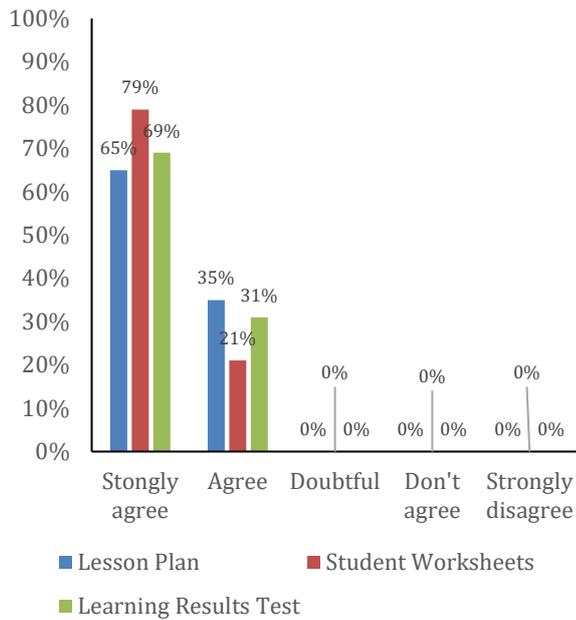


Figure 3. Teacher Response Questionnaire

Figure 3 shows that the results of the teacher response questionnaire to the student worksheets (LKPD) that were developed meet practical criteria for use in physics learning. The teachers' responses to the RPP were 65% strongly agree, 79% strongly agree to the LKPD, and 69% strongly agree to the learning outcomes test. The practicality of learning tools is determined by expert or practical judgment and the fact that the tools developed can be used. In fact, the tools developed in the field can be applied with practical criteria.

**Effectiveness**

1. Results of Student Activity Data Analysis

Student activity data is obtained through student activity sheets. Based on the results of observations made by researchers, the percentage of student activity obtained in 3 meetings can be shown in the following table 11.

Table 11. Percentage of Student Activities

Meeting	Percentage of Student Activities (%)	Criteria
1	93	Good
2	92,5	Very good
3	93	Very good
Average	93	Very good

The percentage of student activity is also shown in Figure 4. From Figure 4, it can be seen that at the first meeting, the percentage was 93%, according to good criteria. At the second meeting, the percentage was 92.5%, with very good criteria. The third meeting had a percentage of 93% and very good criteria. Based on the average of the three meetings, 93% was obtained with very good criteria.

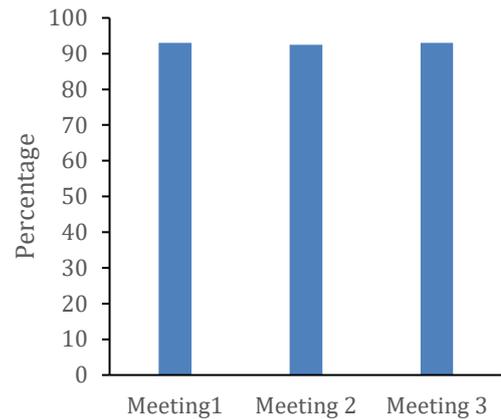


Figure 4. Percentage of student activity

2. Results of Analysis of Learning Outcomes Tests

The increased competency is cognitive. Cognitive improvement can be seen in student learning outcomes through the learning outcomes test (THB) in the form of 10 multiple-choice questions and essays. The test consists of a pretest and posttest. The pretest is given before learning takes place or before treatment is carried out, while the posttest is given after learning takes place or after treatment is carried out. The Learning Results Test (THB) in this trial was given to students after the third meeting in class XI Science 3 SMA N 1 Kabila with a total of 36 students. N-Gain analysis is used to see an increase in learning outcomes. The average results of the pretest scores, posttest scores, and N-Gain scores are presented in the following table:

Table 12. Learning Outcomes Test

Respondent	Pretest (%)	Posttest (%)	N-Gain	Category
36	8.958	74.132	0.7238663	High

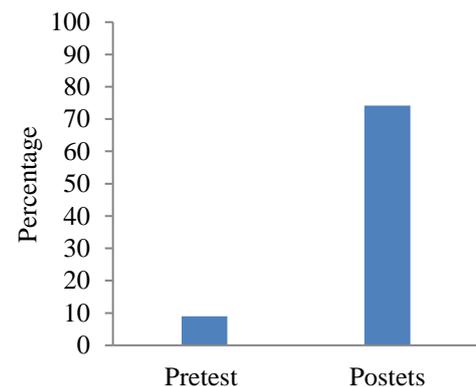


Figure 5. Learning Outcomes Test

The percentage of student learning achievement tests can be shown in Figure 5. Based on Table 5 and the graph above, the posttest value is 74.132, and the achievement of the N-Gain value at SMA Negeri 1 Kabila is 0.7238663, in the test results obtained indicate that these results are in the "high" category. The researcher can conclude that the LKPD was developed very effectively.

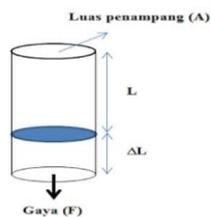
## Development of Student Worksheets (LKPD) with the help of Powtoon media (Material on Elasticity and Hooke's Law)

### 1. Elasticity

Springs and rubber are examples of elastic objects. Elasticity is the ability of an object to return to its initial shape as soon as the external force applied to the object is removed (released). This property applies when the applied force is smaller than the elastic limit. The elastic limit is the point where elastic properties still apply to an object that is given a force. Elastic objects found in daily life include rubber bands, slingshots, and archery players. Some objects, such as clay, plasticine, and cake dough, do not return to their original shape immediately after the external force is removed. Objects like this are called inelastic objects or plastic objects.

#### Tension

Tension is a condition where an object experiences an increase in length when a force is applied to one end while the other end is held. A wire with cross-sectional area  $A$  experiences a tensile force  $F$  at its ends, as shown in Figure 6.



**Figure 6.** A wire with cross-sectional area  $A$  is pulled with force  $F$

As a result of this tensile force, the wire experiences tensile stress  $\sigma$  which is defined as the result between the tensile force  $F$  experienced by the wire and the cross-sectional area  $A$

#### 1) Regangan (Strain)

Strain is a relative change in the size or shape of an object under stress. A tube of original length  $L_0$  is pulled by a force  $F$  so that its length increases to  $L_0 + \Delta L$ . In this change, the tube experiences strain, which is a quantity that states the ratio between the change in length and the original length.

#### 2) Elastic Modulus or Young's Modulus

The two quantities that we have discussed above, namely stress and strain, actually co-occur. That is, when an object experiences a force in a direction parallel to the length of the object, the force per unit area produces tension. With this tension, the object will increase in length, so if the length increases compared to the original length, then a strain value is obtained.

The comparison between the magnitude of the stress and the magnitude of the strain is expressed as the modulus of elasticity, which is a number that shows the material's resistance to deformation (change). The greater the value of the modulus of elasticity of an object, the more difficult it is for the object to change. Calculationally, to determine the modulus of elasticity, it is sometimes also called Young's modulus.

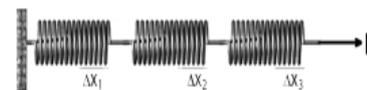
## 2. Hooke's Law

Hooke's law states that in the elastic region of an object, the amount of increase in length is proportional to the force acting on the object. The relationship between the force stretching a spring and the increase in its length in the elastic region was first investigated by Robert Hooke (1635-1703). The results of his investigation are expressed in a law known as Hooke's law, which states that in the elastic region of an object, the amount of increase in length is proportional to the force acting on the object.

The relationship between the forces that stretch the spring and the increase in length in the elastic region was first investigated by Robert Hooke (1635-1703). The results of his investigation are expressed in a law known as Hooke's law, which states that in the elastic region of an object, the amount of increase in length is proportional to the force acting on the object.

#### 1) Springs are arranged in series.

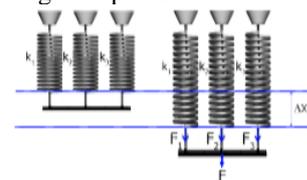
The springs are arranged in series, meaning they are arranged in a row like Figure 7.



**Figure 7.** Series arrangement

One spring has a constant  $k_1$ , the second spring has a constant  $k_2$ , and the third spring has a constant  $k_3$ . If the three are arranged in series, then as a whole, they have a combined constant, which is called the series constant with the symbol  $k_s$ . When one end of a series of springs is pulled, as shown above, each spring will increase in length. The final increase in the length of the spring arrangement is the sum of the increases in the length of the three springs.

#### 1) Springs arranged in parallel



**Figure 8.** Parallel Arrangement

One spring has a constant  $k_1$ , the second spring has a constant  $k_2$ , and the third spring has a constant  $k_3$ . If the three are arranged in parallel, then when pulled with a force  $F$ , all three springs will experience the same increase in length. The force  $F$  is distributed across the three springs with respective magnitudes  $F_1$ ,  $F_2$ , and  $F_3$ .

## Development of Student Worksheets Assisted by Powtoon Media

Figure 9 is a display of the identity of the LKPD assisted by Powtoon media, which was developed where the display contains the identity of the school name, class/semester, subjects, and experiments to be carried out.



Figure 9. Student Worksheet Identity Display

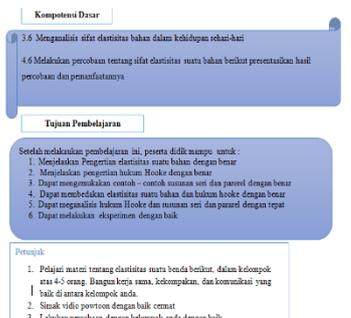


Figure 10. Display of Basic Competencies and Learning Objectives



Figure 11. Display Problem formulation on Video Powtoon

In Figure 11, there is a display of the formulation of the problem on the LKPD. Before starting the experiment, students first analyzed the PowerPoint video displayed.

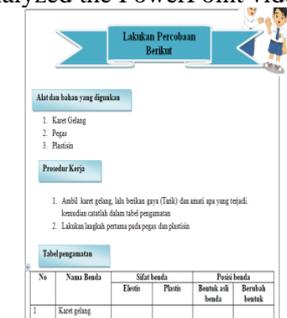


Figure 12. Data Collection Display

Figure 12 is a display of experiments and data collected by students, including tools, materials, and work procedures. Figure 13 is a display of data analysis from the results of experiments carried out by students, namely by filling in several questions that the researcher has prepared. Figure 14 is a display of the conclusions that students will use after experimenting. Students are directed to provide conclusions after experimenting.



Figure 13. Data Analysis Display



Figure 14. Conclusion Display

Validity

The validity of the LKPD assisted by Powtoon media, which was developed, was based on expert validation carried out by 3 physics validator experts using validation instruments provided by the researchers consisting of construct, readability, language, and appearance. Furthermore, the results from several validators stated that the student worksheets assisted by Powtoon Media were suitable for use with minor revisions.

Based on the results of validation by experts, good data was obtained and declared valid. This refers to the average validation score for student worksheets obtained, which is 3.0. The assessment of learning outcomes tests is based on several aspects such as construction, content, readability, and language.

The validation results from the three validators show aspects that are in accordance with the indicators. However, there are only a few revisions, so it can be concluded that the student worksheet (LKPD) assisted by Powtoon Media is suitable for use or valid with only a few revisions, according to [12]. The score is in the "Valid" category with information that can be used with revision.

Looking at the THB results, the average validation obtained is 3.4, which is in the valid category. The validation results from the three validators show aspects that are in accordance with the indicators. However, there are only a few revisions, so it can be concluded that the student worksheet (LKPD) assisted by Powtoon Media is suitable for use or valid with only a few revisions, according to [2]. The score is in the "Valid" category with the information that it can be used with revision.

### **Practicality (Practicality of Student Worksheets Assisted by Powtoon Media)**

The practicality of student worksheets (LKPD) can be determined based on (1) results of observations of the implementation of learning activities, (2) student responses, and (3) teacher responses. Learning tools are said to be practical if teachers and students respond well to the learning tools developed.

Based on the results found from research data, learning implementation at the first meeting reached 95%, with 5% not being implemented. At the second meeting, learning implementation reached 100%, which means all learning implementation was carried out, and at the third meeting, learning implementation reached 90%, with 10% not being implemented. The data found and analyzed above shows that it has more excellent implementation than those that were not implemented. This is in line with the opinion of Purboningsih (2015), who states that learning tools are said to be practical if teachers and students consider the learning tools to be easy to use and in accordance with the researcher's plans.

Practicality can also be seen from the students' responses to the LKPD assisted by Powtoon media, which was given after learning was completed in three meetings. Students' responses to LKPD assisted by Powtoon media consist of 3 indicators containing 20 statements by giving a score to each statement using a Likert scale. For the first indicator, there are 10 statements, then the second indicator contains 6 statements, and the third indicator contains 4 statements, each containing positive and negative statements. In a positive statement, indicators of implementation effectiveness 1-5 are included in the positive statement, while activities 5-1 are included in the negative category. Based on the product test data in Table 4.6, it can be seen that the indicators of students' opinions using LKPD assisted by Powtoon media in learning received a response of 24% strongly agree, 60% agree, 11% unsure, 4% disagree, and 0% strongly disagree. On indicators of effectiveness of the use of assisted LKPD powtoon media received a response of 51% strongly agree, 23% agree, 19% are unsure, 6% disagree, and 0% strongly disagree. Then, the indicators of student learning outcomes after participating in learning using LKPD strongly agree with the learning process. This matter is in line with research conducted [13]. Namely, practicality can be seen in the student response questionnaire.

### **Effectiveness (Learner Worksheets with the help of Powtoon media)**

The effectiveness of the student worksheet (LKPD) assisted by the developed Powtoon media can be seen in the student activities and student learning outcomes during 3 meetings. Learning tools are practical if they can influence student learning completion in line with expectations or more than the same as the set KKM. Menuurt (Mustaming et al., 2015) stated that in development research in the field of learning, the indicators to state that the implementation of the learning tools in this research are said to be effective, for example, are seen from the components (1) student

activities; (2) student learning outcomes. The assessment of student activity is carried out by observers when learning takes place in the classroom. Students fill in the student activity observation sheet by observing what happens in the classroom, including the activity of students in groups.

Based on the results of the analysis of the percentage of student activities carried out at SMA Negeri 1 Kabila, it can be seen that at the first meeting, the percentage was 93% with good criteria. At the second meeting, the percentage was 92.5% with very good criteria, and at the third meeting, the percentage was 93% with very good criteria. Based on the average of the three meetings, namely 93%, the criteria were very good.

The second effectiveness is seen based on student learning outcomes, which refer to the cognitive domain. This is in line with research conducted by [14], which states that learning tools are said to be effective in terms of learning outcomes tests. Based on data obtained from the distribution of essays and multiple-choice tests that had been tested in class -Gain 0.7238663% in the high category.

The effectiveness of learning tools in the practical category can be seen from the level of achievement of students' learning outcomes towards learning objectives, which have been calculated using the N-Gain test, which is measured using tests in the form of pretests and PST tests. Learning tools are said to be effective if there is a change in learning outcomes or abilities possessed by students.

The advantages and disadvantages of using student worksheets assisted by Powtoon media are that they can be accessed easily by teachers and can be used to increase students' interest in learning during the learning process. Furthermore, the disadvantage of student worksheets assisted by Powtoon media is that in making this media, an adequate internet network is needed.

In the learning process in the classroom, teachers use student worksheets (LKPD), whereas, in the LKPD, there are Powtoon media that students can access.

### **Conclusion**

The research conducted at SMA N 1 Kabila focused on evaluating the effectiveness of student worksheets (LKPD) assisted by Powtoon media for the elasticity and Hooke's law material. The quality of the developed LKPD was assessed based on three crucial aspects: validity, practicality, and effectiveness. In terms of validity, the student worksheets received an average score of 3.0 in the "valid" category, according to expert assessments. Similarly, the Learning Results Test (THB) scored 3.4 in the "valid" category, indicating that the LKPD was deemed suitable for instructional use. Moving on to practicality, the student worksheet assisted by Powtoon Media demonstrated a high level of practicality during learning implementation. With an average percentage of implementation at 95%, categorized as "Very implemented," the approach

received positive responses from a questionnaire, further affirming its practicality in the educational setting. Effectiveness was evaluated through the lens of student activity and learning outcomes. The results of the students' activity sheet indicated a commendable 90% rating, categorized as "very good." Simultaneously, the Learning Results Test (THB) showed an N-Gain of 0.72, classifying it in the "high" category. As a result, the researcher concluded that the student worksheet (LKPD) assisted by Powtoon Media met the criteria for effectiveness, providing a valuable contribution to the learning process. The research findings highlight the success of the developed student worksheets in terms of validity, practicality, and effectiveness, emphasizing their positive impact on the quality of learning in the context of elasticity and Hooke's law material at SMA N 1 Kabila.

## References

- [1] Chairunnisa, N.A., Mursalin, M., & Ntobuo, N. E. (2022). Development of Jire Collaborative Model Learning Tools Based on IT (Information and Technology) Physics Material Temperature and Heat. *Ideas: Educational, Social, and Cultural Journal*, 8(3), 805.
- [2] Budiarmo, A. S. (2017). Validity Analysis of Guided Inquiry Model Physics Learning Tools to Improve High School Students' Learning Outcomes on Dynamic Electricity Material. *Journal of Education*, 4(2), 15.
- [3] Affandi, M. R., Widyawati, M., & Bhakti, Y. B. (2020). Analysis of the Effectiveness of E-Learning Learning Media in Improving High School Students' Learning Outcomes in Physics Lessons. *Journal of Physics Education*, 8(2), 150.
- [4] Damayanti, D. S., Ngazizah, N., & Setyadi K, E. (2013). Development of Student Worksheets (LKS) Using a Guided Inquiry Approach to Optimize Students' Critical Thinking Abilities on Dynamic Electricity Material at SMA Negeri 3 Purworejo Class X 2012/2013 Academic Year. *Radiation*, 3(1), 58–62.
- [5] Anggita, Z. (2021). Using Powtoon as a Learning Media Solution During the Covid-19 Pandemic. *Confix Journal of Indonesian Language and Literature*, 7(2), 44–52.
- [6] Andriana, E., Alamsyah, T. P., & Tambun, I. (2020). Development of Contextual Scientific Based Student Worksheets on Natural Events and Disaster Mitigation. *Educational Reflections: Scientific Journal of Education*, 10(2), 163–171.
- [7] Muttaqin, M. Z. H., & Azmi, I. (2020). Application of Problem Based Learning Based on Lesson Study to Increase Activeness and Cognitive Learning Outcomes of Class X Mia Madrasah Aliyah Muhammadiyah 1 Malang Academic Year 2014/2015 in Biology Subjects. *Global Education Scientific Journal*, 1(1), 101–120.
- [8] Sukardi. (2013). *Metode Penelitian tindakan kelas implementasi dan pengembangannya*. Jakarta: Bumi Aksara
- [9] Hakke. (2013). *Analyzing Change/Gain Scores. Area D american Education Research Association's Division D Measurement and Research Methodology*
- [10] Irawan, J., Hadi, S., Zulandri, Z., Jamaluddin, J., Syukur, A., & Hadisaputra, S. (2021). Validating metacognitive awareness inventory (MAI) in chemistry learning for senior high school: A rasch model analysis. *Jurnal Pijar Mipa*, 16(4), 442-448.
- [11] Rahayu, R., Syamsiyah, J., Cahyani, V. R., & Fauziah, S. K. (2019). The effects of biochar and compost on different cultivars of shallots (*Allium ascalonicum* L.) growth and nutrient uptake in sandy soil under saline water. *Sains Tanah-Journal of Soil Science and Agroclimatology*, 16(2), 216-228.
- [12] Ariani, D., & Meutiawati, I. (2020). Development of Student Worksheets (Lkpd) Based on Discovery Learning on Heat Material in Middle School. *Phi Journal; Journal of Physics Education and Applied Physics*, 1(1), 13.
- [13] Chairunnisa, N. A., Mursalin, M., & Ntobuo, N. E. (2022). Pengembangan Perangkat Pembelajaran Model Kolaboratif Jire Berbasis IT (Information and Technology) Materi Suhu dan Kalor Fisika. *Ideas: Jurnal Pendidikan, Sosial, Dan Budaya*, 8(3), 805.
- [14] Anisa, V. M., & Astriani, D. (2022). Implementation of PhET simulation with discovery learning model to improve understanding of dynamic electricity concepts. *Jurnal Pijar Mipa*, 17(3), 292-301.
- [15] Hernawati, E. (2018). Improving Physics Learning Outcomes Through the Use of Demonstration Methods and Audiovisual Media for Class X Students at MAN 4 Jakarta. *Andragogy: Journal of Educational and Religious Technical Training*, 6(2), 118–131.
- [16] Maimunah, Izzati, N., & Dwinata, A. (2019). Development of Student Worksheets Based on Realistic Mathematics Education with a Maritime Context for Class XI High School Students. *Gantang Journal*, 4(2), 133–142.
- [17] Luthfiani, A., & Yerimadesi, Y. (2022). Effectiveness of e-module based on guided discovery learning on learning outcomes of high school students. *Jurnal Pijar Mipa*, 17(6), 770-774.
- [18] Yalyn, D., Sari, D. A. P., & Widodo, W. (2022). The implementation of student worksheets based on problem-based learning to improve students science process skill. *Jurnal Pijar Mipa*, 17(5), 569-576..
- [19] Kurniawan, D., & Dewi, S. V. (2017). Development of Learning Tools using Screencast-O-Matic Media for Calculus 2 Course Using Thiagarajan's 4-D Model. *Siliwangi Journal*, 3(1).
- [20] Laili, C. N., Mahardika, I. K., & Ridlo, Z. R. (2022). Pengaruh penggunaan media interaktif powtoon disertai lkpd terhadap hasil belajar siswa SMP. *Jurnal Pendidikan Fisika*, 11(1), 26-32.