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The development of flip book contextual teaching and learning-based to enhance students' physics problem solving skill

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Abstract. Apply CTL for learning media in the form of Flip Books. This research was conducted at SMAN 2 Bekasi from April to May 2019 as the field-testing phase which used Physics Flip Book media. The method of learning model ADDIE including the stages to develop this model. The Physics Flip Book display used the *Kvisoft* Flip Book Marker 3.6.1 software whose content is supported by several software, such as Camtasia 2018, Movie Maker and PDF. Results of validation test showed score 82.0% for material validation, 82.8% for media validation, and 81.20% for learning validation. The result of this research, 10 of 25 items were valid by using product moment validation test, 0.74 for the reliability test result by using Alpha Cronbach and 0.52 for the Flip Book effectiveness by using N-gain test. The results showed that using CTL-based Flip Books can improve physics problem solving skills in students.

1. Introduction

Education is not only change of behavior process but also a process to educate [1]. With technology as a learning medium, Indonesia has made an innovative step to improve the quality of education to compete at the global level. In the world of education, the Indonesian Ministry of Education sees technology as being used as a tool to support teaching and learning in schools. The education world relates a computer-based learning model. In the over, through this technology, student activity in the learning procedure can be improved Test assessments using computer-based technological progress have an impact on student satisfaction in learning 2013 curriculum leads national education to develop character education. The learning pattern conducted in the 2013 curriculum suggests that learning centered on students and the learning of science conducted are multidisciplinary which combine several scientific disciplines. Students must have the capability to answer a problem.

Through a contextual teaching and learning method with modeling instruction can intensify the capability to answer problems. This is reliable with the results of study studied by E. Sujarwanto on "Ability to Solve Physics Problems in Modeling Instruction in grade of XI High School Students" showing that the development of students' physics problem solving abilities with modeling instruction



is better at recognizing problems on concept based, making a representation from problems, and evaluation toward solutions and concept used [2].

The use of technology as a learning media is one of the innovative steps to improve the quality of education in Indonesia, so it can compete at the global level. This can be seen in the Indonesian Ministry of Education which has begun to use technology as a tool in the world of education that can be used to support the teaching and learning process in schools [3]. Computer-based learning emerged as a new paradigm in modern education [4]. Computer-based learning is a technology of the future, where learning will further enhance student involvement [5]. With the advancement of computer-based technology produces many variations in assessment tests that have an impact on student satisfaction in learning [6]. The ability to solve problems can be improved through the approach of contextual teaching learning with modeling instruction. This is in accordance with the results of a study conducted by E. Sujarwanto on "Ability to Solve Physics Problems in Modeling Instruction in grade of XI High School Students" showing that the development of students' physics problem solving abilities with modeling instruction is better at recognizing problems on concept based, making a representation from problems, and evaluation toward solutions and concept used [7].

Learning by media, learning resources, and teaching materials will be more effective than conventional learning. The role of supporting media that can facilitate the learning process is very necessary so that learning is conducted well and in accordance with the goals and plans of learning. A study shows that learning with multimedia-based learning resources such as multimedia-based book helps students learn actively and independently compared to traditional learning [8].

Compared to conventional learning, interactive learning using learning media, learning resources, and teaching materials will be more effective. The role of supporting media that can facilitate the learning process is very necessary so that learning is conducted well and in accordance with the goals and plans of learning. A study shows that multimedia-based learning resources such as multimedia-based books used in learning can help students learn enthusiastically and independently compared to conventional learning [9].

Built on observations, in classroom activities it was found that physics educators used more printed books, power points, e-books and student worksheets (LKPD).

The diagram below is the result of observations about the availability of learning materials in 10 schools throughout Jabodetabek area.

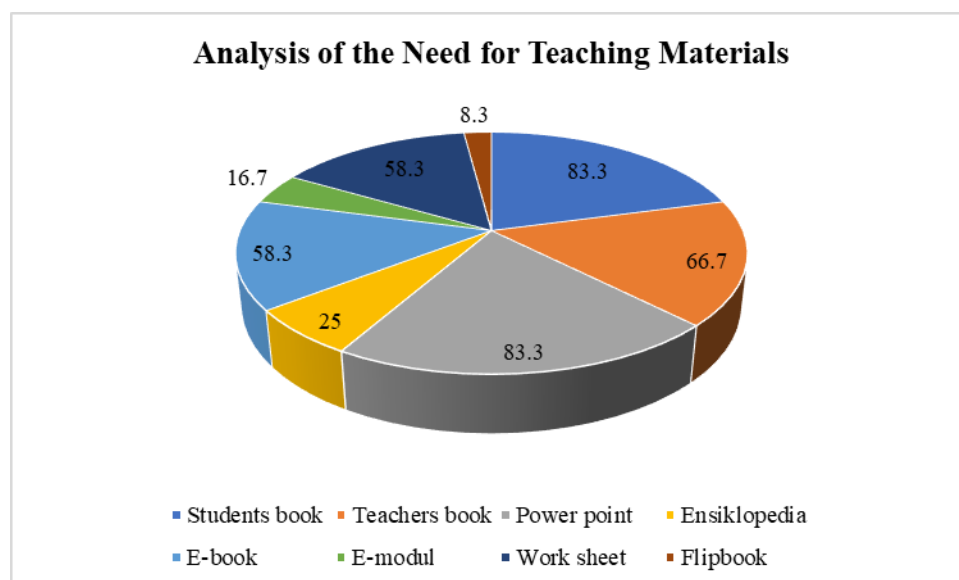


Figure 1. Diagram of Learning Material Availability Analysis

Based on the diagram there are still many who have not been able to utilize teaching materials to the maximum, especially those using electronic media. It can be seen, at least the availability of Flip

Book media that can contain animated and video content, so that data from questionnaires that have been filled in by educators and students need to be made Flip Book as one of the supporting media in learning Physics.

Multimedia-based books have the advantage and special attraction for students such as easy to access and to carry everywhere, also with the attractive appearance. Multimedia-based books that can support physics learning, are books that can display interactive simulations by combining text, image, audio, video, and animation. So that learning can take place more interesting and fun.

To support physics learning, the right media is needed which can explain existing physical phenomena. As an educator, researchers will develop physics Flip Book learning media as an alternative to facilitate physics learning. The research conducted by Sri Hayati about the development of Flip Book learning media shows that physics Flip Book media can help improve student learning outcomes [10]. From the description of several journals, the researchers will develop physics Flip Book learning media which are expected to improve physics problem solving abilities.

2. Research Methods

This research used *research and development* (R&D) method with ADDIE model. Steps of ADDIE model that is used are analysis, design, development, implementation, and evaluation. The research subjects used consisted of 81 students of SMAN 2 Bekasi. Data collection is carried out in the even semester of 2018/2019. The Physics Flip Book display used the *Kvisoft Flip Book Marker* 3.6.1 software whose content is supported by several software, such as Camtasia 2018, Movie Maker and PDF. The following is a Flip Book cover display:



Figure 2. Front and back cover

The contextual teaching learning-based *Flip Book* view has been revised:



Figure 3. Flip Book display

The Flip Book media is compiled based on the contextual teaching learning, as follows [11]:

Table 1. Stages of Contextual Teaching Learning

Stages of Contextual Teaching Learning	Activities
Constructivism	At this stage, the video display related to wave material and initial questions is given as a stimulus for students to build their own knowledge.
Inquiry	Students are guided to formulate problems, collect data through observation, analyze and present the results of writing, tables or charts, and present results to classmates
Questioning	The teacher asks about what the students already know about the physics material and directs it to aspects that are not yet known by the students.
Learning Community	Students form groups to do practicum related to physics material, sharing with friends or working with others, giving information to each other.
Modelling	The teacher guides students to emulate by demonstrating and imitating a knowledge related to material and skills so that students can do it.
Reflection	An overview of the activities or knowledge that has just been received, students can feel these new ideas in his mind.
Authentic Assessment	The teacher use assessment as an illustration of the learning development of students through the process.

Research instruments that were used in this research are: media expert validation sheet, material expert validation sheet, learning material expert validation sheet, physics educators and student assessment sheet, pretest and Post test questions. The instrument of expert validation sheet using the likert scale 1-5. The result items validation, 10 of 25 items were valid by using product moment validation test and 0.74 for the reliability test result by using Alpha Cronbach. And then, to know about the criteria of Flip Book effectiveness can use the N-gain analysis technique as follows [12]:

Table 2. N-gain Score Criteria

Score	Criteria
$g > 0,7$	High
$0,3 \leq g \leq 0,7$	Medium
$g < 0,3$	Low

3. Results and Discussion

The results of media expert validation can be seen in Figure 4.

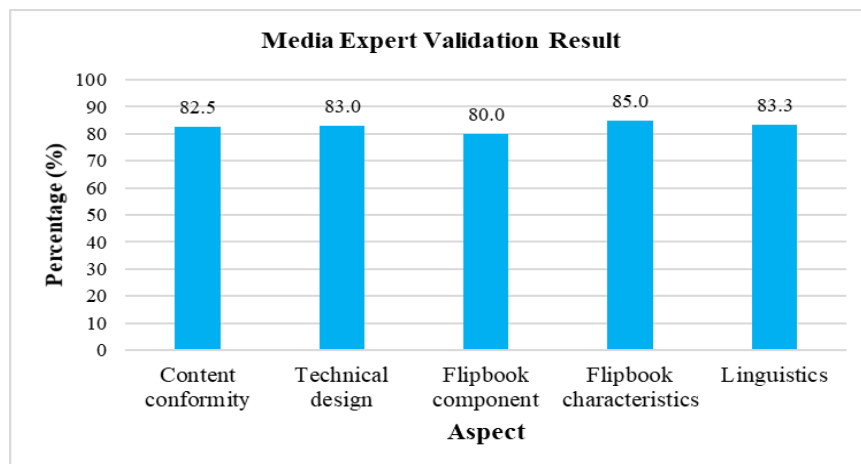


Figure 4. Media Expert Validation Result

Based on the test results on media expert, the average percentage of all indicators is 82.8% with very good interpretations. This shows that Flip Book is based on contextual teaching learning that is made suitable for use and can be tested on users.

The results of material expert validation can be seen in Figure 5.

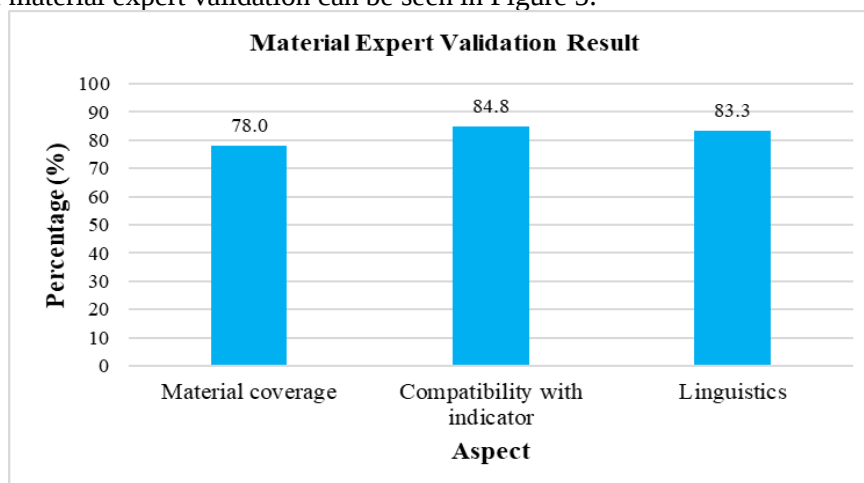


Figure 5. Material Expert Validation Result

Based on the test results on material expert, the average percentage of all indicators is 82.0% with very good interpretation. This shows that Flip Book is based on contextual teaching learning that is made suitable for use and can be tested on users.

In figure 6, the learning expert has validated the results are as follows.

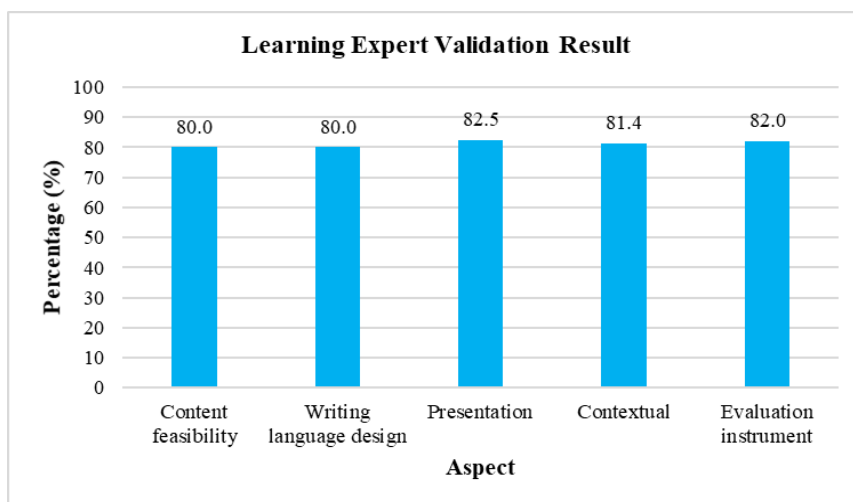


Figure 6. Learning Expert Validation Result

Based on the test results on learning expert, the average percentage of all indicators is 81.2% with very good interpretation. This shows that Flip Book is based on contextual teaching learning that is made suitable for use and can be tested on users.

The next step is to revise the Flip Book based on the input from several experts. After that, a Flip Book trial was conducted on educators and students as users. In Table 3, physics educators result are as follows.

Table 3. Physics Educator's Result

Aspect	Result
Material coverage	98.0%
Presentation technique	94.6%
Linguistics	100%
Benefits of Flip Book	96.7%
Overall Percentage	97.3%

Based on the results of trials on educators as users, the average percentage of all indicators is 97.3% with very good interpretations. Therefore, Flip Book is based on contextual teaching learning that is made suitable for use and can be tested on users. Test results on small group students as a reference in Table 4.

Table 4. Test Results of Small Groups of Students

Aspect	Result
Flip Book contents	89.3%
Presentation technique	89.3%
Complete Flip Book	90.4%
Linguistics	88.0%
Benefits of Flip Book	88.0%
Overall Percentage	89.0%

Test results on small group students as users obtained an average percentage of all indicators, namely 89.0% with very good interpretation. Therefore, it can be summarized that overall Flip Book based on contextual teaching learning is very good and feasible to use.

Test results on large group students as a reference in Table 5.

Table 5. Test Result of Large Groups of Students

Aspect	Result
Flip Book contents	91.4%

Presentation technique	90.4%
Complete Flip Book	93.8%
Linguistics	86.5%
Benefits of Flip Book	95.3%
Overall Percentage	91.4%

Based on the data analysis, the average score of all aspects based by large group of students is 91.4% with a very good interpretation. The Flip Book that has been used correctly are then tested with a certain number of students to find out whether Flip Books can be used effectively thereby increasing students' ability to solve physics tests.

Based on the data, the value of the ability to solve physics problems in general from experimental class increased by 55.46%. This shows that the development of Flip Book media based on contextual learning is suitable for the use in learning physics. The advantages of Flip Book as contextual learning can be a source of independent learning for students can develop their knowledge. Stages of contextual learning in this Flip Book can help students in the thought process.

The results of this study are supported by previous research conducted by E. Sujarwanto on the ability to solve physics problems in modeling instruction in grade XI high school students. The results obtained that the development of physics problem solving abilities makes it easy for students to build knowledge and problem solving through scientific activities [5]. The main purpose of education is to increase human resources, which is influenced by various factors [12].

The instruments used in the pretest and Post-test were tested for validity and reliability. According to Savinainen & Scott to see an increase in students' problem solving skills used the gain test.

Table 6. N-gain Test Results

Class	Average pretest score	Average Post test score	N-gain	Criteria
Experiment	48.63	75.59	0.52	medium

Based on calculations in the pretest and Post-test of the experimental class, the gain value obtained is 0.52 according to the normalized gain criteria because of the medium category. It shows that Flip Book based on contextual teaching learning is developed effectively and suitable for use in physics learning.

4. Conclusions

Based on the results and discussion, it can be concluded that Flip Book based on the learning approach contextual learning have developed. Seven components of contextual participation learning namely constructivism, inquiry, question and answer, learning, modeling, reflection, and evaluation that develop Flip Book waves. Based on the data, the value of the ability to solve physics problems in general from experimental class increased by 55.46% and the gain value obtained is 0.52. This shows that the development of Flip Book media based on contextual teaching learning is suitable for the use in physics learning. Based on the results of analysis and discussion, it can be concluded that physics problems solving skills of students can be improved by the development of Flip Book contextual teaching learning-based.

Acknowledgments

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