

**THE DEVELOPMENT OF DIGITAL BOOK BASED ON CONTEXTUAL LEARNING ON
MOMENTUM AND IMPULS AS LEARNING MEDIA OF SENIOR HIGH SCHOOL
STUDENTS**

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Abstract

This study is intended to describe the development of a digital book based on contextual learning as a media for learning high school students. The results of school identification showed that students had difficulties in physics because it was considered a material contain full of formulas and difficult to understand the concept. This was indicated by the results of Physics teacher's interviews at SMAN 2 Pare who want to learn based on real-life phenomena. As a solution to the problem, the researcher developed a digital book based on contextual learning. The results of the development are observed from three aspects of feasibility, they are the validity, practicability, and effectiveness of learning media. This project was used R&D method, consist of literature study, field study, product development, validation, revision, trial, analysis, and media product. This study was tested with a sample of 34 students of class X IIS 3 in SMAN 2 Pare. Media validation results showed that this medium is valid with a value of 82.03%. Practicability is reviewed through the implementation and constraints of 90.60%. Effectiveness is reviewed from students learning outcomes of 82.35% and the response of learners showed a very good media response that is equal to 81.62%. So it can be concluded that digital book media based on contextual learning can be used as a medium for students of senior high school.

Keywords: Digital Book, Contextual Learning, Momentum and Impulse, Learning Media.

INTRODUCTION

Technology in the 21st century is making science and technology an important basis in building a nation. It takes real effort to follow the rapid development of the times especially in technology and science especially into the world of education. So that education can moving forward by applying technological progress and science connecting in every circumstances and everyday life.

Education is an important foundation in building the nation. Quality education is necessary for the achievement of Human Resources (HR) that can compete globally. According to Soukalova, et al (2014) this is then centered with a high education, because without any development, an education will not happen a significant increase in the level of human resources. Improving the quality of education can be done by making improvements, changes and renewals to improve success in an education.

One aspect to improve the quality of education is improving the quality of learning. Teachers are expected to have a professional attitude and teach a high moral attitude that will affect the success of a learner in achieving a successful future and ready to compete in the world of national and international. According Aksoy in Sari (2014) teachers have various difficulties in transferring the content of educational programs in traditional ways or tools that are still lacking in improving the skills of technology.

The use of technology and media will change the way learning on thinking skills. In the process, teachers must have a strategy to get an effective and efficient learning process. In addition, teachers must be innovative and creative in implementing learning so that learners easily to understand the material.

Technology and education are combinations in a reading and used to measure responses, awareness, and evaluation offerings (Sari, 2014). Science and Technology is growing rapidly bringing lifestyle changes especially in the field of education. The change will bring several facts in the world of education by teachers, employees, students to school. According to Elias, et al in Gueval (2015) learners bring digital books because it is cheaper and easier to carry but prefer printed books because it is more accustomed.

Physics is basically a Natural Science based on experiments (Jian-hua, 2012). The limitation of practicum tools on some physical materials can be an obstacle in solving process skills in learners. One solution in addition to using a real laboratory is the utilization of media by virtual laboratory. Utilization of media can be used learners as a medium of physics material simulation. Learners will be easier to better understand the physical concepts such as through the phenomenon and technological progress. So that the flash media needs to be included in a learning medium for learners.

Physics learning on the material momentum, impulse, and collision according to basic competence (Permendikbud No.24 of 2016) states that learners apply the concept of momentum and impulse and the law of conservation of momentum in everyday life. In addition, it can present the results of testing the application of conservation laws of momentum. The basic competence, ask learners to be able to analyze and apply the concept based on direct problems in life. So the material needs to involve a lot of visualized examples. This is because the process is going too fast and there are some phenomena that can not be directly demonstrated so that to better understand the concept, it is necessary to visualize that can take place quickly or slowly so that the observation can be connected with the concept of physics. In addition, the problem obtained according to Sarioglan research (2014) was obtained from the learning result that is in pre-education learners have misconceptions about the related concepts and determined that the misconception can not completely disappear after the post-education. Need a media that helping the learner to understand the concept of physics more deeply that can reduce the misconception of the matter related physics concepts.

Seeing an important role of learning physics is expected to embed the concept of physics that is able to reflect on their own experiences as well as others, provide ideas that are found alone and have a commitment in learning. Physics according to today's learners is impressed with the formulas and numbers. According to interviews of physics teachers based on his experience, learners feel more happy to be invited to logic in the process of physics learning. So the concept of physics received by learners will be more profound and seem useful in real life. Experience will be an important ingredient to build a concept in physics learning that is very close to real life. The learning that best suits the situation is that it needs to be contextual. Contextual learning by Suprijono (2014: 79) is a concept that helps teachers by linking matter with the real world and encouraging learners to relate their experiences in a life. This can happen because contextual learning is accordance with how the brain works and in principally supports the life of the learners (Johnson, 2007: 32). Based on that, learning should be made as closely as possible with the real world. So in addition to learning by teachers, it takes contextual media as a learning resource that will link the concept of physics in understanding it.

One of the appropriate learning media that is digital media. According to Oetomo (2002:33) Technological innovations have combined computer technology, telecommunications, and multimedia.

Merging technologies will create new innovations in the creation of interactive learning media in an educational system. Computer applications in multimedia are used to combine text, images, graphics, video, animation, virtual lab or audio. Elements in the classroom that use multimedia mean to be introduced by providing video recording on learning and getting feedback through question and answer session and quiz granting (Schuessler, 2016). So that the use of multimedia can be used in education. One of the utilization of teaching materials of learners. Teaching materials used are digital books that can be used learners as one source of learning.

The world is more modern so that the source of learning through digital books. According to (Embong, 2012) the features provided in digital books can provide a wider range of textbooks such as multimedia delivery, electronic environments, interactive quizzes, tangible form, audio visual and wireless communications. Digital books can be used teachers and learners as a medium of learning in the digital age today. An interesting digital book with interactive pictures, videos, and audio will make it easier for learners to understand the material presented by the teacher. The features provided can encourage learners to encourage creativity and learn autonomously.

Learning using digital learning resources, requires software that can convert files to digital publishing pages in the form of a flipbook like a book. Microsoft Reader, Adobe Acrobat Reader, and Adobe Acrobat e-book reader are some examples of its role such as software reader (Embong, 2012). Some advantages of the software can insert some other multimedia files such as images, animations, audio and video. So the media is very interesting with regard to momentum and impulse in the events of everyday life. This will create a special attraction for learners.

Making digital books with software is one of innovation as a learning resource of learners that will change the paradigm of independent and pro-active learning. As to the world is driving the development of technology and the digital world that today's learners experience, a new vision for learning comes naturally. Learners will not rely on conventional learning but will learn wherever they are. Physics book expected by teachers and learners that physics learning can invite to be logic and impressed interesting make its not boring. The development of digital books will provide a more engaging look and eliminate the haunted impression of a physics book that impressed more on many numbers and formulas. In the process, digital books will be presented with phenomenon, technology, materials, examples, questions, tips, and competency test with

attractive design so that learners can learn it easily and fun so it is expected to develop interest in physics learning that will affect the learning outcomes. Based on these descriptions where the reality that is being faced in education is towards the digital age, the researcher conducted a study on "The Development of Digital Book Based on Contextual Learning on Momentum and Impulse as Learning Media of Senior High School Students."

METHOD

This research is used research and development method, because this research will produce a product of digital book based on contextual learning as well as to test the feasibility of the product. Research and Development method is a research method used to produce a certain product and test the effectiveness of a product (Sugiyono, 2014: 407). Subject of research in one of X class in SMA Negeri 2 Pare. Research stages based on Borg and Gall modification are literature study, field study, development stage, validation phase, revision, product trial, and analysis.

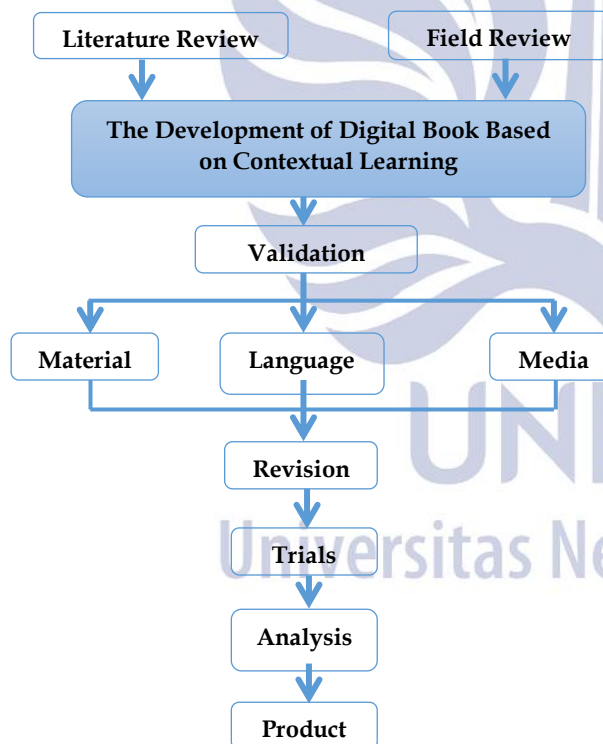


Figure 1: Research and Development Steps

Trial design using the One-shot Case Study method where research is given posttest.

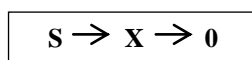


Figure 2. Research design
(Adapted by Sugiyono)

Information:

S = Group of students

X = Treatment by using digital book media based on contextual learning

0 = Posttest

Methods of data collection by using questionnaires, observations and assessment tests. Observation is done to know the implementation of media in a learning. Assessment tests are used to test the concept's understanding by learners after the learning process. Questionnaire is used to determine the response of learners using the development of contextual based learning media.

The data analysis technique used quantitative descriptive analysis. The feasibility assessment of digital book media development is seen from its validity, validity and effectiveness. Validation viewed through the assessment of 2 expert lecturers. Analyze data through Likert scale scores. The percentage value is made into conclusions based on the table of validity. Digital Book Rating is said to be eligible if positive response of $\geq 61\%$ based on Riduan (2015) with modifications resulting in the following percentage.

Table 1. Percentage Eligibility

Percentage	Category
21%-40%	Very Less
41%-60%	Less
61%-80%	Good / Reasonable
81%-100%	Very

(Modification of the Riduan, 2015)

RESULTS AND DISCUSSION

At the product development stage, the result is a digital book based on contextual learning. Digital Books themed Contextual Physics where the product emphasizes the application of physics in everyday life with the material momentum and impulse so that the media can be adjusted with contextual learning. Starting from the collection of information with literature studies and field studies that are about the problem of technological changes are increasingly rapid and the impression of the formula on the subject of physics so that the need for learning innovation through digital book technology presented in the form of flipbook.

A. Validation

Validation was done by two physics lecturers namely Endah Rahmawati, M.Si and Drs. Dwikoranto, M.Si with mentor Drs. Imam Sucahyo, M.Si. The product produced in this research is digital book media developed according to

contextual learning on the material momentum and impulse.

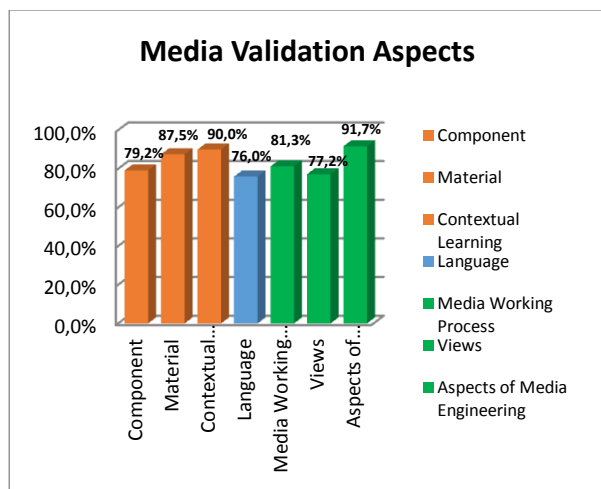


Figure 3. The Validity Assessment Results

The validity assessment results provided by the Validator are known through the scores obtained and then interpreted in the formula:

$$Presentase = \frac{210}{256} \times 100\% = 82,03 \%$$

Based on the validation of digital book media based on contextual learning on the material momentum and impulse have 82.03% percentage which according to Riduan media Digital Book worthy to use with very good criteria.

B. Practicability

Practicability of a media seen from the implementation and constraints of media use during the learning process takes place. Assessment of the implementation based on the implementation sheet assessed by the observer. Results of media observation based on the learning process that is 90.6%. Based on the percentage value, it can be concluded that the practical media used in very good category and can be adjusted with contextual learning. Based on the implementation of the use of media in learning according to observers that is with very good category. The process of teaching and learning in the classroom is in accordance with contextual learning in accordance with the theory according to Suprijono (2014: 79) where contextual learning provides the concept by linking the material with the real world and encouraging students to experience according to everyday life. So that the media used is adjusted as closely as possible with learning in the real world. Constraints during the study included the time given it to be shortened so that this research was prioritizes the

core on the previous RPP has been made. In addition some students who have not got the media files and there also still in trouble during the installation process because some laptops needed special attention to be installed. It was quite time consuming so that the learning process needs to be accelerated so that the purpose of the syllabus can still be achieved. To overcome it, the students who have installed the files are asked to help other friends.

C. Effectiveness

a. Result of Student Learning

Results of student learning is based on the results of the evaluation of the problem with the number of questions as many as 10 questions essay. The value is to know the completeness of learning results after using digital book media. Based on the results of evaluation done by 34 students.

The value of KKM physics in SMA Negeri 2 Pare is 75, so from 34 students there are 6 students who have not completed yet. Based on the calculation of classical completeness is as follows:

$$\text{Classic Exercise} = \frac{\text{Number of Completed Sudents}}{\text{Number of Sudents One Class}} \times 100\%$$

$$\text{Classic Exercise} = \frac{28}{34} \times 100\% = 82,35 \%$$

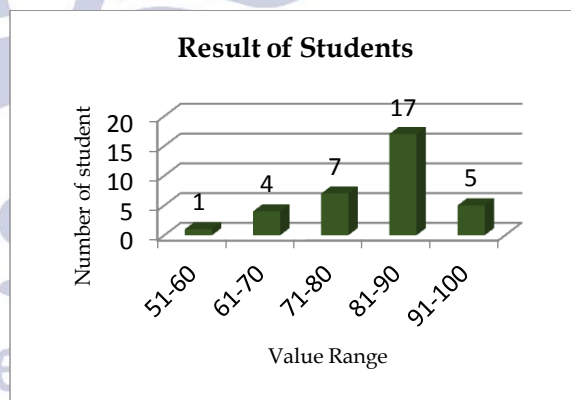


Figure 4. Student Learning Outcomes

Based on grade X IIS-3 is said to be complete if percent of classical completeness $\geq 80\%$. So that Digital Books can be said to be effective to support student learning outcomes.

b. Student Response

Analysis of the response of learners is arranged based on Likert scale in the form of a statement by providing a response question to obtain the following data:

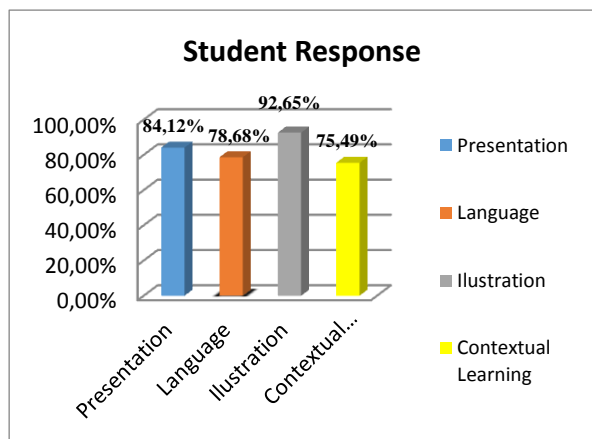


Figure 5. Media Response by Students

In accordance with the table shows that digital book based on contextual learning get good response from students where percentage positive response in each category that is by presenting 84.12%; Language 78.68%; Illustration 92.65% and contextual learning 75.59%. So after averaging a positive response of 81.62% with very good category. Some assessments are still considered to be less according to student respondents where students still find it difficult to understand the language as well as the term in the digital book, thus quite affecting the students' concept of understanding. So that digital book still need to be explained again by teacher so that student can understand concept on momentum and impulse material.

Students also comment on the lowest response column so as to provide criticism and suggestions. Some student comments that the media provided is very helpful to understand the concept of physics but the language used by writers is still difficult to understand. So it is still necessary for teachers to teach it conceptually in order to understand the contents of digital book media. In addition, students are quite helped by the flash in digital books so that students can better understand the law of conservation of momentum and the types of collisions. Some opinions can be concluded that the digital book based on contextual learning can be accepted by students or by teachers at school.

CLOSING

Conslusion

Based on the results of research on Digital Book Based on Contextual Learning, it can be concluded that the media can be used as a learning

material for high school students. This can be seen from three aspects:

1. Digital Book Based on Contextual Learning has the value of validity 82.03% with very good category, so it can be used as learning material of Physics for high school students
2. The value of media implementation based on the observer's assessment is 90.6% with very good category, so it can be said this media is practical and in accordance with contextual learning.
3. Student learning outcomes expressed completeness with the percentage of 82.35% completeness with a sample of thirty four students that can be said to be effective as a medium of learning high school students. Student's response to media is 81,62% with very good criteria.

Suggestion

Based on the results of research, researchers provide advice for those who want to develop digital books are:

1. In making digital books, the most important thing is grammar, because students will start interested to read if the language used is simple and clear
2. At the time of the learning process, cultivated is made as attractive as possible because the contextual learning of planting the concept is the most important thing.
3. Prior to learning, media must be properly installed so as not to reduce the time during the learning process.
4. Distribution of groups is an important concern because the learning process using laptop media.
5. Contextual learning requires an appropriate time allocation in order to master the concept of matter better.

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