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Development of Learning Media for Digital Comics Based on a Contextual Approach to Increase Learning Motivation in Optical Instruments

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Abstract

This study aims to describe the feasibility and characteristics of digital comic learning media based on a contextual approach to increase learning motivation on the material of optical instruments and get a good perception of readability from students. This research is a research and development (R&D) with a 3D model with the steps to define, design, and develop. Data collection techniques are non-test techniques that use observation data, document review, and questionnaires. Data analysis techniques are descriptive, qualitative, and quantitative methods. The subjects used in this study were physics teachers and students of class XII in SMA Negeri 2, 4, and 9 Bengkulu City. The results of this study can be concluded that the digital comic learning media developed is included in the very feasible criteria with an average percentage of 90.41% and has the characteristics of a contextual approach and learning motivation so that it deserves to be tested and gets a very good perception from students of the readability of comic learning media digital with an average percentage of 85.70%.

Keywords: *Development Research, Learning Media, Digital Comics, Contextual Approaches, Learning Motivation, Optical Instruments*

A. Introduction

Currently, learning in Indonesia is carried out online or online due to the COVID-19 pandemic. Online learning during the COVID-19 pandemic has created a polemic in society. For teachers, distance learning requires them to be more creative in delivering material through online learning media [1]. The creativity of teachers in dealing with learning during the COVID-19 pandemic is very much needed so that distance learning continues to run smoothly and is fun and meaningful for students. In this case, learning media is one of the important things to pay attention to create meaningful and fun learning that is appropriate.

In connection with these problems, it is necessary to make improvements, adjustments, and learning activities during the COVID-19 pandemic, namely by developing and utilizing Android-based learning media that display concepts and microscopic ones that are difficult to visualize or display directly in the laboratory [2].

According to Risdianto (2008), learning media is needed in the physics learning process where the use of learning aids or learning media is one part that cannot be separated from the learning process and is a form of integration of a learning method used.

Using comics as a medium of learning is one of the right ways to make learning more fun [4]. Comics are usually packaged in book form, but along with the times, comics are not only packaged in printed form. The rapid development of technology has made digital media one of the new media for producing and disseminating comics.

According to Ahmad (2009) comics in digital form compared to printed comics have advantaged such as having borderless capabilities (unlike paper which is limited in size and format), so that comics can have unlimited shapes, for example very elongated sideways or downwards, to a spiral shape. If comics in printed form have a limited age due to the durability of paper, then digital comics in the form

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of electronic data can be stored in digits or bytes and can be transferred to various kinds of storage media.

Comic learning media reviewed based on the results of previous research can increase learning motivation, as shown by the results of research conducted by Widyawati, Ani., & Prodjosantoso (2015) entitled Science Comics Media to Improve Learning Motivation and Character of Students which shows the results that learning by using learning media comics that have been developed can increase learning motivation and character of students with a significance of 0.05. In line with this, according to Huriawati, Farida. & Permatasari (2015), comic learning media can increase learning motivation as evidenced by the results of research which state that this constructivism-based physics comic book shows a high increase with an average N-Gain of 0.70 and in a limited trial. showed a moderate increase with an average N-Gain of 0.67. Furthermore, according to Anesia, Regita., Anggoro, B. S., & Gunawan (2018) and Maharani, L., Rahayu, D I., Yuberti, Komikesari, H., Sodikin & Hidayah (2019), the results of the study show that comics learning media are very feasible to be developed, and according to Hadi, W.S. dan Dwijananti (2015), comics media are suitable to be used as learning supplements and have a readability level of 80, 59%.

Based on the description above, it is necessary to research with the title "Development of Digital Comics Learning Media Based on Contextual Approaches to Increase Learning Motivation in Optical Instruments". The problem formulations are: 1) How is the feasibility of digital comic learning media based on a contextual approach, and ; 2) What are the characteristics of digital comic learning media based on a contextual approach, and; 3) How are students' perceptions of the readability of digital comic learning media based on a contextual approach.

B. Research Method

The type of research conducted here is the type of research and development (RnD). According to Sugiyono (2013), Research and Development is a research method used to produce certain products and test the effectiveness of these products. The Research and Development (R&D) model used in this study is the 4D development model (Four D Models) developed by Thiagarajan (1974) which stands for Define, Design, Develop, and Dissemination. The process in this research only carried out 3 stages, namely define (definition), design (design), and development (development).

Data analysis in this research is using descriptive, qualitative, and quantitative analysis techniques. Qualitative data in this study were obtained from validator input at the validation stage, input from material experts, media experts, and linguists. While quantitative is data that describes the results of product development in the form of digital comic learning media based on a contextual approach. The data obtained through the assessment instrument at the time of the trial were analyzed using statistics. This method is expected to understand further data. The results of data analysis are used as the basis for revising the developed product. The response questionnaire was filled out by a physics lecturer at Bengkulu University.

Furthermore, the calculation of each item statement is carried out. The interval data can be analyzed by calculating the percentage of answers on each item using the following formula :

$$P_s = \frac{S}{N} \times 100\%$$

Furthermore, the percentage of eligibility obtained is then interpreted into the eligibility criteria based on Table 1 as follows.

Table 1. Eligibility Criteria

Percentage (%)	Criteria
0% - 20%	Highly Less Feasible
21% - 40%	Less Feasible
41% - 60%	Quite Feasible
61% - 80%	Feasible
81%-100%	Highly Feasible

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Based on these criteria, the learning media is said to be feasible if the percentage is ≥60% of all aspects [8].

Furthermore, it is known that what is found is then carried out a readability test based on the perceptions of students which are interpreted into the criteria of students based on Table 2 as follows.

Tabel 2. Student Perception Criteria

Percentage	Criteria
81%-100%	Very Good
61%-80%	Good
41%-60%	Quite
21%-40%	Less
0%-20%	Highly Less

[12].

C. Results And Discussion

The results of the analysis of the learning implementation plan (RPP) are: 1) The lesson plan used is the curriculum 13 lesson plan; 2) the components of the lesson plans used contain identity, core competencies, basic competencies, indicators, objectives, learning materials, learning methods, learning media, learning implementation, assessment of learning outcomes and validation sheets; 3) the learning objectives contained in the lesson plan do not yet contain the ABCD rules (audience, behavior, condition, and degree); and 4) the learning materials contained in the lesson plans do not contain facts, concepts, principles, and procedures.

The results of observations and needs analysis in the journals of Utami, Setiawan, Risdianto, & Viona (2021) are in the observation activities obtained the results that SMAN 2, SMAN 4, and SMAN 9 Bengkulu City have used the 2013 curriculum, in teaching and learning activities teachers use LKPD, printed books and other supporting teaching materials. Learning media that are often used are PowerPoint and interactive video. The results of the needs questionnaire given to teachers and students of class XII MIPA at SMAN 2, SMAN 4, SMAN 9 Bengkulu City according to Utami, Setiawan, Risdianto, & Viona (2021) showed that some students were interested in physics but they could not understand or difficulty in physics lessons. This can be seen from the average percentage in the aspect of student responses of 85% who enter the criteria for strongly agree. Students prefer pictorial learning rather than glued to text, comics learning media is an alternative to help students learn because comics learning media have never been used by teachers in the learning process.

Students need learning media that can be accessed via smartphones that are associated with activities and daily life to help increase students' learning motivation regarding optical materials, therefore digital media is very important to develop, this can be seen from the percentage the average obtained in the aspect of the need for digital comic learning media is 68.88% according to students and 80.95% according to teachers who enter the criteria for agreeing and strongly agreeing.

Based on the results of the analysis carried out at the define stage or the defining stage, the format of learning media that will be developed is adjusted to the needs of students based on needs analysis. Learning media is designed as attractive as possible so that students are motivated to read and learn it.

Broadly speaking, the design of the developed digital comic learning media consists of 2 parts, namely the first part which contains competencies, concept maps, instructions for using comics, and a bibliography. The second part is the comic which contains the cover or front cover, character introduction, content, and back cover.

The final process in making comics is the digital delivery process by converting pdf files into e-books that can be accessed online via smartphones or computers.

The results of product design at the development stage were validated by three validators to determine the feasibility of using it in physics learning. The final result diagram of the validation of

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aspects of content, presentation, language, cover design, text message design, and picture message design and learning motivation can be seen in the following figure:

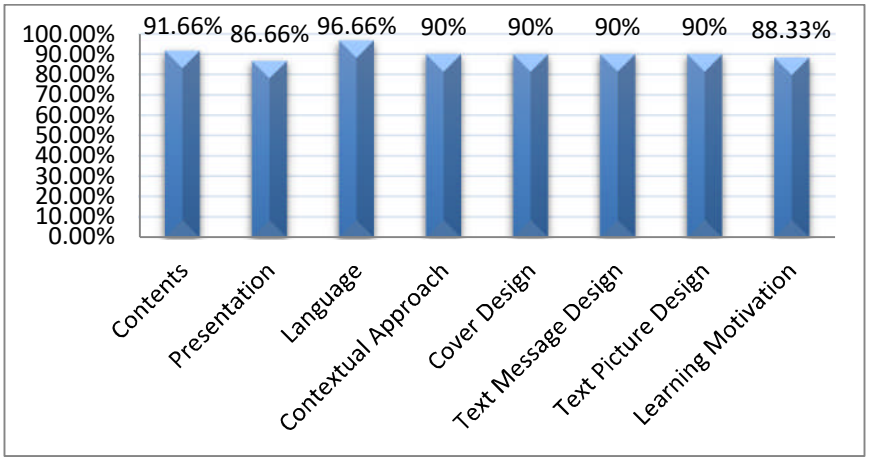

Figure 1. Feasibility Final Result Diagram by Expert

Based on the feasibility test of the aspects of content, presentation, language, cover design, text message design, and picture message design as well as learning motivation in the development of digital comic learning media based on a contextual approach with 3 expert judgment people, namely from 2 Physics Education lecturers at Bengkulu University and 1 teacher in SMAN Kota Bengkulu obtained very decent results with a percentage value of 90.41%. After being declared eligible, a readability test was carried out based on the perceptions of students in three different schools including SMAN 2, 4, and 9 Bengkulu City. The diagram of the results of the readability test on the aspect of appearance, presentation of material, and benefits can be seen in the following figure :

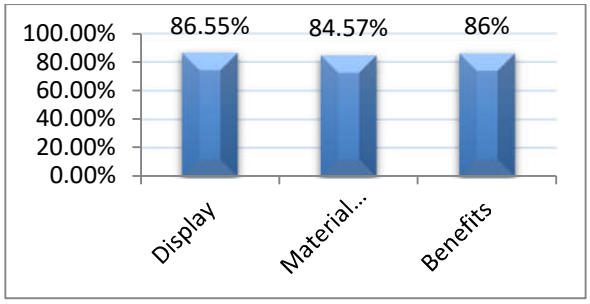

Figure 2. Final Result Diagram of Readability Based on Student Perception

Based on the readability test of the display aspect, the presentation of the material and the benefits of developing digital comics learning media based on a contextual approach based on the perceptions of students in three schools, namely SMAN 2, 4, and 9 Bengkulu City, excellent results were obtained with a percentage value of 85.70%..

Based on the steps in the research stage of digital comic learning media based on a contextual approach, namely: the first stage carried out in this research is the define stage, at this stage consists of preparing instruments at the define stage, analysis of learning implementation plans, needs analysis and observation. The preparation of the instruments used for the define stage is as needed to analyze the curriculum. When analyzing the learning implementation plan at SMA N 09 Bengkulu City, it was found that the RPP used was by the 2013 curriculum RPP components.

The results of the observation activities according to Utami, Setiawan, Risdianto, & Viona (2021) showed that SMAN 2, SMAN 4, and SMAN 9 Bengkulu City had used the 2013 curriculum, in teaching and learning activities teachers used LKPD, printed books, and other supporting teaching materials. Learning media that are often used are PowerPoint and interactive video. The teaching

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materials and media provided still make students less interested in understanding the subject matter, it can be seen from the students who are not so enthusiastic and enthusiastic in answering questions from the teacher in the learning process, therefore very few students respond to the teacher during the physics learning process. To support the results of the observations, a needs analysis was carried out given to teachers and students which according to Utami, Setiawan, Risdianto, & Viona (2021) teachers and students needed digital comic learning media based on a contextual approach to increase learning motivation on optical instruments. In the second stage, namely the design stage, Broadly speaking, the design of the digital comic learning media developed consists of 2 parts, namely the first part which contains competencies, concept maps, instructions for using comics and a bibliography. The second part is the comic which contains the cover or front cover, character introduction, content and back cover. The final process in making comics is the digital delivery process by converting pdf files into e-books that can be accessed online via smartphones or computers.

In the next stage, the development stage at this stage is the product development stage. This stage aims to describe the feasibility and characteristics of the product being developed and to describe the readability of the product that has been developed based on the perceptions of students. The feasibility of digital comic learning media based on a contextual approach to increase learning motivation based on expert validation consists of 8 aspects of assessment, namely content aspects, presentation aspects, language aspects, contextual approaches aspects, cover design aspects, text message design aspects, picture message design aspects, and motivational aspects. studied by two expert judgment people and one practitioner. Based on the average results of the validation of the eight aspects of the assessment, namely the content aspect, presentation aspect, language aspect, contextual approach aspect, cover design aspect, text message design aspect, picture message design aspect, and learning motivation aspect, which was carried out by two expert judgments and practitioners found that the digital comic learning media based on a contextual approach to increase learning motivation on the optical instrument material developed was in a very feasible criterion with an overall average percentage of 90.41% of a maximum score of 100%. This is because several assessment statements on the content aspect, presentation aspect, language aspect, contextual approach aspect, cover design aspect, text message design aspect, picture message design aspect, and learning motivation aspect obtained low scores so that some suggestions or inputs were obtained from the validator.

The suggestions or input from the validator are used as a reference in revising the digital comics learning media both in terms of content, presentation aspects, language, contextual approaches, cover design aspects, text message design aspects, picture message design aspects, and learning motivation aspects. Revisions on the design aspects include the correct use of sentence and writing balloon effects, the compatibility of the background color with the text, typo writing, and line and color composition.

The results of this study are relevant to the results of research conducted by Widyawati and Prodjosantoso (2015) entitled Science Comics Media to Improve Learning Motivation and Character of Students which shows that learning with comics learning media developed can increase student motivation and character with a significance of 0.05. In line with this, according to Huriawati and Permatasari (2015) comic learning media can increase learning motivation as evidenced by the results of research that this constructivism-based physics comic book shows a high increase with an average N-Gain of 0.70 and in a limited trial it shows a moderate increase with an average N-Gain of 0.70. the average N-Gain is 0.67. Furthermore, according to Anesia, et al (2018) and Maharani, et al (2019), the research results show that comic learning media is very feasible to be developed.

The characteristics of digital comics learning media based on contextual approaches to increase learning motivation that have been analyzed using an analysis sheet of digital comics learning media characteristics are media that link the contextual approach and learning motivation, where the characteristics of digital comics learning media in this contextual approach include the constructivism section, where the material presented through illustrated stories in this digital comic learning media is knowledge-constructing and not a process of receiving knowledge so that the material presented can stimulate students to find their knowledge by the inquiry component. In the asking component, some

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questions encourage, guide, and measure students' thinking abilities. In the learning community component, some questions can stimulate students to discuss. The modeling components are found in examples of procedural questions accompanied by pictures and how to solve them. The reflection component is found at the end which includes a summary of the material that has been studied. The last component is an authentic assessment, which is based on an assessment based on a developmental picture that students experience the learning process correctly when students read comics they can understand and master the learning material.

The linkage of the contextual approach and learning motivation, the characteristics of digital comic learning media to support learning motivation are that there is humor in the presentation which in this digital comic learning media there are character attitudes that tend to be done to arouse joy and trigger laughter, examples of questions that clarify the concepts expressed, as well as examples that are directly related to the condition of students and also statements that build students' knowledge.

Based on the characteristics of the developed digital comic learning media, it already contains a relationship between a contextual approach and learning motivation in accordance with the opinion of Afifah, N., Aini, Kurratul & Isnaini (2018) which states that students' motivation will be awakened if during the learning process are provided with appropriate learning media. interesting but still contains learning material to be delivered, whose opinions are interrelated with the criteria of learning media according to Johar, Asahar., Risdianto, Eko. & Indriyati (2014) on the aspect of suitability or relevance, this will make students not feel bored and even sleepy in the classroom during the learning process which will lead to ineffective learning activities.

Furthermore, according to the use of comics learning media can build interest and then the formation of students' motivation to take part in the learning process activities in the classroom where the statements are interrelated with the opinions of Johar, et al (2014) regarding the criteria for learning media on the attractiveness aspect. The interest of students with comics learning media affects students' attitudes towards learning process activities in the classroom. This attitude is influenced by the existence of one of the factors owned by the comic media. One of them is its appeal to foster enthusiasm and improve student performance.

After knowing the feasibility and characteristics of the digital comic learning media, a readability test was carried out to determine students' perceptions of the learning media that had been developed, as for the students' perceptions of the readability of digital comics learning media conducted at three schools, it was known that digital comics learning media were based on a contextual approach to improve learning media. motivation to learn on the material of optical instruments that have been made to get a perception of legibility with very good criteria which include aspects of appearance, presentation of material and benefits. From these three aspects, it can be concluded that the overall perception of students towards the readability of this digital comic learning media is very good with an average score of 85.70%. These results were obtained because based on comments and suggestions from several students stated that this digital comic learning media is very entertaining so it does not cause boredom, with this digital comic learning media the material presented is easier to understand because it is related to everyday life and this learning media It is hoped that it can be an alternative for independent learning to better understand the subject matter because it is interesting.

The results of this study are by the results of research from Hadi and Dwijananti (2015) which state that comics are appropriate to be used as learning supplements and have a readability rate of 80.59%. A high level of readability means that the comics used in this study are easy to understand, that is, when readers are asked again about the material contained in this comic, they can answer the question correctly and the reader can retell the content or core contained in the comic story.

D. Conclusion

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Based on the results and discussion, it can be concluded that 1) digital comics learning media based on a contextual approach to increase learning motivation on optical instruments material based on the overall average results of the validation test on the eight aspects of the assessment can be concluded that it is feasible to be used for testing because it has fulfilled the aspects content, presentation aspect, language aspect, contextual approach aspect, cover design aspect, text message design aspect, picture message design aspect and learning motivation aspect; 2) the characteristics of digital comics learning media based on a contextual approach to increase learning motivation on optical materials that have been developed in terms of their feasibility include the characteristics of the contextual approach and learning motivation; 3) learning media of digital comics based on contextual approach to increase learning motivation on optical materials based on the average result of the overall perception of students on media readability is in very good criteria which includes aspects of appearance, presentation of material and benefits.

The suggestions for future research are: 1) the resulting digital comic learning media cannot be accessed via smartphones without using the internet, for further research it is expected to create digital comic learning media that can be directly opened via smartphones; 2) conduct research and development of digital comic learning media with different approaches and materials; 3) this study has obtained a very good perception of media readability from students. So that this research should be continued or tested in the learning process in the classroom.

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