

## Development of optical devices learning media using webtoon for high school class XI students

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Received: 12 April 2022 · Accepted: 7 January 2023 · Published Online: 28 February 2023

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### Abstract

Successful education will determine the development of a country towards independence in all fields. Learning media is an important part because learning media is a tool used to deliver learning materials. Physical learning cannot be separated from the media and teaching materials used. Media and teaching materials are often used in the form of books or modules that contain explanations with sentences and only a few pictures and make students bored and lacking in experience. The complexity of the material presented makes students less interested in reading textbooks including physics books. Students tend to be interested in reading picture story books (such as comics) rather than ordinary textbooks, or they can also use webtoons. The development of science and technology, gave birth to online learning and using internet facilities as a learning method that solves problems to reduce difficulties in understanding learning. In this case, students will understand the material of optical instruments that are packaged more easily. The story presented is plotted so that students can imagine and easily recall the optical instrument material. The problem in this research is how to develop Webtoon-based learning media for the material of optical devices for class XI high school students. This research method uses research and development methods. Research and development (R&D) in education is to develop and validate educational products. While the type of development is carried out using a 4D model (Define, Design, Develop, and Disseminate). The results of this study. Based on the results of the analysis and discussion, it can be concluded that the learning media using webtoons for optical instrument material in class XI high school students is very feasible with several improvements.

**Keywords:** Learning media · Optical devices · Webtoon

### INTRODUCTION

Education is an important factor in human resource investment. (Wahyuni & Monika, 2016). Successful education will determine the development of a country towards independence in all areas of life. The formation of capable and independent individuals through a learning process is one indicator of a successful education. God Almighty has bestowed favors on his creatures

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**How to Cite:** Destriana, D.R., Roichana, S., & Setiaji, B. (2023). Development of optical devices learning media using webtoon for high school class XI students. *Wahana Pendidikan Fisika*, 8(1), 79-88. <https://doi.org/10.17509/wapfi.v8i1.45384>

with religion and reason, both of which are interconnected to complement one another, with reason producing science and technology. In line with the development of the era turning to the development of science and technology. (Yuberti, 2016) Humans like it or not must be able to understand the sophistication of existing technology.

Information technology and today have developed in such a way and affect our lives in various forms of application. It cannot be denied that the rapid development of information and communication technology has caused a number of major changes in society (Miarso, 2004). Improving the quality of education can be done in the form of developing models for delivering learning materials, developing curricula, and developing various types of learning media. One integral part of the renewal effort is in the form of learning media innovation. Learning media is an important part because learning media is a tool used to convey learning material (Gunawan, 2014).

The subject of physics is one of several fields of study that originates from all life activities which are always developing along with advances in science and technology. Therefore, it is necessary to bring back events in life in order to increase understanding of the concept of physics in explaining these events. By utilizing ICT as a basis for creating learning media that is able to overcome these problems, learning activities will be more effective and efficient (Asyhar, 2011).

The learning media used by the teacher greatly influences the motivation, interest, as well as the learning outcomes of students (Widyawati & Prodjosantoso, 2015). Physics learning cannot be separated from the media and teaching materials used. The media and teaching materials that are often used are in the form of textbooks or modules that contain writing or explanations with sentences and only a few pictures and tend to make students bored and less motivated.

The complexity of the material presented makes students less interested in reading textbooks including physics books. Students tend to be interested in reading picture story books (such as comics) compared to regular textbooks, or they can also use webtoons, namely listening to someone's voice, usually presented through their own application. The development of communication and information technology gave birth to online learning and using internet facilities as a learning method which is considered as a problem solving to reduce difficulties in understanding learning. Because technological developments provide opportunities for educators to solve and review existing educational problems (Yuberti, 2015).

The development of technology and information, especially the internet, has helped a lot in human life, starting from national/international news, entertainment, social networking, and even education. In this case students will understand optical device material which is packaged more easily understood for students using Webtoons. With learning media that is more up to date, it is hoped that students will more easily understand optical instrument material. The stories presented are grooved so that students can have an image and easily recall the optical instrument material. The problem of this research is how is the feasibility of developing Webtoon-based learning media for optical instrument material for class XI high school students.

Nana Sudjana (2013) defines Webtoon as a form of animation that reveals characters and dramatizes stories in a series that are closely related to visuals and are designed to entertain readers. From the definition above, comics can be understood as images and symbols arranged side by side and in a certain reading order for the purpose of conveying information and

obtaining a good response from the reader. Digital media can be created, viewed, distributed, modified and maintained on digital electronic devices. The growth of digital media and its enormous impact on society has ushered in a new era for a paperless society in which all media is produced and sold on computers or later.

Based on the background that has been explained, the researchers conducted research related to the problem in this study, namely how the feasibility of developing Physics learning media using Webtoons for Class XI High School students on optical instrument material.

## METHODS

This research method uses research and development methods (*Research and Development*). The *Research and Development* research method aims to find, develop, and validate a product. Sukmadinata (2008) argues that the *Research and Development* research method is a research approach to produce new products or improve existing products. The resulting product can be in the form of software or hardware, for example, modules, packages, books, learning programs and learning aids. Development research is recommended to be implemented in learning activities. Development research (R&D) in education is to develop and validate educational products. While the type of development carried out uses the 4D model (*Define, Design, Develop, and Disseminate*). The steps for the general 4D model development procedure can be seen in Figure 1.

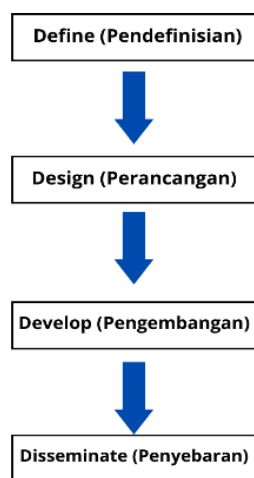


Figure 1. 4D model development procedure

The first stage is Defining (define). At this stage a field study was carried out. Field studies are carried out by observing. There are several things that need to be known to carry out this development such as knowing the type of curriculum, learning methods and media used, student behavior, student difficulties in learning, student perceptions of the learning media used so far, and students' familiarity with comics. After conducting a field study, the material developed was determined and outlined in detail. Then do a review of basic competencies and learning indicators. Then the material concepts developed are outlined and adapted to basic competencies along with learning indicators.

The next stage is designing, the stages carried out are determining the type of learning media that is appropriate to the material and needs of students, then determining the form of

presentation of learning media, and finally the stage of making media with a presentation design that has been prepared and adapted to basic competencies and learning indicators.

Furthermore, in the design (develop) stage, several stages are carried out, namely selecting the type of learning media that is relevant to the material and needs of students, then determining the form of presentation of learning media, and finally, the stage of making media with a presentation design that has been prepared and has been adapted to basic competencies and learning indicators.

In the final stage, this is a product trial to determine the feasibility of this product by distributing it to students who have studied optical instruments. Then ten people from a total of 25 students will be selected as respondents who represent these responses in order to find out student responses to the online comic media that was developed.

The subjects in this study were students from various universities in Indonesia who had studied optical instruments. In the study, the number of respondents to the due diligence test was 58 students. The object to be examined in this study is a physics online comic (webtoon) entitled "Science Camp". Learning media using this webtoon were developed and then tested for its feasibility as an alternative learning media that focuses on Optical Instruments material for class XI high school students. The data collection technique used in this study was by distributing questionnaires or questionnaires given to students, which consisted of several students who also understood Webtoon media.

In this study, the results of the due diligence questionnaire were obtained by material experts until March 22, 2022. The feasibility test was carried out through online questionnaires to find out how appropriate the learning media developed was. The research instrument used by researchers was a feasibility test questionnaire with three aspects and each aspect had several questions. The questionnaire was used to contain questions which were then given responses by respondents.

Obtained data includes quantitative and qualitative data which are then analyzed by calculating the percentage score. This research focuses on the feasibility of developing Webtoon learning media on optical devices. The resulting feasibility data were analyzed descriptively. The following are the steps taken: 1) using the results of a questionnaire with a predetermined point score indicator. 2) Make data tabulation. 3) Calculate the presentation of the results of the questionnaire. 4) The percentage results that have been obtained are then transformed into bold with the aim of determining the qualitative criteria obtained.

**Table 1.** Feasibility score indicators

No.	Criteria	Score point
1	Very worthy	4
2	Worthy	3
3	Not enough worthy	2
4	Very less worthy	1

The formula for calculating the percentage of due diligence questionnaire results is as follows:

$$\text{Percentage} = \frac{\text{total interval}}{\text{max score}} \times 100\% \tag{1}$$

Table 2. Rating Scales

Interpretation	Percentage
Very worthy	$81\% \leq \text{score} \leq 100\%$
Worthy	$61\% \leq \text{score} \leq 80\%$
Not enough worthy	$41\% \leq \text{score} \leq 60\%$
Very less worthy	$0\% \leq \text{score} \leq 40\%$

## RESULT AND DISCUSSION

The analysis was carried out in order to find out various kinds of problems in optical learning media using Webtoons so that appropriate learning tools/media are needed. This analysis was carried out by identifying the feasibility of learning media using Webtoons.

The next stage is the initial planning stage, namely the design of the Webtoon for the development of learning media. This stage includes concept planning, scenario creation, plot design, and character design. This design is done to simplify the illustration at the development stage. Webtoon learning media can be accessed via the following link <http://bit.ly/sciencecamp-webtoon> which can be accessed via smartphones, computers and laptops.

Assessment of the feasibility test was carried out by distributing questionnaires with a total of 58 students in the field of Physics as respondents. Then, the questionnaire data was changed from ordinal data to interval data using the MSI method. The results of the analysis of the assessment of the average score of the assessment of each aspect of 58 respondents can be seen. The results of the feasibility test questionnaire analysis were obtained by material experts as follows:

Table 3. Due diligence results per aspect

No.	Aspect	Score	Classification
1	Material learning tool optical	84%	Very Worthy
2	Media learning Webtoonstool material optical	87%	Very Worthy
3	Linguistic aspect	87%	Very Worthy

The feasibility test assessment has been analyzed obtained in the aspect of learning material for optical instruments obtaining a percentage of 84% which is included in the very feasible category. This is supported by the suitability of the material presented and the data of respondents who chose score points 3 and 4 on the questionnaire items. Then in the aspect of Webtoon learning media, the material for optical devices obtains a score of 87%, including in the very feasible category, this score is greater than the first aspect because the visual design of the Webtoon learning media has been planned beforehand so that the results are more interesting to read. The third, namely the linguistic aspect, scored 87% in the very decent category because the researcher packaged the language used in accordance with PUEBI so that it was easy for readers to understand and the material could be conveyed properly. meeting, students are given writing assignments. In this study, learning activities were carried out for two meetings so that there were two writing assignments that had to be given to students after each lesson was finished. There are forms of journal writing assignments assigned to students that refer to student reflective journals exposed in the homework book developed by Al-Rawahi & Al-Balushi (2015), namely; (1) the teacher's learning objectives that can be achieved after learning; (2) subject matter explained by the teacher that can be understood in the form of

concepts, core concepts, connecting them, understanding the surrounding facts, and applying the concepts; (3) practice questions which are considered difficult to solve or the causes as well. Tasks are done individually. Figure 1 shows a form of writing assignment that has been done by students.

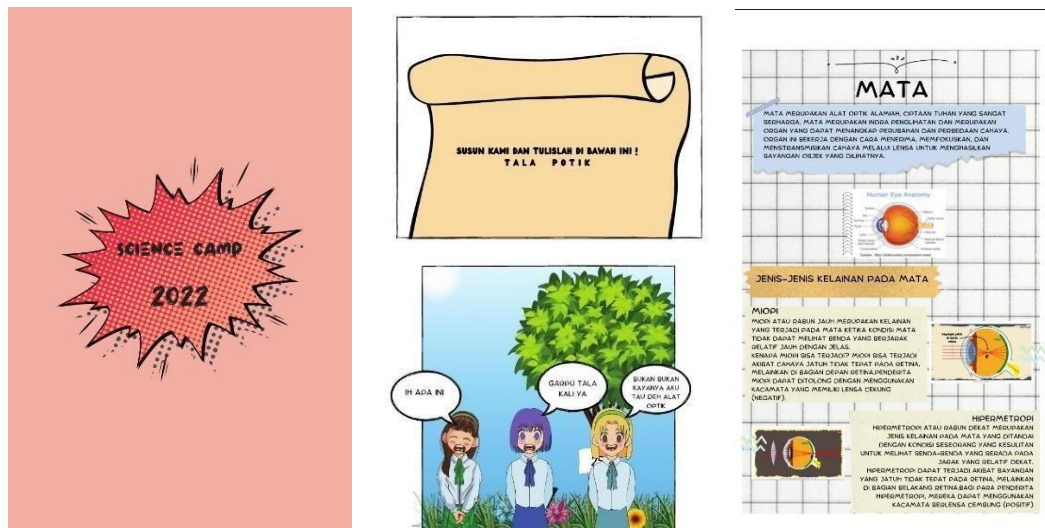


Figure 2. Webtoon Science Camp

The 1st aspect, namely regarding the learning material for optical instruments, obtains a percentage scale of 83.59%. This percentage is included in the very feasible category to develop. The following details the scale on the 1st aspect with each question item.

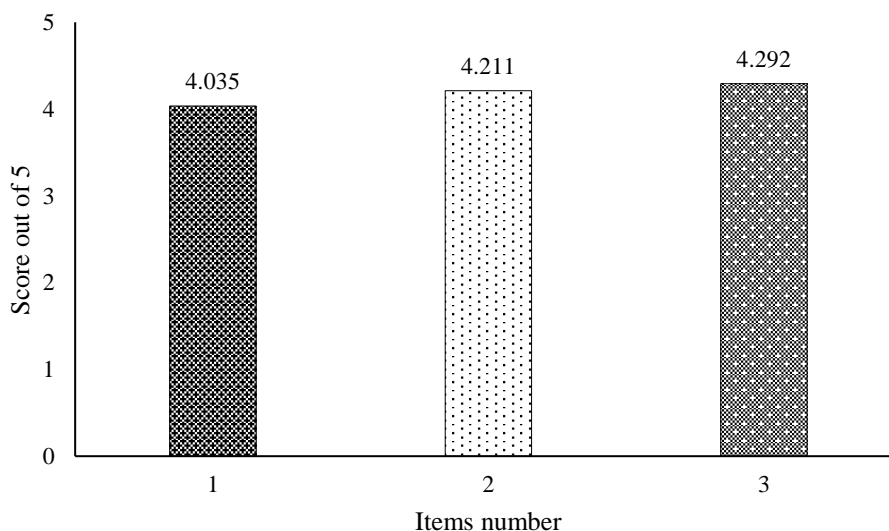


Figure 3. Feasibility Results of Aspect 1

The results of aspect 1 show that the material for optical instruments is very feasible to develop. This is supported by the results of each question item above 4.035. Respondents generally considered that the ease of material in learning media with Webtoons increased students' understanding of optical devices.

In the 1st aspect, which has the lowest score of 4.035, is the question in the first item, namely the question "Compatibility of learning media goals by increasing understanding of the concept of learning Physics of optical instrument material". The question items indicate that the majority of respondents do not know the purpose of Webtoon learning media to increase understanding of the concept of learning Physics for optical instruments.

In the other question items in aspect 1 it was stated that it was feasible, but revision was still needed. In making revisions according to the suggestions and comments given by respondents when filling out the questionnaire in the "Suggestions & Comments" section. This is done so that this development can be better than before. The material presented is clear and concise, in accordance with Webtoon which is not too long in presenting material, but the essence of the material is still conveyed properly. In the convenience of learning media with Webtoons, it can increase students' understanding of optical instrument material, indicating that it is appropriate or feasible.

Then, in the 2nd aspect, namely regarding Webtoon learning media regarding optical device material, it obtains a percentage value of 86.52% which indicates it is in the very decent category with several improvements or improvements. Following are the feasibility results in the 2nd aspect.

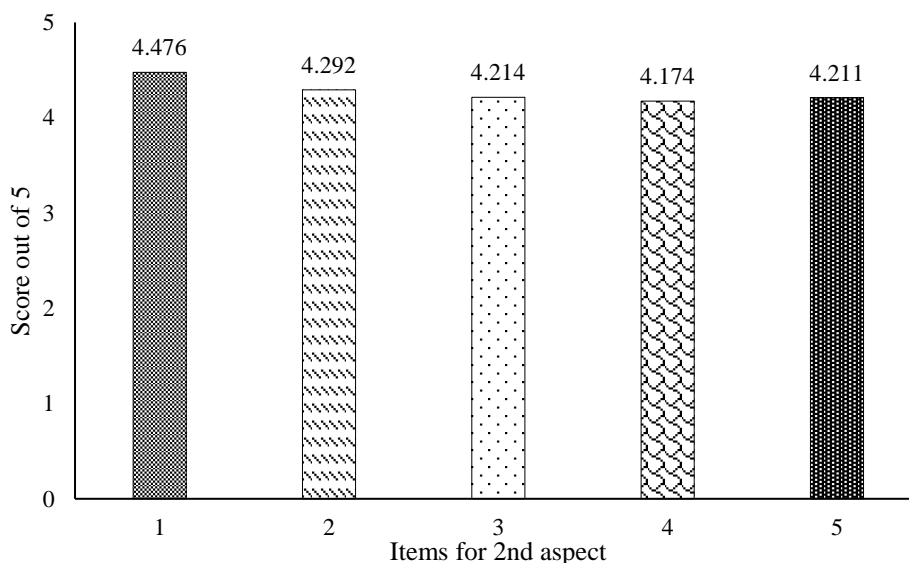


Figure 4. Feasibility Results of the 2nd Aspect

Based on the results of graph 2. shows the feasibility of learning media included in the very feasible category. In general, the second aspect obtained results above 4.00 which stated that it was feasible to develop. To fill in these aspects, pay attention to the display in Webtoon learning media. Respondents considered that the media or display presented was appropriate and easy to understand for understanding optical instrument material so that researchers would improve it according to the suggestions and comments given.

In question number 7 it can be seen that it has the smallest value among the other items. In item number 7 with the question "The story presented attracts readers to learn optical instrument material". This question number 7 gets an average score of 4.1754 which is very feasible. However, this item has the smallest value among the other items. This shows that researchers need to pay attention to the stories presented so that they are better suited to the suggestions

given by respondents, one of which is "It is better that the story is not too long so that the reader does not get bored when studying material through Webtoons. So, the value of item number 7 is very influential on the eligibility and understanding of students because it is through stories that material is conveyed to students.

In the third aspect, namely regarding language, it obtains a percentage scale of 87.06%. This percentage is included in the very feasible category to develop. The following details the scale on the 3rd aspect with each question item.

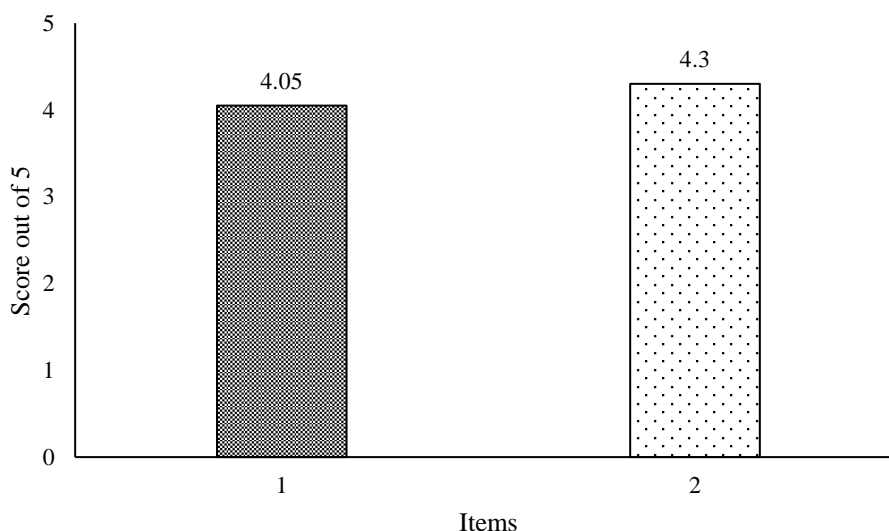


Figure 5. Results of the feasibility of the 3rd aspect

Based on the results of graph 3, it shows that the feasibility of the language used is already in the very decent category. In general, the 3rd aspect obtained results above 4.00 which stated that it was feasible to develop. To fill in these 3 aspects pay attention to the linguistic elements used in presenting material on the Webtoon. Respondents considered that the media or display presented was in accordance with PUEBI and easy to understand for understanding optical instrument material so that researchers would improve it according to the suggestions and comments given. In the results it is known that item number 10 produces a higher score compared to question number 9 which means that the linguistic aspect with the question items the language used is easy to communicate and understand. In item number 9, namely the question regarding language compatibility with PUEBI, it still needs to be considered again because in Webtoon it uses more relaxed language, not too standard. Thus, researchers need to pay more attention to linguistic aspects so that they are compatible with PUEBI.

All aspects that underlie the readiness of this learning media get a very decent category. Even though it has obtained a very feasible category, the development of this learning media still needs some improvements in order to perfect this learning media as described in the discussion above.

## CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that learning media using webtoons for optical instrument material in class XI high school students is very feasible.



This development gets a very decent category but still needs a little improvement. The three aspects that underlie the readiness of this learning media are in the very decent category but still need a little improvement. Improvements can be made in every aspect. In the first aspect, improvements that can be made are clarifying the essence of the purpose of this learning media. Then in the second aspect the improvements that can be made are by shortening the storyline so that the essence of the material can be conveyed better. In the third aspect, improvements that can be made are that the language used can be made non-standard so that reading is more relaxed.

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