Research Article

Development of a Learning Media Based on E-Comics

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Abstract.

The results of a preliminary study conducted on a Biology teacher and students of Class X Science 2 showed that WhatsApp was the most regularly used communication media. This is considered to be less effective, resulting in the learning becomes not optimal. During the pandemic, one of the learning media which could have been used was e-comic. This could be accessed through Instagram. Thus, this study aimed to develop and assess the feasibility of Instagram-assisted e-comic learning media. The development model used was 3-D: define, design, and develop. This development research was carried out at 24 Senior High School Bandung. The research subjects consisted of 3 expert validators and 18 students of class Class X Science 2. This development research used assessment questionnaires for validators and respondent questionnaires for students. The results of the validation with the revision process based on the advice of chapter experts show that this learning media is very valid with a combined score of 89.80%, and the results of the questionnaire of product trial respondents to the students got a *very good* category of feasibility with a score of 4.4.

Keywords: development, learning, media, e-comics

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1. INTRODUCTION

One of the lessons at the high school level is Biology. This subject explains living things or life sciences. Biology in tenth grade, the odd semester following the Revised 2013 Curriculum includes the Scope of Biology, Biodiversity, Classification of Living Things, Viruses, Bacteria, and Protists. It is common knowledge that Biology is a subject that needs to be presented with illustrations or visual images to make it easier for students to build concepts. Learning in 2020 is different than usual. The whole world is experiencing a pandemic caused by the coronavirus—SARS-CoV-2. On March 11, 2020, WHO (World Health Organization) stated that Covid-19 had become a worldwide pandemic until now [1]. With this determination, learning becomes distanced. As explained in the Law on Higher Education No. 12 of 2012, Article 31 that distance learning, or PJJ (*Pembelajaran*

Jarak Jauh in Indonesian) is a teaching and learning process carried out remotely through the use of various communication media [2].

Based on the results of a preliminary study conducted online considering that the Covid-19 pandemic is still happening. According to [3] that since this pandemic entered Indonesia, school learning has been affected. Classroom learning is usually face-to-face, during the Covid-19 pandemic, learning is done online. According to the results of interviews with Biology teachers with the help of the WhatsApp chat feature and filling out online questionnaires via Google Form by 24 of 35 students of class X Science 2 at 24 Senior High School Bandung that the communication media used during distance learning, namely Google Classroom, Google Meet, WhatsApp, and Zoom. However, according to the 24 students, they stated that the most frequently used communication tool was WhatsApp with a percentage of 95.8% (23 students).

The obstacles experienced during online distance learning are felt by the Biology teachers themselves. She stated that during distance learning, learning became ineffective so the question-and-answer process which is common in teaching and learning was disrupted. This correlates with the statements of students in class X Science 2. A total of 87.5% of the 24 students stated that while studying at home, the teacher gave more assignments than direct explanations. However, students are trained to remain active and respond to each other so that the teaching and learning process can continue properly [4]. Therefore, the role of the teacher is very important. Referring to the statement of [5] teachers have an important role in educating, namely by providing motivation and making classroom arrangements as effective as possible. Based on this, the learning media based on e-comic assisted by Instagram can be used as an alternative.

According to [6]. Instagram is an application for minimizing information risks and costs and maximizing information value because Instagram uses pictures and videos for the main facilities so that information conveyed can be more concise and solid. According to the results of the preliminary study, 79.2% of students liked picture stories/ comics. The result is the same as the statement of 24 students—the percentage of results 79.2% that Biology is preferred because of the many pictures/ illustrations. Instagram, this online application is a social media application that is easily accessible by anyone. With a smart device and an internet connection, Instagram can be used. Instagram has an advantage in the number of communities or people that can access it.

The main thing that will be discussed is learning media. According to the terminology, media comes from Latin, namely "medium" which means relation or intermediary, while in Arabic, media comes from the word "wasaaila" which means to convey messages

from the sender to the recipient of the message. Learning according to the KBBI is a process, method, or job that can make a person learn. The existence of learning media teaches students to take a critical attitude in receiving media messages and encourages them to take advantage of it to facilitate learning [7].

There are many kinds of learning media. 2D (two-dimensional) learning media is a learning media that includes 2 elements, namely length, and width. An example of two-dimensional learning media is comics. The use of comics as a learning medium has the power to generate students' desire to learn and help them remember the subject matter they are learning, especially the virus chapter [8].

E-comic—electronic comics circulating today are not just for entertainment. However, e-comic can also be used as a medium for delivering messages. According to Maharsi in [9], the e-comic is diverse, one of which is for education. E-comic has the potential to appeal to readers in unique ways and to present content across disciplines using particular set of grammatical and semiotic tools [10].

2. RESEARCH METHOD

The research method used is Research and Development, known as R&D in [11] opinion. Three expert validators and 18 students from 35 students of class X Science 2 at 24 Senior High School Bandung will be used as a sample. Instruments in this development research are open interviews with a tenth-grade Biology teacher, preliminary study questionnaires, assessment questionnaires, and respondents' questionnaires via Google Form. Aspects that are assessed from the results of the questionnaire are e-comic adjustment with the virus chapter (validators) and students' responses about e-comic in the virus chapter (respondents). The result from the interview with a tenth-grade Biology teacher and the students' statements about e-comic produced descriptive data for when preliminary study. Then, the assessment questionnaire is processed using a formula to produce valid or invalid data. The final process is the respondents' feedback from the questionnaires about attractiveness, chapter, and language using the Likert scale for the conclution in this research development.

The model of 4-D development is the method that will be applied in this research. 4-D is a development model of research and development procedures. According to Trianto in [12] 4-D consists of 1) Define, 2) Design, 3) Develop, and 4) Disseminate. However, this research is limited to the third step—3D, which is the develop stage only. The following is a description of the steps carried out.

1. Define

    The first stage—define—a preliminary study was conducted at 24 Senior High School Bandung class X Science 2 by giving a preliminary study questionnaire and analysis of learning tools (Core Competency, Basic Competency, Indicators of Competency Achievement, and Learning Objectives). This is done to find out the obstacles during learning and the initial response to learning media based on e-comic assisted by Instagram. In this first stage, the e-comic will be adapted to the existing chapter and ready for the next stage.

2. Design

    In the second stage—design—this process, e-comic has entered the manufacturing process. From sketching to comics. Using PaintTool SAI version 2.0 computer software. It is known that this learning media based on e-comic assisted by Instagram is a tool for teachers or students, so this design cannot be separated from the chapter presented.

3. Develop

    The third stage—develop—this stage is a process of assessment by validators and taking respondent questionnaires. The e-comic that was developed did not escape the revision process until finally the learning media based on e-comic assisted by Instagram in this virus chapter deserved to be disseminated. The distribution is carried out, namely by uploading it to the @bioincomic.id Instagram account. Teachers and students can access this learning media through this account.

Data can be said to be valid if it meets the requirements in accordance with existing provisions. Therefore, the following is the formula for processing data from the validation results by the expert validators [13].

$$V = \frac{Tse}{TSh} \times 100\%$$ (1)

Information:

   V = Expert validation

   Tse = Total empirical score achieved

   TSh = Total expected score

The validation process of this learning media requires 3 validators, so that validation can be combined with the following formula [13].

$$V\,combination\,(\%) = \frac{V1 + V2 + V3 + \ldots Vn}{Validator\,Total}$$ (2)

That way, from this formula it can be seen whether this e-comic is valid or not. The interpretation of the validation results by the validators can be seen in Table 1.

TABLE 1: Interpretation of validation results by validators.

No.	Validation Value Index	Category	Information
1	$80.01\% < V \leq 100\%$	Very valid	Very valid or can be used without revision
2	$60.01\% < V \leq 80.00\%$	Valid	Valid or usable but needs minor revision
3	$40.01\% < V \leq 60.00\%$	Quite valid	Not valid, it is recommended it needs a major revision
4	$20.01\% < V \leq 40.00\%$	Invalid	Invalid or cannot be used
5	$00.00\% < V \leq 20.00\%$	Very invalid	Very invalid, it can't be used

Data from respondents' questionnaire can be produced statement uses a Likert scale. This scale uses a graduation from very positive to very negative. To facilitate quantitative measurement, a score is used. This research uses a score between 1—5. Determination of the assessment score of the respondents' questionnaire can use the following formula [14].

$$Score = \frac{total\ of\ statement\ score}{total\ of\ the\ highest\ score} \times the\ highest\ total \tag{3}$$

To describe the score, it can be seen in Table 2.

TABLE 2: Description Score on the likert scale.

No.	Respondent Criteria	Statement to Directions	
		Positive	Negative
1	Strongly Agree (SA)	5	1
2	Agree (A)	4	2
3	Neutral (N)	3	3
4	Disagree (DA)	2	4
5	Strongly Disagree (SD)	1	5

After knowing the range of scores needed for analysis purposes, the the result obsained from filling out the questionnaire with a scoring system, can be calculated for class intervals, with the formula [11].

$$P = \frac{Xmax - Xmin}{b} = \frac{5 - 1}{5} = 0,8 \tag{4}$$

Information:

X_{max} = Maximum value = 5

X_{min} = Minimum value = 1

b = Many criteria = 5

P = Class interval length = 0.8

That way, it can be found the category of each interval in making it easier to determine the qualitative assessment as follows Table 3 [11].

TABLE 3: Category of each class interval.

Rating Score	Interval	Category
1	1.0 – 1.8	Very bad
2	1.9 – 2.6	Bad
3	2.7 – 3.4	Currently
4	3.5 – 4.2	Good
5	4.3 – 5.0	Very good

3. RESULTS AND DISCUSSION

The use of learning media based on e-comic assisted by Instagram is not limited by the number of meetings in the classroom because it is flexible and can be read at any time to support learning. Students as respondents can access this e-comic through the @bioincomic.id account on Instagram social media. The e-comic is presented in the form of slide uploads on the Instagram feed. It can be seen in Figure 1.

In one story title, up to 10 slides of interconnected images are loaded. Judging from the number of sub-chapters, namely five sub-chapters, this virus e-comic divides the sub-chapters into 17 comics plus one introductory learning comic in the form of presentations on Core Competency, Basic Competency, Indicators of Competency Achievement, and Learning Objectives (18 uploads). Especially in the sub-chapter Application of Viruses in Human Life, information is added as well as an invitation to students to campaign to prevent HIV/AIDS and how to stop the spread of the coronavirus that causes Covid-19.

Learning media based on e-comic assisted by Instagram is a research and development type of media. Learning media is a learning media that support the student's learning process in getting the appropriate subject matter in the classroom. This media is intended, especially for students of tenth-grade senior high school which contains Biology. This time, the e-comic-based learning model with the help of Instagram contains one of the chapters in tenth-grade, namely Virus. Making learning media aims to meet the needs of students in learning anywhere and anytime. In addition, by utilizing Instagram as a social media to access e-comic, students have a better reason to open Instagram, for reading e-comic to study. An example of an e-comic made can be seen in Figure 1.

Figure 1: Feed preview @bioincomic.id on Instagram.

Research and development or abbreviated as R&D carried out on this learning media based on e-comic assisted by Instagram aims to produce a product that can support the learning process. Thus, to carry out this development research was carried out with a 4-D development model under Thiagarajan's instructions. However, the development
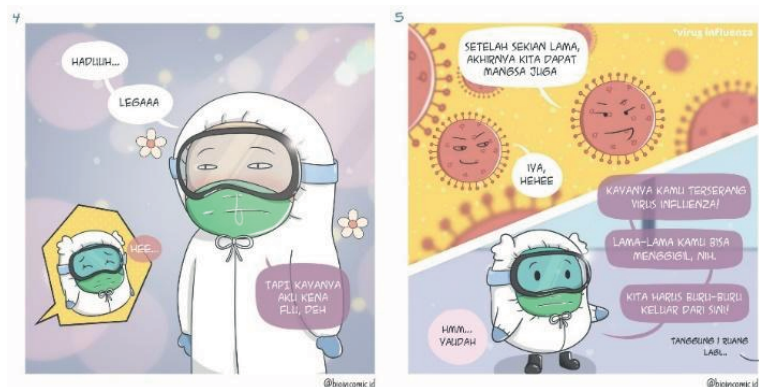
Figure 2: Examples of the results of learning media (e-comic) that were made, were taken from the title "Tour to the Virus Museum (Part II)" on the 4th and 5th slides.

model is further simplified into 3-D. The 3-D development model contains define, design, and develop research tools.

The define stage—is carried out with a preliminary study of 24 students from 35 students of class X Science 2 24 Senior High School Bandung and analysis of learning tools. This is done to find out the obstacles during learning and the initial response to this learning media based on e-comic assisted by Instagram. In this first stage, the e-comic will be adapted to the existing subject matter and ready for the next stage.

The design stage—is the second process in the 4-D development method. At this design stage, the e-comic has entered the manufacturing process. From sketching to comics. It is known that this learning media based on e-comic assisted by Instagram is a tool for teachers or students, so this design cannot be separated from the subject matter presented.

The develop stage—this stage is a process of assessment by three validators and taking respondent questionnaires from 18 students in class X Science 2 24 Senior High School Bandung. The e-comic that was developed did not escape the revision process until finally the e-comic-based learning media assisted by Instagram in this virus chapter deserved to be disseminated.

Three validators gave an assessment of this e-comic and the results of the data processing state that the learning media in question is very valid. The statement can be seen in Table 4.

Each of these types of validation is held by one validator in accordance with their field of expertise. The data table above shows the percentage results in the range of $80.01\% < V \leq 100\%$. It is concluded that this learning media is very valid and suitable for use in the learning process. But, before getting the appropriate category, this learning

TABLE 4: Expert validation analysis results.

No.	Validator	Validation Percentage (%)	Information
1	Subject expert	82.50	Very valid
2	Media expert	98.00	Very valid
3	Biology Teacher	88.89	Very valid
	Combined validation percentage	**89.80**	**Very valid**

media goes into the revision process. The revision was obtained from the results of the first validation carried out by the subject expert.

Data processing of respondents' questionnaire in product trials on 18 students (out of 35 students) stated that the e-comic was very good, as shown in Table 5.

TABLE 5: Respondents' questionnaire results assessment score (product trial).

No.	Aspects	Rating Score	Information
1	Attractive aspect	4.4	Very good
2	Subject aspect	4.4	Very good
3	Language aspect	4.7	Very good
	Average	**4.4**	**Very good**

The aspects presented in this respondents' questionnaire amounted to 10 statement points which were into 3 aspects. The attractive aspect is presented in a 5-point statement. From the five points, the average point is 4.4. that way, the points obtained produce very good dominant qualitative data. Subject aspect is presented in 4-point statement. From the four points, the average is 4.4. that way, the points obtained produce very good dominant qualitative data. The last aspect is language. This aspect is presented in 1-point statement. The result point is 4.7. that way, the point obtained produce very good qualitative data. The results of the respondents' questionnaire in this product trial show that the learning media based on e-comic assisted by Instagram in the virus chapter developed has a very good feasibility value with an average score of 4.4 (from 10 statement points).

4. CONCLUSION

This learning media based on e-comic assisted by Instagram in Virus is presented in the form of slides or multiple uploads instead of panels in a comic book. This makes learning media based on e-comic assisted by Instagram look different. In one upload, a maximum of 10 images can be uploaded (10 slides). The results of validation experts (subjects, media, and Biology teacher) stated that the e-comic assisted by Instagram

was feasible to use without revisions that were very valid with a percentage of 89.80% and the results of the respondents' questionnaire in the product trial stated that this learning media was very good with the score 4.4. So, this learning media deserves to be used without revision.

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