

Development of comics as a learning media on human digestive system topic

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Abstract: The human digestive system is a difficult subject for high school students. The purpose of this research was to develop comics as a learning media on the human digestive system topic. The development of comics used the Sugiyono model which consists of the stages of identifying potentials and problems, data collection, product design, design validation, design revision, product testing, product revision, usage testing, and product revision. The participants involved in the product trial were seventh grade students of SMP Diponegoro and SMP Raden Fatah in Batu City. The data collection instruments used were validation sheets and test sheets. The results of the validation from content and media experts inform that comics were included in the appropriate category. The average of students' posttest results were always greater than the pretest, both on small-scale and large-scale trials. Student responses to comics were also categorized as very positive. In conclusion, the comics developed are effective and feasible to use.

Keywords: comic, human digestive system; learning media

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1. Introduction

The learning process is an effort to deliver messages by the teacher by planning and creating a learning environment system so that students can carry out learning activities optimally. The skills to plan and implement the learning process are related to the duties and responsibilities of teachers as educators (Hasyim, 2014). Teachers as presenters of information in the learning process must be able to convey material in an interesting and varied manner, so as to create a pleasant learning atmosphere. The process of fun learning activities is certainly not created just like that, a way of managing learning facilities (media) is needed that is designed by the teacher, making it easier for students and encouraging the student learning process (Supartini, 2016).

The use of media in learning activities, of course, makes teachers need to be selective in choosing the media to be used. Accuracy and accuracy in the selection of learning media will support the effectiveness of the learning activities to be carried out (Sungkono, 2008). Books are learning media that contain various kinds of information that can be obtained through reading activities. Reading is an integrated process to understand the meaning of a writing (Budiarti & Haryanto, 2016).

Based on the results of interviews with Natural Science (IPA) teachers in class VIII of Diponegoro Junior High School, it was found that the GLS (School Literacy Movement) had been implemented in Diponegoro Junior High School before the lesson began, however, this program was still not running optimally. This can be seen when the student learning process is not focused on learning material because some students are busy alone and prefer to chat with friends rather than reading books so that students' reading interest is less. The results of the preliminary study at Raden Fatah Batu Junior High School were that the school had not implemented the GLS program and during the science learning

process some students were less interested in issuing and reading books. Students are more likely to listen to the material delivered by the teacher without reading the books used as learning media.

Diponegoro Junior High School and Raden Fatah Batu Junior High School use similar learning media, namely books provided by the Government, in the form of BSE and LKS package books. The teacher also uses the torso in explaining the material of the human digestive system to facilitate students' understanding, however, the use of the media is still not running optimally. Students tend to memorize and do not understand the concepts explained by the teacher.

Based on these two problems, it can be concluded that students' low reading interest greatly affects the learning process. The lack of intensity in reading books will affect the level of students' understanding of the subject matter, so students tend to ask the teacher instead of digging up information from books. One way that can be used so that students are able to understand the concept of the material provided is by reading a lot of books related to the material. The learning books used today are mostly in the form of textbooks, although there have been variations in the addition of illustrations but have not had a sufficient effect on increasing students' reading interest so that appropriate learning media are needed.

The selection of the right learning media is able to adjust to the characteristics of each student who will use the media in the learning process (Sungkono, 2008). According to Slavin, (2019) stated that the main achievement in junior high school age is in the form of abstract and purely symbolic thinking. The characteristics of junior high school students who like pictures and symbols show that they naturally like picture books like comics. Comics are one of the visual-based media. The use of visual media serves to channel messages from the source to the recipient. The message conveyed is poured into symbols or visual communication images. These symbols need to be understood correctly so that the message delivery process is successful and efficient (Sadiman et al., 2009).

The use of comics as an educational medium, namely comics is able to convey information that is packaged in a simple and attractive way. Comics also have advantages in learning, besides the unique characteristics of comics, the effectiveness of media in learning is a beneficial aspect in education. The application of media in learning will attract more students' attention so that it can foster learning motivation and stimulate students' desire to read. The use of comics is expected to be able to provide a new color in learning so that motivation appears in students to learn using comic-based media (Hidayah & Ulva, 2017).

In learning Natural Sciences there are many things that are taught that are directly related to the processes of our daily lives including the respiratory system, digestive system and excretory system. Digestive system material is material that is included in the physiological realm and makes students tend to memorize rather than understand the concept of the learning material. Efforts that can be used to make it easier for students to understand the material of the human digestive system are by providing learning media. The learning comic media provided must be able to help students understand the concept of the material presented by the teacher. The media used must also be able to attract students' interest in learning so that it fosters interest in reading and is expected to improve student learning outcomes. Therefore, the researcher decided to take the title "Development of Comics as Learning Media in Human Digestive System Material for Class VIII Junior High School Students."

The objectives to be achieved in this study are to determine the development process and feasibility of comics as a learning medium and to determine the effectiveness and response of students after using comics as a learning medium in the human digestive system material for grade VIII junior high school students. The product of illustrated comic learning media on the subject of biology, the material of the digestive system for Grade VIII Junior High School students is arranged based on the basic material of Basic Competencies of the human digestive system Basic Competencies 3.5 and 4.5.

Comic specifications consist of two parts, namely the appearance of the comic and the content of the comic. The overall appearance of the comic is in color with A4 paper size and in the form of print media. The content of the comic consists of an introduction, a material section and a closing section. This comic consists of 20 pages with 2 sub-topics, namely: 1. Organs in the human digestive system and the systematics of the digestive process in the human body, 2. Disorders related to the human digestive system.

2. Materials and Methods

According to Sugiyono, (2019) research and development methods or Research & Development are used to produce certain products and test the effectiveness of these products. In this study, the product developed was comics as a medium for learning Biology on the material of the human digestive system for grade VIII junior high school students. According to Sugiyono, (2019) stated that the research steps are shown in Figure 1.

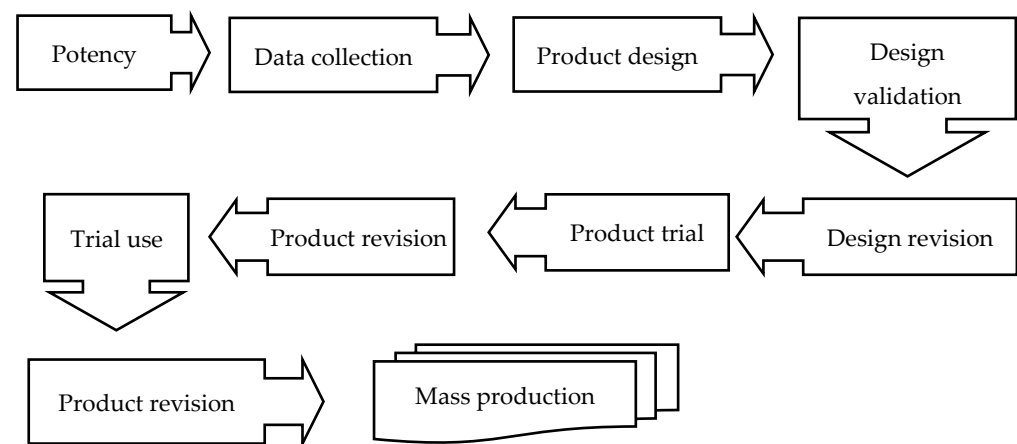


Figure 1. The steps for using the Research & Development Method

The development of media in the form of comics used as learning media is a research that uses 4-D research stages by Thiagarajan, Sammel and Sammel. In this study, the development stage was only carried out until the third stage. So that the stages to be carried out are the defining stage, the design stage and the develop stage. The last stage, namely the dissemination stage, was not carried out because the time required in the deployment stage was quite long and the amount of costs required in the deployment stage was quite long.

This research was conducted in November-December 2019 at Diponegoro Junior High School which is located at Jln. Raya Junrejo Village/Kec. Junrejo Batu City and Raden Fatah Batu Junior High School which is located at Jln. Flowering Hill 261 Sidomulyo Batu City, East Java. The test subjects during this development research were grade VIII students of Diponegoro Junior High School who followed the small group and large group trial stage and Raden Fatah Batu Junior High School. While the object of this development research is comics as a medium of learning on the material of the human digestive system.

The types of data used in the research and development of comics as learning media for the human digestive system are: 1) qualitative data (obtained from criticism, suggestions, responses, and inputs from material experts, media experts, teacher and student responses) and 2) quantitative data (the results of the assessment of media experts, material experts, students and teachers through expert validation questionnaires and student test questionnaires containing numbers obtained from test answer scores). The data collection instruments in the study were: observation, interviews, questionnaires (validation of media and materials, teacher responses, student responses) and test sheets.

The data analysis technique was carried out with a questionnaire technique used to obtain data in the form of responses or assessments from expert validators on the developed product. Briefly presented in [Table 1](#).

According to [Sugiyono, \(2019\)](#) the appropriate data analysis technique to analyze the results of the questionnaire is descriptive analysis technique, the answers to each instrument use a Likert scale obtained from the expert assessment of the validator by giving a score of one to four with the [Formula 1](#). Description formula 1: P = Gained percentage of validators, $\sum x$ = Total score for each selected criterion, and N = Total ideal score.

$$P = \frac{\sum \chi}{N} \times 100 \% \tag{1}$$

Table 1. Data analysis techniques

Required data	Data source	Data collection
Produce comic-based learning media products that are feasible to be applied as learning media in biology subjects for the human digestive system	Comic media eligibility	Descriptive

The criteria for the validity of the questionnaire data assessment validators of media experts, material experts and student responses to the use of comics are presented in [Table 2](#).

Table 2. Interpretation of media expert and material expert score

Score range (%)	Qualification	Information
81 - 100	Very good	Very decent, no revision needed
61 - 80	Good	Eligible, revised as necessary
41 - 60	Enough	Not worth it, needs to be revised
21 - 60	Not good	Not worth it, needs to be revised
≤ 20	Very Not Good	Very unworthy, needs to be revised

Source: ([Arikunto, 2013](#))

According to [Riduwan, \(2013\)](#) the appropriate data analysis technique to analyze the results of the questionnaire is descriptive analysis technique, the answers to each instrument use a Likert scale obtained from the assessment of teacher and student responses by giving a score of one to four with the [Formula 2](#) and [Table 3](#). Description formula 2: P = percentage number, SD = number of data collection, and SI = sum of the highest scores.

The criteria for the validity of the questionnaire data assessment validators of media experts, material experts and student responses to the use of comics are presented in [Table 4](#). The data analysis technique of the test results was using the SPSS 25.0 application which was analyzed using paired t-test.

$$P = \frac{SD}{SI} \times 100 \% \tag{2}$$

Table 3. Data analysis techniques

Required data	Data source	Data collection
Produce comic-based learning media on the subject of biology material for the human digestive system so that the delivery of material is more interesting	Teacher and student	Descriptive

Table 4. Interpretation of teacher and student response questionnaire scores

Percentage	Criteria
$\geq 75\%$	Very positive
$50\% \leq P < 75\%$	Positive
$25\% \leq P < 50\%$	Enough
$P < 25\%$	Not enough

Source: (Riduwan, 2013)

3. Results

The result of product development in this study is that comics are used as learning media for the human digestive system material for class VIII SMP. Comic Media Arrangement: (a) comic cover display. The front cover consists of the title of the comic, the name of the author, and there are illustrations that match the title of the comic; (b) table of contents. Displays a list of comic content that is equipped with page descriptions; (c) appearance of characters and characters. Introducing the characters who play a role in the comic story; and (d) the materials section consists of the organs contained in the human digestive system and the systematics of the digestive process in the human body.

Design validation was carried out by material experts and media experts to assess the feasibility of the product before being tested on students. The results of validation by material experts are in Table 5 and media experts are in Table 6. The results of the test response can be seen in Table 7.

Table 5. Validation of material experts

No	Statement	Criteria	Score
1	Comic media is easy to use for the learning process	Very good	4
2	Compatibility of comic shape and size	Very good	4
3	The use of illustrations is appropriate to the material.	Very good	4
4	The storyline presented is coherent and in accordance with the material.	Very good	4
5	The presentation of comics is in accordance with the characteristics of class VIII junior high school students.	Very good	4
6	The sentence structure is clear.	Good	3
7	The language and terms used are correct.	Good	3
8	The language used in this comic is simple and easy to understand.	Very good	4
9	Use polite language.	Very good	4
10	Use the appropriate typeface.	Very good	4
11	Use the appropriate font size.	Very good	4
12	Proper use of spaces.	Very good	4
13	Color composition according to the writing and characteristics of students.	Very good	4
14	The arrangement is done systematically and efficiently.	Very good	4
15	The accuracy of the location of illustrations and text.	Good	3
16	The suitability of the layout of the character image with the conversation in the word bubble.	Very good	4
17	Design images and covers that are appropriate and attractive.	Very good	4
18	Comics can increase students' motivation in studying Biology.	Very good	4
Amount			69

Table 6. Validation of media experts

No	Statement	Criteria	Score
1	The material delivered is in accordance with the Basic Competencies.	Very good	4
2	Concept and definition accuracy.	Very good	4
3	Image and illustration accuracy.	Very good	4
4	Use examples from everyday life.	Very good	4
5	Dialogue / story according to the material discussed.	Very good	4

No	Statement	Criteria	Score
6	The use of language supports understanding the flow of the material.	Very good	4
7	Use polite language.	Very good	4
8	The dialogue text used in comics can convey the right material.	Good	3
9	The use of words does not contain words with double meanings/misinterpretations.	Good	3
10	Ease of reading writing.	Good	3
11	Presentation of material encourages students to actively participate in learning.	Very good	4
12	The storyline presented is able to make it easier for readers to understand the material.	Very good	4
13	The whole look of the comics.	Very good	4
Amount			49

Table 7. Results of small-scale student responses at Diponegoro Middle School

No	Statement	Percentage value (%)	Description
1	Learning to use this comic is my first experience.	95	very positive
2	I can understand the material with the help of the pictures in the comics.	98	very positive
3	The cover design describes the content or story that is conveyed.	93	very positive
4	I think the design of this comic is interesting.	93	very positive
5	I can read the text easily because the type and size of the font chosen is right.	93	very positive
6	I love how each comic page looks.	95	very positive
7	This comic learning media helped me understand the material of the human digestive system.	95	very positive
8	The dialogue or text used is simple and easy to understand.	93	very positive
9	The language used is simple and easy to understand.	95	very positive
10	With this comic I gained a deeper knowledge of the material of the human digestive system.	95	very positive
11	I prefer to learn with this comic rather than just listening to the teacher's explanation.	90	very positive
12	I can understand the material presented easily.	90	very positive
13	This comic motivates me to learn.	95	very positive
Average Percentage		94	very positive

4. Discussion

The results of material expert validation showed that the comics used as learning media on the human digestive system material for grade VIII Junior High School students were assessed for feasibility by a material expert, namely Mrs. Dr. Nurul Mahmudati, M.Kes. In filling this out, the lecturer as a validator also provides several suggestions, namely: (1) The language used is still like a sentence in a book (less interesting); (2) Increase the font size; (3) Give an explanation of the meaning of each organ of the human digestive system; (4) Replacing the image of the esophagus and stomach organs; and (5) Checking the literature: a. Why stomach acid can increase?, b. Why in diarrheal disease, bacterial infection can cause continuous discharge of water?, c. Can spicy food cause heartburn? After being revised, the results of the assessment are obtained as shown in [Table 5](#).

Based on the re-assessment by the material expert, the score obtained is the total score obtained is 49 with a maximum score of 52. There are 10 statements that get a score of 4 while 3 statements get a score of 3. This shows the acquisition of a feasibility percentage value of 94%. The percentage of 94% is included in the very feasible category and does not need to be revised ([Arikunto, 2013](#)).

The results of media expert validation showed that the comics used as learning media on the human digestive system material for grade VIII Junior High School students were assessed for feasibility by media experts, namely Mr. Dwi Setyawan, M.Pd. In filling this out, the lecturer as a validator also provides several suggestions, namely: (1) How to read comics is added based on directions. (from right to left or from left to right); (2) Pay more attention to the choice of diction in sentences; (3) UMM logo can be added on the comic cover; (4) Author biodata can be added; and (5) If used as an achievement of Basic Competence 4.5 with indicator 4.5 .1 & 4.5.2 Comics do not yet show representative content. After being revised, the results of the assessment are obtained as shown in [Table 6](#).

Based on the assessment by media experts, it was obtained that the total score obtained was 69 with a maximum score of 72. A total of 15 indicators got a score of 4 while 3 indicators got a score of 3. This shows the acquisition of a feasibility percentage of 96%. The percentage of 96% is in the very feasible category and does not need to be revised ([Arikunto, 2013](#)).

A small-scale trial was conducted at Diponegoro Junior High School. The trial was carried out on 10 students of class VIII A on November 20 and 21 2019. At the small-scale trial stage, it was carried out with an allocation of 2 meetings (5 JP). At the first meeting, the steps taken were doing the pretest questions, then studying the Human Digestive System comic, after discussing the material on the comics, after finishing the students working on the posttest questions. At the second meeting, students did a practicum on the difference between mechanical and chemical digestion, students grouped and discussed, at the end of the activity students filled out student response questionnaires.

Based on the results of the small-scale student response test, data obtained that the average percentage of small group student responses to comics was 94%. The percentage of 94% is included in the very positive category ([Riduwan, 2013](#)) which means that students accept and like comics as a medium of learning. The suggestions for assessing student responses are: The letters on some comic pages are too small.

Based on the results of the large-scale student response test at Diponegoro Junior High School, data obtained that the average percentage of large-scale student responses to comics is 92%. The percentage of 92% is included in the very positive category ([Riduwan, 2013](#)) which means that students accept and like comics as a medium of learning.

Based on the results of the large-scale student response test at Raden Fatah Batu Junior High School, data obtained that the average percentage of large-scale student responses to comics is 95%. The percentage of 95% is included in the very positive category ([Riduwan, 2013](#)) which means that students accept and like comics as a medium of learning. The comments from the assessment of student responses are: I really like learning with this Natural Science lesson by doing it through the medium of reading comics.

The results of the tests that have been carried out on 10 students at Diponegoro Junior High School. The pretest and posttest questions are the same question consisting of multiple choice questions with four answer choices. Based on trials on a small scale that have been carried out, the results obtained that the average posttest value is greater than the pretest value, namely ($86 > 71$). This shows that the use of comics as an effective learning media is used.

A large-scale study at Diponegoro Junior High School was conducted on November 27 and 30, 2019. The research subjects were 16 students of class VIII A, originally the number of students was 26 students but was reduced by 10 students because they had used the media in small-scale trials. The results of the large-scale test at Diponegoro Middle School, namely the posttest average value is greater than the pretest score ($80 > 66$). This shows that the use of comics as an effective learning media is used.

Large-scale research at Raden Fatah Batu Junior High School was conducted on December 03 and 05, 2019. The subjects of the study were 23 students of class VIII C. The results of the large-scale test test at Diponegoro Junior High School, namely the posttest

average value is greater than the pretest score, namely ($83 > 65$). This shows that the use of comics as an effective learning media is used.

5. Conclusions

The resulting product development in the form of learning comics obtained from the results of the development of Sugiyono's research model with 9 steps. This comic product is produced as a print media. Comic with the title Human Digestive System and Its Disorders for Class VIII Junior High School Students. The results of the assessment of comics by material experts get a value of 94% while the results of the assessment by media experts get a value of 96%. Based on these two results, it can be concluded that the comics of the human digestive system are very suitable to be used as learning media.

Student learning outcomes in the small-scale trial, the posttest value was greater than the pretest score ($86 > 71$), in the large-scale trial at Diponegoro Middle School, the posttest score was greater than the pretest value ($80 > 66$) and the large-scale trial in Diponegoro Raden Fatah Batu Junior High School the posttest value is greater than the pretest value of ($83 > 65$) which means that after using comics there is an increase in scores in small-scale trials and large-scale trials so that the human digestive system comics are effective for use in the learning process.

The results of student responses after using comics as learning media are that in the small-scale trial, a percentage value of 94% was obtained, which means that the use of comics was very positive, in the large-scale trial at Diponegoro Junior High School, the percentage value was 92% (very positive) as well as the results. a large-scale trial at Raden Fatah Batu Junior High School obtained a percentage value of 95% (very positive).

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