Development of Mathematics E-Comic
to Facilitate the Mathematical Communication Ability

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Abstract

*This study aims to develop a valid mathematics e-comic learning media for class VIII students on statistical material. The design of the e-comic mathematics learning media development using the PPE stage includes planning (planning), production (production), and evaluation (evaluation). The criteria for achieving quality are carried out by testing so that they are declared valid by experts. The results showed that the e-comic learning media for class VIII students on statistics material for class VIII students on statistics material met the valid criteria. Product validity was obtained based on the assessment of experts which showed that the quality of the learning media was included in the **very good** category with an average score of 3.65 by the material expert validator, and was included in the **very good** category with an average score of 3.75 by the media expert validator. Based on the results of the assessment, it can be concluded that the e-comic learning media for class VIII students on statistical material is valid.*

Keywords: *e-comic, mathematical communication ability, statistics, learning media*

INTRODUCTION

Learning is a term that has been known in everyday life. Many interpret the word learning with different meanings, it is possible that there are people who misinterpret or interpret it based on general opinion only. According to Burton in (Wicaksana, 2016a). Learning can be interpreted as a change in behavior in individuals due to interactions between individuals and other individuals and individuals with their environment so that they are better able to interact with their environment. Learning can also be interpreted as

a change in reaction activities to the environment. The change in the activity in question includes knowledge, skills, behavior, and this is obtained through training/experience (Wicaksana, 2016b). From some of the definitions above, we can draw the conclusion that learning is an activity carried out by a person intentionally and in a conscious state to obtain a new concept, understanding or knowledge and with it can form a change of individual self both with the environment and with other individuals.

Meanwhile, learning is a translation of the word "learning" which comes from the word learn or "to learn" (De Groot & Keijzer, 2000). Article 1 point 20 of Law no. 20 of 2003, learning is a process of interaction between students and educators and learning resources in a learning environment. There are five learning components in the explanation, namely: interaction, students, educators, learning resources, and learning environment. This interaction means that there is a reciprocal relationship between teachers and students which is very important in learning. According to Wina Sanjaya in (Wicaksana, 2016c) Learning is a collaborative process between teachers and students in utilizing all the potential and existing learning resources, both the potential that comes from within the students themselves such as interests, talents, and basic abilities possessed and the potential that exists outside the students such as the environment, facilities, and learning resources as an effort to achieve certain learning objectives.

As a form of collaborative process, learning does not only focus on the activities of educators or student activities, but educators and students jointly strive to achieve predetermined learning goals. To achieve learning objectives, it is necessary to strive for supporting factors such as good student conditions, facilities and a supportive environment, as well as the right learning process. In the learning process there are also other components such as learning competencies, materials, methods, sources or media, learning interaction management or classroom management, assessment, educators and the development of the learning process. In addition, it also said that the learning components include: objectives learning, students, teachers, planning Oemar Hamalik teaching, teaching media, learning strategies, and evaluation of teaching. Meanwhile, according to Sardiman (2007), learning components include: learning objectives, teachers, students, materials/messages which is the content of learning, methods for achieving goals, situations, and assessments on learning outcomes (Rohman, 2009).

Learning mathematics is a process of interaction between teachers and students which involves developing patterns of thinking and processing logic in a learning environment that is deliberately created by the teacher with various methods so that the mathematics learning program grows and develops optimally and students can carry out learning activities effectively and efficiently (Matematika, 2011). Mathematics is a science that cannot be separated from other sciences because mathematics plays an important role as an introduction to other sciences (Ibrahim & Suparni, 2008). This is supported by Law Number 20 of 2003 concerning the National Education System Article 37 Paragraph 1 which requires several subjects at every level of education from elementary to secondary schools. Among these subjects is mathematics. Mathematics has an important role in various disciplines and advances the power of human thought as stated in the Ministry of National Education, 2006 that improving the quality of education is directed at improving the quality of Indonesian people as a whole through heart, thought, taste, and sports in order to have competitiveness in face global challenges.

Mathematics is given to equip students with the ability to think logically, analytically, systematically, critically and creatively, as well as the ability to work together. Mathematics is a science that has an important role for the progress of human civilization. And as an Indonesian citizen who is entitled to receive education as stated in the 1945 Constitution, of course, must have a minimum of general knowledge. The minimum general knowledge of which is mathematics. As clarified in Law number 20 of 2013 Chapter III article 4 paragraph 5 education is held by developing a culture of reading, writing and arithmetic for all citizens. One that is mentioned is counting, namely mathematics itself. In the world of education, mathematics is a very important lesson, because mathematics teaches how to think and process the logic used to solve everyday problems. This fits the view. Examples such as trading, calculating the amount of currency, knowing Roman numerals on road directions, land surveying, painting, construction, astronomy and helping in developing other disciplines. By studying mathematics, a person is accustomed to thinking systematically, scientifically, using logic, critically and can increase creativity (Nurhayati et al., 2018). Apart from that, many people still think that mathematics is a difficult science to understand and is often associated with boredom, reluctance, failure and even fear (Karmawarti, 2007).

The problems of learning mathematics can be caused by factors from students and teachers. One of the teacher's factors that cause problems in learning mathematics is the lack of mastery of appropriate learning methods and approaches to be used in each different class. Based on research conducted by (Sari, 2019) said that the problems of learning mathematics include an immature understanding of mathematical concepts, this results in students not having knowledge in mathematics learning from the previous grade level, the application of learning methods is not in accordance with the characteristics of students, the use of learning media has not been effective in attracting students' interest students to learn, and learning motivation is not good, many students have low motivation in learning mathematics. Whereas students who do not like mathematics can have difficulty understanding the material presented and have an impact on low mathematics learning achievement. This is in accordance with the opinion (Halmuniati et al., 2020) that students with high levels of anxiety do not perform as well as students with low levels of anxiety.

In learning mathematics, if students have learning difficulties are considered as a matter of course. This is because mathematics is always associated with something difficult, abstract and an unfriendly teacher. As a result of such attributes, mathematics is likened to a scary and boring ghost. Parents also generally complain, how confusing math is not only for children but for them as parents. Many parents are disappointed to see their children's learning outcomes are not optimal, and are unable to help their children learn mathematics at home. It is not uncommon for children to be in tears, because they are unable to finish their homework and are afraid to go to school, some are even not interested in doing math homework and are ignorant of math, although they often protest and think that what the teacher teaches is the right one. Moreover, if the problem being worked on is a story in the form of a story, the perceptions between children and parents in all respects are very much different (Karmawarti, 2007).

Children's learning difficulties can be classified into two groups, namely: Internal factors (factors from within humans themselves) which include physiological factors, psychological factors (Ahmadi & Supriyono, 1991). Physiological factors are factors related to the physical condition of the individual. This factor is divided into two kinds. First, the state of physical tone. The state of physical tone in general greatly affects a person's learning activities. A healthy and fit physical condition will have a positive

influence on individual learning activities. On the other hand, a weak or sick physical condition will hinder the achievement of maximum learning outcomes. Therefore, the state of physical tone greatly affects the learning process, it is necessary to make efforts to maintain physical health. Psychological factors are a person's psychological state that can affect the learning process. Some of the main psychological factors that affect the learning process are student intelligence, motivation, interests, attitudes and talents. Meanwhile, external factors (factors from outside humans) include non-social factors and social factors. Factors that include the non-social environment, namely first, the natural environment, such as fresh air conditions, not hot and not cold, light that is not too bright/strong, or not too weak/dark, cool and calm atmosphere. The natural environment are factors that can affect student learning activities. Conversely, if the conditions of the natural environment are not supportive, the student learning process will be late. Second, instrumental factors, namely learning tools that can be classified into two types. First, hardware, such as school buildings, learning tools, learning facilities, sports fields and so on. Second, software, such as school curriculum, school regulations, guidebooks, syllabus and so on. Third, the subject matter factor (which is taught to students). This factor should be adjusted to the age of student development as well as the teacher's teaching methods, adjusted to the conditions of student development. Therefore, in order for the teacher to make a positive contribution to student learning activities, the teacher must master the subject matter and various teaching methods that can be applied according to the student's condition.

Meanwhile, social factors include the social environment of the school, the social environment of the community, and the social environment of the family. The school's social environment such as teachers, administration, and classmates can affect a student's learning process. The harmonious relationship between the three can be a motivation for students to learn better at school. Sympathetic behavior and can be a role model for a teacher or administration can be an incentive for students to learn. Community social environment. The environmental conditions of the community where students live will affect student learning. The slum environment of students, many unemployed and neglected children can also affect student learning activities, at least students have difficulty when they need study partners, discussions, or borrow learning tools that they don't have. Family social environment. This environment greatly affects learning

activities. Family tension, parental characteristics, family demographics (location of the house), family management, all of which can have an impact on student learning activities. Harmonious relationships between family members, parents, children, brothers or sisters will help students carry out learning activities well.

In addition to internal and external factors, Smith added that the factors that cause learning difficulties are teaching and learning methods, social and emotional problems, intellect, and mentality. In line with the assumptions that emerged from students at school about learning mathematics that was difficult and boring, it happened not far from the learning process carried out at school. These assumptions will have an impact on student learning motivation which will automatically propagate to student learning outcomes. The learning process will not be effective and interesting if the teacher only tells (lectures) about things that happened (Mahmudah, 2016). Conventional learning methods (lectures) which are still widely used by teachers in schools cause the weak ability of students to construct meaning about what is learned. (Kamarullah, 2017). They generally only memorize what they have learned. The ability to memorize in general only lasts a relatively short time. The inaccuracy of the applied learning model can hinder the achievement of student learning outcomes. The weakness or negative impact of this conventional learning pattern according to ("Probl. Posing," 2014) among others: The learning process that takes place is monotonous, students will become passive because they only accept what is given. Students will be more focused on taking notes. Students will forget the learning material more quickly because the learning process is deemed less meaningful. If the problems given by the teacher are different from the examples that have been given, students will have difficulty in solving these problems. The difficulty of students in working on these questions can be one of the clues to determine the extent to which students master the material. Moreover, the statistical material is actually simple but growing a mindset is difficult because it involves a lot of data (Dahri, 2019). Statistics is a science of collecting, processing, presenting, analyzing and interpreting the data obtained into information to assist in effective decision making. Statistics can also be used as a tool to simplify the calculation of data in the form of numbers. (Amalia, 2020) said that students still have difficulty in solving statistical problems. The difficulty is that students are not careful in observing the questions given. Due to lack of student focus. Students' errors in completing the work process are caused by being in a hurry, being

lazy, having too many numbers, and forgetting formulas, students forgetting to write symbols or notations on the subject of statistics, there are steps in completing the statistical subject matter that are incomplete and correct, lack of understanding the concepts involved. related to the subject matter of statistics. Besides that, (Febrianti & Chotimah, 2020) said that the difficulty of class VIII students in solving statistical problems based on the indicators used in statistical material, namely; 1) connecting mathematical ideas into diagrams, 2) explaining mathematical ideas, situations, and mathematical relationships orally or in writing with graphs and algebra, 3) expressing everyday events into mathematical language or symbols, 4) making a mathematical model of a situation and solving it, 5) arrange questions about the statistics that have been studied.

The solution to the given problem (Sari, 2019) are 1) the provision of scaffolding, the provision of scaffolding is given to students who have problems regarding mastery of science concepts that are not good from the previous grade level so that students better understand the material taught by the teacher, 2) the teacher provides a personal approach, provides guidance and a psychological approach to students so that students are more motivated to participate in the mathematics learning process, 3) the application of learning methods adapted to the characteristics of the participants, and 4) the use of contextual and digital-based media such as macromedia flash and educational games to stimulate students and the adjustment of learning media to the material taught by students according to homogeneous or heterogeneous classes.

So far, mathematics learning media that are often used are only pragmatic teaching aids and it is not uncommon for students to complain because of the difficulty of understanding material with limited media. Looking at the existing technological advances, the author considers that conventional methods in learning mathematics are no longer relevant. Learning that seems conventional, besides being less than optimal in meeting the needs of students, it also feels boring (Irwandani, 2016). Students need variations in the field of mathematics learning media to create a new atmosphere in the mathematics learning process that is effective and fun as a motivation for students to continue to follow the mathematics learning process. Therefore, independent learning media are needed that can make learning more interesting. So the author is interested in conducting a study using a mathematics learning media to overcome student boredom

and boredom. Students need variations in the field of mathematics learning media to create a new atmosphere in the mathematics learning process that is effective and fun as a motivation for students to continue to follow the mathematics learning process. Therefore, independent learning media are needed that can make learning more interesting. So the author is interested in conducting a study using a mathematics e-comic learning media to overcome student boredom and boredom.

(Nurrita, 2018) says that learning media is an intermediary for everything that can convey messages through various channels, can stimulate students' thoughts, feelings, and willingness so that they can encourage the creation of a learning process to add new information to students so that learning objectives can be achieved properly. Interesting learning media in learning mathematics is learning media in the form of e-comic (Groot, 2018). This is supported by the recapitulation of data from the results of his research which shows that 65% of students want learning media in the form of e-comic. (Ratnasari & Ginanjar, 2020) also said that comics are learning media that can be used because many people tend to like and have read comics. Supporting statements are also submitted in the research (Saputra & Azka, 2020) that comic readers continue to increase along with the development of the comic itself. This is one of the reasons for researchers to use comics packaged in electronic form or e-comic.

In addition, e-comic can also save paper usage. The use of e-comic in learning also allows students to attract students' interest and motivate them to study a material, including in terms of studying Statistics material. Statistics material that is packaged in the form of illustrated stories with interesting plots and illustrations accompanied by material concepts, quizzes, and practice questions on e-comic allows students to understand the material easily without feeling bored. And because it is packaged in the form of electronic media (gadgets/mobile phones) it is expected to be able to support student learning anytime and anywhere. That way, students can understand a concept from Statistics material more easily so that it is expected to achieve learning objectives. Based on this, researchers are interested in developing a mathematics learning media that can be used flexibly and attractively for students so that the concept of the material can be understood more easily.

The development of this e-comic is to improve mathematical communication skills. This is because, in a mathematics lesson students solve problems provided by a teacher

or book with the aim that students can understand and answer questions given by the teacher correctly. However, in the process students are rarely given the opportunity to express questions or be asked for an explanation from where they get answers. This results in students rarely communicating in mathematics. According to (Rasyid, 2020), Mathematical communication ability is the ability of students to convey mathematical ideas both orally and in writing. Oral communication such as: discussion and explaining. Written communication such as: expressing mathematical ideas through pictures/graphs, tables, equations, or in the students' own language. According to (Aminah et al., 2018) Mathematical communication is an essential basic mathematical ability and needs to be possessed by high school students (SM). Some of the reasons underlying the statement of the importance of having mathematical communication skills for students include 1) Mathematical communication skills are listed in the curriculum and mathematics learning objectives, 2) Basically Mathematics is a symbolic language that is efficient, orderly, and capable of quantitative analysis, 3) Mathematical communication is the essence from teaching, learning, and accessing, 4) Even mathematical communication is a central force in formulating mathematical concepts and strategies, 5) Mathematical communication is a capital in solving, exploring, and investigating mathematics and is a forum for social activities with friends, sharing thoughts and discoveries , brainstorming, assessing and sharpening ideas to convince others, 6) Mathematical communication is widely used in various mathematical content and other fields of study.

Mathematical communication skills are an important part of the mathematics learning process. Mathematical communication skills are very useful for students to deepen their mathematical knowledge and also for everyday life. According to (Kurniawan et al., 2017) the importance of mathematical communication skills in learning mathematics, namely helping students sharpen their thinking, as a tool to assess student understanding, helping students organize their mathematical knowledge, helping students build their mathematical knowledge, improving mathematical problem solving skills, advancing their reasoning, building self-efficacy, improving social skills , as well as useful in establishing a mathematical community. In addition, there are two reasons for communication to be one of the focuses in learning mathematics, namely first, mathematics is basically a language. Mathematics is not only a thinking tool that helps students to find patterns, solve problems and draw conclusions, but also a tool to

communicate students' thoughts about ideas clearly, precisely and concisely. Second, learning mathematics is a social activity that involves at least two parties, namely teachers and students. In the teaching and learning process it is important for students to express their thoughts and ideas by communicating them to others through language.

Indicators of mathematical communication skills include students' ability to 1) connect real objects, pictures and diagrams into mathematical ideas, 2) explain ideas, situations, and mathematical relationships orally and in writing with real objects, pictures, graphs and algebra, 3) State events in everyday language or mathematical symbols, 4) listening, discussing, and writing about mathematics, 5) reading written mathematical presentations and compiling relevant questions, 6) making conjectures, constructing arguments, formulating definitions and generalizations.

This research is based on indicators of mathematical communication skills as previously described, namely by linking these indicators with the learning concepts contained in this study. However, the implementation of this research is only at the stage of the validity of the e-comic learning media.

METHOD

The research method used in this study is the Research and Development (R&D) method or research and development. Research and development is a research method to develop and test products in the world of education. Nana Syaodih Sukmadinata said "research and development is a process or steps to develop a new product or improve an existing product and can be accounted for" (Rustandi & Hikma, 2020). This study uses the PPE (Planning, Production, and Evaluation) research model developed by Richey and Klein in Sugiyono. 2016) states "the focus of research and development design can be on the front-end analysis planning, production and evaluation (PPE)". The research subjects are material experts and media validation experts and the object of research is the Development of RIKA's E-Comic Learning Media (Let's Learn Statistics) for class VIII students.

In the process of collecting data by researchers, the data collection method used is the secondary data collection method. Where the researcher conducts secondary data research from books, journals and articles related to the material to be raised, namely the development that will be carried out, namely the development of mathematics e-comic media for class VIII students on statistical material.

This development research refers to the steps proposed by Richey and Kley the PPE (Planning, Production, and Evaluation) method, the focus of design and development research is analytical from beginning to end, with the steps of Planning, Production and Evaluation (Sugiyono, 2015 : 39-48). This planning stage includes data collection (literature study) related to the problem under study and reviewing the results of previous research. This development stage includes product planning, initial draft development and product finishing processes. Evaluation phase includes product assessment and validation as well as product revision. Mathematics E-Comic was validated by material experts and media experts, namely two mathematics education lecturers.

The data collection instrument used was a mathematical e-comic assessment sheet. Before using this assessment sheet, it was validated by an expert (expert judgment) to determine the validity of the instrument. The product assessment sheet is designed with a Likert scale rule, namely Very Good (SB), Good (B), Not Good (TB) and Very Not Good (STB).

The data analysis technique in this study is to use qualitative data regarding the feasibility of E-Comic learning media. Based on the expert's assessment of the learning media and research instruments used, including the product assessment scale sheet on the feasibility of the product. The qualitative data in question is in the form of input that is analyzed descriptively qualitatively, while qualitative data in the form of a Likert scale will be changed to numbers through table 1: (Widoyoko, 2012: 110-112)

Table 1. Scoring Rules for E-comic Learning Media Assessment Sheets

Statement	SB	B	K	SK
Score	4	3	2	1

The next step is to determine the minimum score for each statement item, then determine the number of interval classes, then determine the interval distance with the following conditions: Jarak Interval $= \frac{\text{maximum score} - \text{minimun score}}{\text{Total of Interval Class}}$. After getting the value from the interval distance, the next step is to make a scale that describes the score limit.
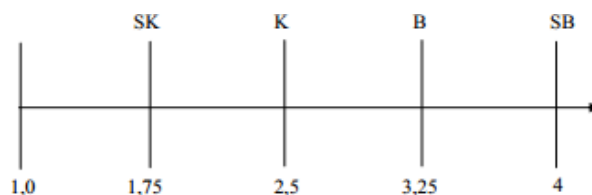
Figure 1. Score Limit Scale

Then make a range table, to interpret qualitatively the average number of scores for eachaspect using the criteria. The following is a reference for score conversion criteria:

Table 2. Range Table

Mean Score	Qualification
3,25 – 4	Very Good
2,5 – 3,25	Good
1,75 – 2,5	Poor
1 – 1,75	Very Poor

And the last step is drawing conclusions. Based on the results of the validation of material experts and media experts, it can be concluded that if the RIKA E-Comic learning media (Let's Learn Statistics) gets an average score of $3.25 \leq \bar{x} \leq 4$ then the qualification of RIKA's e-comic media is Very Good, if it gets an average score of $2,5 \leq \bar{x} \leq 3,25$ then the qualification of RIKA's e-comic media is Good, if it gets an average score of $1.75 \leq \bar{x} \leq 2.5$ then the qualification of RIKA's e-comic media is Less, and if it gets an average score $1 x 1.75$ then the qualification of RIKA's e-comic media is Very Poor. If, RIKA's E-Comic learning media (Let's Learn Statistics) gets very good or good qualifications, it can be concluded that the media in this E-comic is said to be valid. However, if the RIKA E-Comic learning media (Let's Learn Statistics) gets Less or Very Less qualification, it can be concluded that the media in this E-comic is said to have not been or is not valid.

RESULT AND DISCUSSION

This research produces a product in the form of the RIKA e-comic "Let's Learn Statistics" for class VIII. This development is carried out with the following PPE model:

Planning

Planning means the activity of making product plans to be made for a particular purpose. Planning begins with a needs analysis conducted through a literature study. The

needs analysis carried out by the developer includes the development of e-comic learning media, the use of technology, mathematics learning, mathematical communication skills, and statistical material. The literature used by the developer is in the form of books and relevant research.

Production

Production is the activity of making products based on designs that have been made. The following are the steps used by researchers in producing e-comic mathematics learning media for class VIII students on statistics material:Membuat draft e-comic. In this step, the developer first determines the theme and title that will be used in the e-comic mathematics learning media. Then, the developer determines the character, character, storyline, setting of events, and character dialogue.

The characters themselves can be called the actors of the story. This character can also be an animal, object, or any character that represents the course of a story. Based on the function, the character is divided into 2, namely the main character and the supporting character. In this e-comic learning media, there are 2 main characters, namely Rika and Riky, while the supporting characters are Mrs. Aisyah, Ms. Zain, and Ms. Tiara.

Disposition or character is the giving of both physical and spiritual traits to an actor or character in the story. The presence of the characters plays a role in bringing the story to life. The characters in this e-comic learning media include: Rika has a beautiful, kind, cheerful character, Riky has a Handsome and smart character, Ibu Aisyah has a Wise character, Kak Zain has a kind and friendly character, Sis Tiara has a beautiful, kind character and friendly.

Storyline is a series or arrangement from beginning to end. The story line is also the structure of a series of events in a story that is arranged chronologically. The storyline is divided into three, namely the forward plot, backward plot, and mixed plot. The storyline used in this e-comic learning media is a forward plot.

Setting of events is a description of the place, time, and atmosphere in the story. Places used in e-comic learning media stories are classrooms, libraries, bus stops, and ice cream shops. The time in the e-comic learning media story is in the afternoon after school. The atmosphere of the story in the e-comic learning media story is fear and joy.

Character Dialogue is a conversation between characters to tell the story raised in the drama. The dialogue in this e-comic learning media can be seen at the following pictures:

Figure 2. Drafting E-Comic

The second step is to create an e-comic design. The e-comic design is in accordance with the e-comic draft that has been made previously. The developer uses the help of the Autodesk Sketchbook application to create the e-comic design. Autodesk SketchBook is a software for editing photos, with the advantages of having brushes and colors, so you can easily use them to paint.

Figure 3. Creating e-comic designs

The third step is making an e-comic application. At this stage, the developer uses the Anyflip application as a tool to change the designs that have been made previously into an application that can be accessed via an Android smartphone. AnyFlip is a platform that offers us the creation of digital books. The process is very easy as with other platforms. The first step is to visit the AnyFlip website, which is https://anyflip.com/ . However, before entering the AnyFlip site, we must already have a file that we will use as digital teaching materials in the form of a PDF file.

Figure 4. Making e-comic applications

The compilation of comics is carried out based on the predetermined Competency Achievement Indicators (GPA). The comic sections that are in accordance with the Competency Achievement Indicators are as follows: First, Understanding the concept of

the mean or average of a data. The mean or average value of a data is an average value obtained from adding up all data divided by a lot of data. In this e-comic learning media students can find the concept of the mean or average of a data through conversations as shown in fugre 5:
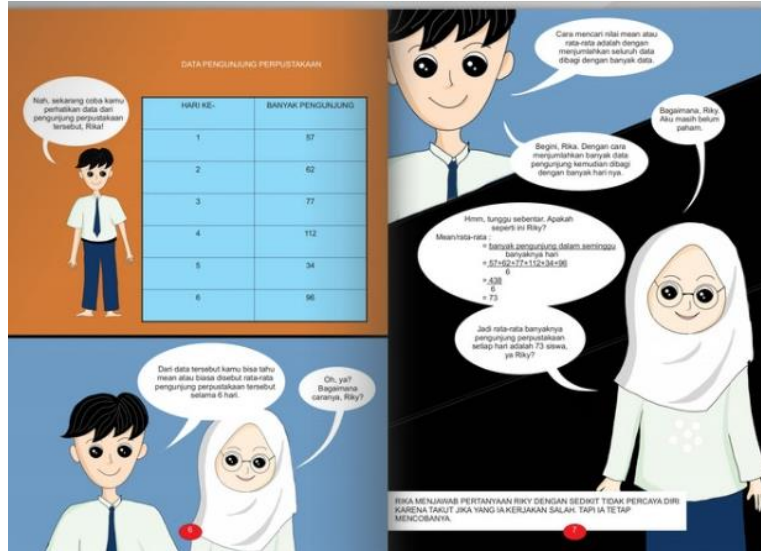

Figure 5. Understanding the concept of the mean or average of a data

Second, understand the concept of the mode of a data. The mode is the data that appears frequently. In this e-comic learning media students can find the concept of the mode of a data through conversation as shown in figure 6:

Figure 6. Understanding the concept of the mode of a data

Third, understand the concept of the range of a data. The range of a data is the difference between the largest value and the smallest value from the data set. The range or quartile consists of three kinds, namely: the lower quartile (Q1), the middle quartile (Q2), and the upper quartile (Q3). In this e-comic learning media students can find the concept of the reach of a data through conversation as shown in figure 7.

Fourth, solve problems related to the mean or average, mode, median and quartiles. In this e-comic learning media students can find the concept of solving problems related to the mean or average, mode, median and quartiles through practice questions as shown in Figure 8.

Figure 7. Understand the concept of the range of a data

Figure 8. Practice Question Page

Evaluation

Evaluation is an activity of testing, assessing how high the product has met the specifications that have been determined. This evaluation will be carried out by media experts and material experts to determine the quality of the media developed. This evaluation also aims to find out the shortcomings of the developed media so that improvements can be made as needed. The results of this evaluation and improvement

will later be used as a basis for determining the feasibility of the developed e-comic media.

The results of the assessment of material experts and media experts regarding RIKA's E-comic learning media (Let's Learn Statistics) are explained as follows:

Table 3. Results of E-comic Learning Media Quality Assessment by Material Experts

No	Expert	Content	Language	Appearance	Implementation	Overall Score Average
1	I	25	15	14	12	3,47
2	II	27	20	16	10	3,84
	Total	52	35	30	22	
	Mean	26	17,5	15	11	3,66

Based on the table 3, it can be seen that the results of research on aspects of material feasibility include aspects of content, language, presentation and implementation. The content aspect got a total score of 52 and an average score of 26, the linguistic aspect got a total score of 35 and an average score of 17.5, the presentation aspect got a total score of 30 and an average score of 15, and the implementation aspect got a score The total score is 22 and the average score is 11. Assessment of the E-comic learning media by material experts obtained an overall average score of 3.65, where the score indicates that the product developed has very good qualifications. Thus, the material on the E-comic learning media is said to be feasible or valid.

Table 4. Results of E-comic Learning Media Quality Assessment by Media Experts

No	Expert	Comic Anatomy	Figure Quality	Overall Appearance	Total	Overall Score Average
1	I	19	10	15	44	3,67
2	II	19	12	15	46	3,83
	Total	38	22	30	90	
	Mean	19	11	15	45	3,75

Based on table 4, it can be seen that the results of research on media feasibility aspects include aspects of language, E-comic anatomy, image quality, and overall appearance. Anatomy of E-Comic obtained a total score of 38 and an average score of 19, image quality obtained a total score of 22 and an average score of 11, and the overall display obtained a total score of 30 and an average score of 15. E-comic learning media by media experts obtained an overall average score of 3.75, where the score indicates that the product developed has very good qualifications. So that the media in this E-comic is said to be feasible or valid.

CONCLUSION

This research on the development of mathematics e-comic learning media on statistical material for class VIII students was developed according to the PPE development model according to Richey and Klein (2009) in Sugiyono (2016, hal. 39). The steps in the development of e-comic mathematics learning media for class VIII students on statistics material for class VIII students include Planning (Planning), Production (Product preparation), Evaluation (Evaluation). The three stages have been carried out properly to produce a product in the form of e-comic mathematics learning media on statistics material for class VIII students on statistics material for class VIII students. This development research succeeded in developing an e-comic learning media product for class VIII students on statistical material that met the valid achievement criteria. Product validity was obtained based on the assessment of experts which showed that the quality of the learning media was included in the very good category with an average score of 3.65 by the material expert validator, and was included in the very good category with an average score of 3.75 by the media expert validator.

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