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Development of Learning Media at Junior High School: Comic Reading Applications Using Software Ispring Suite

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ABSTRACT

The background research was conducted as an effort to overcome students' low interest and understanding of mathematics due to the monotonous learning approach. Therefore, this study aims to develop a mathematics learning media application in the form of comics that focuses on the material of linear equations with two variables, specifically designed for eighth-grade junior high school students. This research uses the Plomp development model, which includes the stages of initial investigation, design, realization/reconstruction, test, evaluation and revision, and implementation. This research was conducted at Junior High School 1 Bulango Timur. The data collection approach used in this research is a validation sheet and a questionnaire for students and teachers. Data analysis in this study used qualitative descriptive analysis. The results of validation by experts show that this media is valid, with the readability test obtaining a feasibility level of 97.27% and student responses reaching 99.2% (very practical). Teacher responses also showed practicality at 91.7%. This media is proven to increase student learning motivation, facilitate understanding of abstract concepts, and create captivating learning experiences, so it is feasible to be applied in learning mathematics on the material of the system of linear equations of two variables.

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1. INTRODUCTION

Effective education enables the development of high-quality human resources. This is an important component in the progress of a country. As stated by Apsari and Rizky (2018); Dung (2021), education plays an important role in improving the quality of human resources in a country; therefore, there is always something intriguing to develop and learn. The topic also pertains to the advancement of the learning and teaching process in the classroom, specifically in the field of mathematics.

Mathematics is an important subject that is taught starting from elementary school, junior high school, and high school to university level. Despite this, many students dislike math; they think math is a difficult subject because they have to deal with abstract mathematical concepts and symbols (Boaler, 2022; Escarez Jr & Ching, 2022). In

addition, many math teachers lack creativity in teaching students who are still confused about mathematical concepts in certain materials (Beswick & Fraser, 2019).

There are many math topics that have a very important role in everyday life, including the material on the system of linear equations of two variables in class VIII junior high school. The system of linear equations of two variables is very relevant to everyday life, because this material is often encountered in various activities at school (Nursyahidah et al., 2018; Fitriyani & Pradipta, 2025). For example, in the buying and selling process and other activities related to the calculation of the number of objects, ownership, and remaining money. In fact, until now there are still many students who are confused when learning this material. This is due to the lack of teacher innovation in developing learning media. The lack of learning media innovation can affect interest, which has an impact on the learning outcomes of each student (Syawaluddin et al., 2020; Roemintoyo & Budiarto, 2021; Yuliansih et al., 2021).

According to Abdullah (2017); Sofi-Karim et al. (2023), learning media is a tool that helps educators in the process of delivering understanding to students quickly; in other words, the media is a tool that helps teachers explain the learning objectives to be given. This corresponds to the opinion of Maulana (2017); according to him, learning media is a tool to convey and distribute information/knowledge from the teacher in a structured manner to create a more conducive learning atmosphere where the recipient can carry out the learning process effectively and efficiently. In other words, learning media are methods, tools, and techniques used by educators to optimize the process of disseminating information to students in a learning and teaching environment. The use of appropriate learning media is also able to stimulate a deeper thinking process in students (Ariska et al., 2018; Sinaga & Setiawan, 2022). This is because learning tools can help students access learning materials that are easy to understand in order to achieve learning objectives, develop knowledge, and create meaningful experiences in learning. Therefore, there is a need for learning media that can attract students' interest in the learning process.

There are several criteria that must be considered in selecting learning media. According to Djamarah and Zain (2013), the primary criterion is (1) the media's alignment with the learning objectives. (2) support for the content of the lesson material, meaning that lesson materials that are facts, principles, and concepts require media so that they are easily understood. (3) The teacher can use the media. (4) There is time to use. This assessment should be tailored according to the level of student thinking. In addition, Papadakis (2021) also said the criteria for assessing interactive media are divided into simplicity, completeness of learning materials, communicativeness, self-learning, learning step by step, and the sixth unity of multimedia.

In a preliminary study with interviews with the school of junior high school 1 Bulango Timur, the average student at the school has a problem with interest in learning, especially in learning mathematics. According to the math teacher at the school, students' enthusiasm for learning mathematics is lacking. This condition is characterized by a lack of student participation and activity in the learning process. According to the teacher, this scenario happens because the learning media used is monotonous and lacks

development. According to my interview with the math teacher, the learning process in class usually uses media in the form of PowerPoint and blackboards with the lecture method. This trend is the root of the problem of interest in learning math, according to him. The use of PowerPoint with a repetitive format and an uninteresting way of applying the media makes students quickly bored and uninterested in undergoing the learning process. To address these media problems, researchers have developed learning aids in the form of math comics.

Math comics are one of the learning media that can capture students' interest during the learning process (Tay et al., 2024). According to Toh et al. (2017), comics serve as an engaging educational tool for students. In addition, Pange (2022) also argues that comics are one of the presentations of learning materials in class that can display problems that are relevant to real events or events in everyday life. This allows students to easily understand and become interested in the learning process. In his research, Lo et al. (2022) states that students read comics more frequently than textbooks, averaging at least one comic book per month compared to reading textbooks only once a year. Additionally, each learner has more flexible access to comics, making it easier to develop them as a learning medium alongside the advancements in technology this century.

Today's technology has developed rapidly. In the 21st century, the growth of information and digital technology has entered every aspect of human life (Khahro & Javed, 2022). This is not only happening in the economic, social, and cultural sectors but also in the field of education. Devices like Android-based cell phones have become a significant technological trend. In accordance with research submitted by Komariah et al. (2018), research related to media developed from research using an Android base is very well implemented in learning mathematics.

Today, the field of education often uses these technological advances to develop learning media (Jamilah et al., 2021). One of the concepts that emerged as a result of these advances is m-learning, which stands for "mobile learning." According to Ibrahim and Ishartiwi (2017), learning through mobile devices is known as m-learning. This method makes learning easier for students because they can take their devices anywhere and anytime. This advantage makes it flexible as a learning medium (Valtonen et al., 2021).

In my interviews with subject teachers, most students at the school already have smartphones. This can be seen from several school activities that require students to use smartphones, for example, the implementation of the Mid-Semester Examination and Final Semester Examination as well as assignments to access learning videos via YouTube links during the Covid-19 transition period. In addition to learning activities that permit smartphone access in class, smartphones are primarily used for submitting assignments and facilitating communication between students and teachers. This school has never directly used smartphones as learning media in class, which prevents students from utilizing them to their full potential.

Therefore, in response to the previously described problems, the researchers aim to develop an application that serves as learning media accessible via Android

smartphones, utilizing math comics focused on the system of linear equations in two variables, called "SIMPEL DAVA (System of Linear Equations of Two Variables)." We create this multimedia using the PowerPoint-assisted iSpring software and the Website 2 APK Builder Pro. In accordance with Firdha and Zulyusri (2022), iSpring software allows you to convert PowerPoint presentation files into Flash files. Once converted into Flash, simply use the website 2 APK Builder Pro software to transform it into an Android application. In addition, to illustrate animated images in comics, researchers use editing applications such as Infinite Design, PixelLab, PicSay Pro, and Eraser Background as comic-making tools.

This application is a learning medium developed using audio and visual media. With the theme of contemporary comics, this application provides a learning topic of the two-variable linear equation system wrapped with unique animated images and intriguing storylines. Students can access and use this multimedia anytime and anywhere they use their smartphones. In addition, this application combines comic reading, a summary of learning materials, and material evaluation that can be accessed directly in the application to trigger interaction between teachers and students so that it can become interactive multimedia in the learning process.

Therefore, this study seeks to create a mathematics learning medium in the form of a comic reading application focused on the topic of systems of linear equations in two variables for eighth-grade junior high school students. The development aimed to address pupils' diminished interest and comprehension of mathematics resulting from a monotonous pedagogical style.

2. METHOD

The type of research used in this study is research and development (R&D). This study developed learning media in the form of comic reading applications. This study aims to develop a comic reading application on the material of a system of linear equations of two variables for students in grade VIII junior high school/equivalent. Before being used, the media was first tested for effectiveness. This research was conducted at Junior High School 1 Bulango Timur. This research uses the Plomp model in making comic reader applications in the form of learning multimedia using iSpring Suite software. This development model is divided into five stages, which include the initial phase of the research, namely conducting problem analysis and planning research activities to develop learning media, which includes interviews with mathematics teachers and several students at Junior High School 1 Bulango Timur, reviewing learning tools used in the learning process, and mathematics learning outcomes on the system of linear equations of two variables material in class VIII; the design phase, namely designing learning media and questionnaire sheets; The realization/construction phase involves developing the product and creating an initial prototype (prototype 1) based on the previously designed model. The test, evaluation, and revision phase includes testing and evaluating prototype 1 to determine two aspects: the quality of the learning media as assessed by experts and its quality as perceived by target users,

specifically teachers and students. Finally, the implementation phase refers to applying the learning media in a larger classroom setting. Figure 1 illustrates the Plomp model.

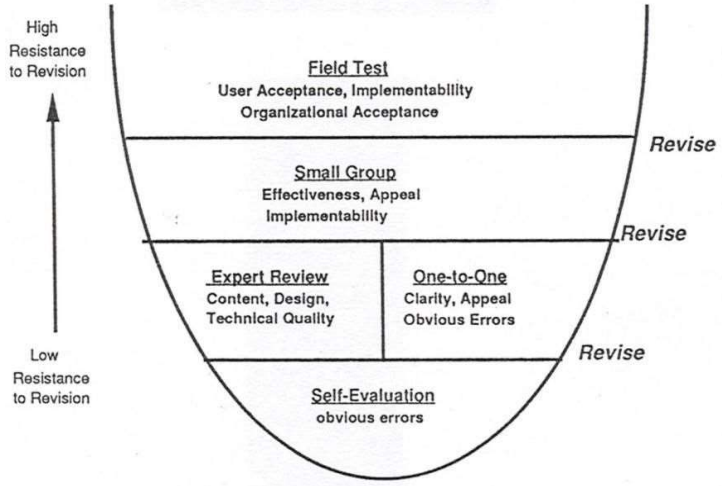

Figure 1. Illustrates the Plomp Model

Media development instruments in this study are in the form of validation sheets for media experts, material expert validation sheets, readability test sheets, and student and teacher response questionnaires. The data analysis technique used in this research is the descriptive analysis technique, which describes the results of media development, namely teaching materials in the form of comics. In this case, the instruments used for data analysis are media and material expert validation sheets and student and teacher questionnaire sheets. The average assessment that has been obtained is converted into the learning media feasibility category so that conclusions can be drawn based on the eligibility criteria in Table 1 (Hasanah, 2020).

Table 1. Media Feasibility Percentage Scale

Percentage	Value Scale	Interpretation
85 – 100%	4	Very Feasible
75 – 84%	3	Feasible
56 – 74%	2	Less Feasible
0 – 55%	1	Not Feasible

For the response data of students and teachers, it was analyzed quantitatively using a Guttman scale, where the measurement scale obtained firm answers, namely "yes - no", "true - false", "ever - never", "positive - negative" and others.

Table 2. Guttman Scale Assessment

No	Score	Description
1	1	Yes
2	0	No

To determine the level of practicality of the developed product, the assessment qualification criteria are used, namely (Ferdiansyah, 2021):

Table 3. Practical Criteria

Percentage	Criteria
81 – 100%	Very Practical
61 – 80%	Practical
41 – 60%	Practical Enough
21 – 40%	Less Practical
0 – 20%	Not Practical

Referring to Table 3 above, the developed media is considered practical if the results of the analysis of teacher and student responses show a minimum percentage of ≥ 61%.

3. RESULTS AND DISCUSSION

Results

This comic reading application-based learning multimedia was developed using iSpring Suite 9 software with the help of the PowerPoint application and the Website 2 APK Builder Pro. This multimedia contains circle material developed using the PLOMP development model. This model consists of 5 phases, namely the preliminary investigation phase, design phase, realization/construction phase, test, evaluation, revision phase, and implementation. The purpose of this research is to develop learning multimedia in the form of an Android-based comic reading application using iSpring Suite software on the material of the two-variable linear equation system at junior high school 1 Bulango Timur. The features available in this medium include the homepage, which displays basic application information, such as details about the application, activities, and instructions for use; a comic menu that lists materials divided into three main subchapters: introduction, completion, and application of the system of linear equations of two variables; an evaluation feature designed to help students assess their understanding of the material learned; and a profile section containing brief information about the application developer, including educational background and experience.

The design of this learning media facilitates students' comprehension of the material under instruction. This learning media blends audio and visual elements to pique students' interest in learning. Through this media, students can be directly involved, and students are more active in the learning process. In addition, this media can be accessed anytime and anywhere. This advantage allows students to continue learning through this medium at any time.

In this study, researchers used an expert validation sheet as a tool to display the validator's responses and input on the media that had been made. The validator then receives the created media for assessment. Based on the validation results from media experts, the learning media was declared valid to be tested with revisions or improvements according to the suggestions of the validator.

The media development trial was conducted in class VIII. A of junior high school 1 Bulango Timur, which consisted of 25 students. The implementation activities took place face-to-face. After the learning activities were completed, the researchers distributed questionnaires to the teachers and students. This questionnaire aims to

collect feedback on the mathematics learning media using the comic reading application. Through the questionnaire, researchers wanted to evaluate the practicality of the media used. The analysis result of the teacher's response in this development test was 91.7%. This indicates that the media used satisfies the criteria for practicality, demonstrating its high level of effectiveness. Likewise, the results of the analysis of student responses in the development test were 99.2%. This data shows that students' responses to the media used meet the criteria of being very practical. Figure 1 presents the following learning media: comic reading applications created with iSpring Suite software, focusing on the material of the system of linear equations of two variables.

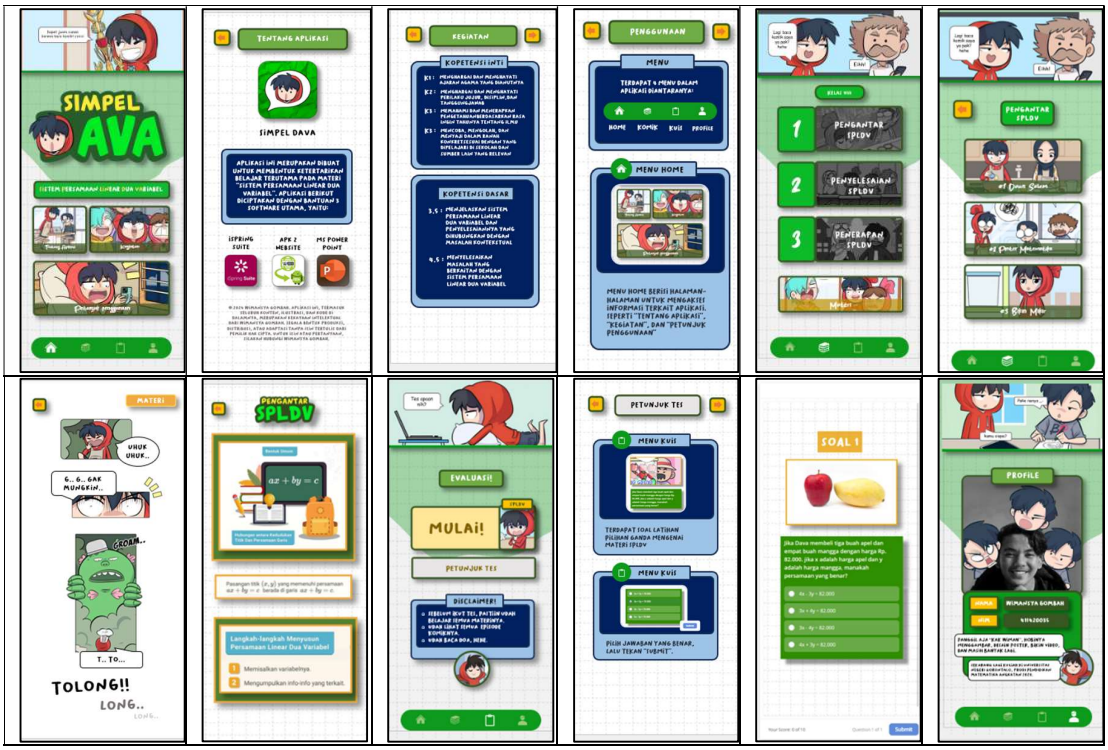

Figure 1. Comic Learning Media

Discussion

The development of mathematics learning media based on comic reading applications uses the Plomp model. This model consists of 5 phases, namely the preliminary investigation phase, the design phase, the realization/construction phase, the test, evaluation, and revision phase, and implementation. This research aims to develop mathematics learning media that can support the learning process in the classroom, especially on the topic of the system of linear equations of two variables that requires clear and interesting visualization. In particular, this research wants to validate and improve this learning media so that it is easier to use and able to increase students' interest in learning the system of linear equations in two variables material.

In this preliminary investigation stage, several activities are carried out to support the development of learning media, such as initial analysis, technology analysis, and finally

learner analysis. Researchers identify the learning needs and problems faced by both teachers and students during the initial analysis stage. In the initial analysis stage, researchers identify the learning needs and problems faced by both teachers and students. This approach helps students understand the concept of mirroring. Teachers generally only use media in the form of a blackboard and sometimes use PowerPoint. Although the material is delivered verbally and visually through PowerPoint, students tend to be passive and less involved in the learning process. As a result, students' understanding of mirroring material is still low, especially in terms of visualization and application of concepts. Additionally, the current learning media does not utilize any technology. technology. The teaching materials presented are also not equipped with visual elements, such as images and interactive videos, which can motivate students to be more active in learning. This situation suggests that we need to enhance the existing learning media to pique students' interest and foster their active participation in the learning process. This argument is in line with the opinion of Sari & Siswono (2020) that the use of media in learning can increase motivation, stimulate learning activities, and have a positive psychological impact on students. This condition shows that there is a need for media development that is in accordance with students' interests to attract attention and increase their involvement in the learning process.

The second is technology analysis. Based on the results of the analysis, it was found that in the process of learning mathematics, the use of technology is still rarely done. As explained in the initial analysis stage, teachers only utilize technology in the form of PowerPointin teaching. As for the use of other technologies, namely teachers utilizing WhatsApp groups to send assignments to students. Based on this, researchers developed learning media in the form of Android applications so that the learning process is not monotonous and students can easily run the media that has been made. Therefore, the use of I Spring Suite 9, assisted by PowerPoint and Website 2 APK Builder Pro, is a tool to realize the creation of applications to facilitate more interesting learning.

The last analysis carried out is the analysis of learners. From interviews with related teachers, information was obtained that all students are able to operate smartphones; this can also be seen during the midterm examination and final semester examination, where students must use smartphones to access questions. Based on this, learning media that can be accessed on smartphones will make it easier for students to learn.

Additionally, the teacher gathered information about students' interest in the trend of comic reading applications operated through smartphones. The teacher directly explained this, noting that students showed great interest when presented with several examples of mathematical applications in learning books that illustrated problems using interacting characters.

The information above suggests that learning media featuring character visualization and smartphone operation is the optimal choice. The development of Android-based learning media themed around math comics allows students to access educational content more easily and practically, thereby increasing their interest in learning mathematics. After conducting the initial investigation, the researchers proceeded to the design stage. At this stage, the researchers designed the type of media to be used,

selected the material, created the flowchart, and developed the research instruments. The researchers identify the most appropriate media type for students to utilize. This selection is based on the learning needs and preferences of the target users, specifically students studying the material on systems of linear equations in two variables. The media designed must be interactive, easy to use, and relevant to the learning objectives. Therefore, researchers chose comic-themed Android-based learning media. The material used in the application is designed based on the applicable curriculum, focusing on the topic of a system of linear equations with two variables. The preparation of the material is done systematically so that it covers basic concepts, solution methods, and applications in everyday life. Thereafter, the researcher designed the application flowchart. The flowchart was made to describe the application's workflow in a clear and structured manner. This diagram includes navigation sequences, user interactions, and evaluation processes, making it easier for developers to realize the application in accordance with the planned design. The researchers also created research instruments to gauge the application's effectiveness. These instruments include evaluation tests for students and questionnaires to collect user responses to analyze user interaction with the application. The instruments were designed with validity in mind to produce accurate data.

The learning media developed was then carried out in a limited trial by obtaining data from the readability test questionnaire given to five students of class VIII junior high school 1 Bulango Timur. The results of the readability test analysis showed very feasible criteria, with a percentage of 97.27%. The highest score was obtained in the statement, "By learning with the help of this media, I am more excited to learn math; this medium is easy to use; the media display is interesting." This rating is in line with the purpose of learning media, namely to facilitate the delivery of material, overcome the limitations of space and time, and make learning more interesting and effective so that students are more active and understand the material well (Fadilah et al., 2023). Then the lowest score is for the statement, "The language used makes it easy to understand the material." This phenomenon can occur due to differences in student characteristics, such as language skills, learning styles, and their level of understanding. Different types of intelligence, such as linguistic intelligence, may influence each student's information access needs. As explained by Cavas and Cavas (2020), each individual has different potential intelligences, which can include linguistic, logical-mathematical, visual-spatial, musical, kinesthetic, intrapersonal, interpersonal, naturalist, and existential intelligence. These intelligences can affect how students absorb learning materials. For example, students with high linguistic intelligence may locate it easier to understand material presented verbally (Hasanudin & Fitrianingsih, 2018), while students with visual-spatial intelligence may prefer visually supported learning media such as pictures or character visualizations (Anugrah et al., 2023).

Furthermore, implementation was carried out based on research conducted after a limited trial. According to the results of the student response questionnaire, the average total percentage for all aspects is 99.2%. This data shows that the media used meets the criteria of being very practical. The results of the teacher response questionnaire indicate

that this comic reading application-based learning media also meets the practicality criteria, achieving a percentage of 91.7%. Therefore, this media is considered good and suitable for use in the mathematics learning process, particularly for teaching the system of linear equations in two variables, as it meets the criteria of validity, feasibility, and practicality. The highest score of the student response questionnaire is in the statement "I think the display on the media is very intriguing; learning using this media is in accordance with the learning I want; learning media is very intriguing and interactive; the use of this media can make learning feel less boring." The highest score on the statement shows that students respond very positively to the appearance and interactivity of learning media; students feel that the learning media used succeeds in creating an intriguing and fun learning atmosphere.

This assessment is in accordance with the opinion of Pauweni et al. (2022), which states that learning media can make classes more interesting and fun so as to stimulate student activeness in the learning process. Students' interest in interactive media and in accordance with their needs supports increased motivation and active participation during learning. The lowest score was for the statement, "Evaluation questions in the media are able to show the level of mastery of the material I learned." These results could be due to individual student psychological factors, such as difficulty in processing information quickly or anxiety in dealing with direct question exercises. Some students may feel burdened by time or find it difficult to absorb the material directly despite having studied. Learning processes that involve processing information quickly can be challenging for some students who take longer to understand or remember material (Sweller, 2020). This difficulty is not due to deficiencies in the learning media but is more related to the individual characteristics of students who have different information processing speeds. This conclusion is in accordance with the opinion of Fatah and Risfina (2023) related to information processing theory, namely that information is absorbed, processed, and stored in memory. In the context of learning, students with slower processing ability may need more time to learn the material and respond to questions, which affects their practice results.

4. CONCLUSION

This research on developing mathematics learning media, which uses comic reading applications to teach the system of linear equations for class VIII at Junior High School 1 East Bulango, concludes that the media, based on the Plomp model, is considered a feasible alternative for teaching mathematics. The teacher's response to the media in learning mathematics as a whole is in the very practical category, with a percentage of 91.7%. The results of students' responses to media in learning mathematics as a whole are in the very practical category, with a percentage of 99.2%. Therefore, this media has been proven to increase student learning motivation, facilitate understanding of abstract concepts, and create engaging learning experiences, making it suitable for use in teaching the material on systems of linear equations with two variables.

As a suggestion, teachers can implement the comic reading app developed in this study to increase students' interest and motivation in reading. Teachers can participate in training to learn how to develop and implement comic reading apps in their teaching. Further research can be conducted to develop comic reading apps for other curriculum materials. Furthermore, further research can be conducted to develop more interactive and engaging app features for students, such as games or quizzes.

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