DIGITAL MATH COMIC DEVELOPMENT BASED ON THINKING TO INCREASE STUDENTS' INTEREST IN LEARNING

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Abstract

Digital Math Comic based on the Experience, Interaction, Communication, Reflection (MIKIR) approach is deliberately developed into a learning media needed in mathematics learning activities, especially on the material of Arithmetic Rows and Rows. So the author aims this research to find out the MIKIR-based learning approach that has existed before, the specifications of Digital Math Comic learning media, the feasibility of MIKIR-based Digital Math Comic, the advantages and disadvantages of MIKIR-based Digital Math Comic, and how MIKIR-based Digital Math Comic can increase student interest in learning. This research is a research and development (R&D) method using Thiagarajan's 4-D research model: Define, Design, Develop, and Dessiminate. The subjects of the study were students of grade VIII of SMP Muhammadiyah 1 Medan in the academic year 2023/2024 totalling 71 students. The types of data were qualitative data and quantitative data. The data were analysed qualitatively and quantitatively. The research instruments used were Digital Math Comic assessment sheets by material, language, and media expert lecturers, mathematics teachers, peers, student learning interest tests and student response questionnaires. The method of data collection through questionnaires/questionnaire sheets using a Likert scale. The results of this study indicate that the MIKIR-based Digital Math Comic is empirically proven to be valid, feasible to use, and able to increase students' interest in learning. As shown by the average score given by the validators which is 4.35 has a very good classification. Students' learning interest increased as indicated by the percentage increase in learning interest by 23% from 57% to 80%. Then the students' response to Digital Math Comic got a score of 4.2 with a good classification.

Keywords: *Digital Math Comic*, MIKIR, Learning Interest

Abstrak

Digital Math Comic berbasis pendekatan Mengalami, Interaksi, Komunikasi, Refleksi (MIKIR) sengaja dikembangkan menjadi sebuah media pembelajaran yang dibutuhkan dalam kegiatan pembelajaran matematika, khususnya pada materi Barisan dan Deret Aritmatika. Maka penulis menujukan penelitian ini untuk mengetahui pendekatan pembelajaran berbasis MIKIR yang sudah ada sebelumnya, spesifikasi media pembelajaran *Digital Math Comic,* kelayakan *Digital Math Comic* berbasis MIKIR, keunggulan dan kelemahan *Digital Math Comic* berbasis MIKIR, serta bagaimana *Digital Math Comic* berbasis MIKIR dapat meningkatkan minat belajar siswa. Penelitian ini merupakan penelitian dengan metode *research and development* (R&D) menggunakan model penelitian 4-D Thiagarajan: *Define, Design, Develop, and Dessiminate*. Subjek dari penelitian adalah siswa kelas VIII SMP Muhammadiyah 1 Medan tahun ajaran 2023/2024 berjumlah 71 siswa. Jenis data berupa data kualitatif dan data kuantitatif. Data dianalisis secara kualitatif dan kuantitatif. Instrumen penelitian yang digunakan adalah lembar penilaian *Digital Math Comic* oleh dosen ahli materi, bahasa, dan media, guru matematika, teman sejawat, tes minat belajar siswa dan angket respon siswa. Metode pengumpulan data melalui angket/ lembar kuesioner menggunakan skala Likert. Hasil penelitian ini menunjukkan bahwa *Digital Math Comic* Berbasis MIKIR terbukti secara empiris dinyatakan valid, layak digunakan, dan mampu meningkatkan minat belajar siswa. Sebagaimana yang ditunjukkan oleh skor rata-rata yang diberikan para validator yaitu 4,35 memiliki klasifikasi sangat baik. Minat belajar siswa meningkat yang ditunjukkan oleh persentase peningkatan minat belajar sebanyak 23% dari 57% naik menjadi 80%. Kemudian respon siswa terhadap *Digital Math Comic* mendapat skor 4,2 dengan klasifikasi baik.

Kata kunci: *Digital Math Comic*, MIKIR, Minat Belajar

INTRODUCTION

Learning that adapts to the conditions of the times is a good form of learning effort. A mathematics teacher must be more inventive in utilizing learning media and existing technology development (Rahmata et al., 2020). The development of science and technology has almost affected all aspects of human life. Technology developed rapidly in the fourth industrial revolution because it facilitated human activities, including increasing educational standards that can be used for the teaching and learning process (Maharani, H. R. et al., 2016).

In the teaching and learning process, it will be inseparable from a media that has a role as a tool for delivering material to facilitate learning. So far, the learning media used as teaching materials are books, worksheets, and other sources of documents. The learning process using media in the form of books and worksheets is always accompanied by lecture methods that have not been very successful in increasing students' interest in learning.

One of the materials in mathematics lessons that requires an increase in students' interest in learning is the Arithmetic Rows and Series. The learning of Rows and Arithmetic Sequences can make students explore simple number patterns so that they can construct the knowledge gained on their own and build a better conceptual understanding. The low interest in learning of students today makes students lagging behind in understanding the concept of Rows and Arithmetic Sequences so that innovation is needed in the learning media used.

Innovation in learning media is a need to respond to teaching and learning activities in Indonesia which tend to be monotonous (Aeni, Yusupa., 2018). The rapid development of information and communication technology (ICT) in Industry 4.0 today has further increased the ability to utilize information technology in all aspects of human life. Indonesian people are increasingly familiar with the use of computers, the internet, smartphones, social networking applications and other technologies, which allow people to access information quickly anytime and anywhere. Advances in information and communication technology (ICT) in general have had an impact on improving the quality of education through easy access to education and the provision of quality education to provide fast, efficient and effective services (Marianus Yufrinalis, S.Fil., M.A., 2021).

Digital-based education is growing rapidly . These developments are supported by interconnected and continuous software and hardware . This shows that there is an important relationship between digital developments in the context of educational technology development. Nowadays, educators are required to be able to take advantage of technological developments in the learning process. Where interactive communication in learning will be more effective if the media that is carried out supports optimal information processing (Yuberti., 2015). Chuntao (2011) argues that the decision to apply learning technology in the implementation of the curriculum must be part of the teaching model. Increasing the awareness of educators and administrators about the introduction of learning technology in educational institutions can bring changes in student learning and teachers' teaching habits (Gilakjani., 2022).

The Industrial Revolution 4.0 has arrived in Indonesia which demands technical progress and utilizes information and communication technology as a more advanced tool to accelerate the learning process. However, in the field there are still various kinds of problems, One of the problems in learning is the lack of interest in learning students because of the lack of interest in teaching and learning activities in the classroom and teaching and learning materials used by teachers in the classroom, therefore there is a need for innovation from teachers to improve the educational process such as Comic Development using *Digital Math Comic* (Saira et al., 2021).

Digital writing is tangible evidence of the contribution of technological developments to learning media. Nowadays, there are many books, magazines, newspapers, novels, and comics that used to have to be printed on paper, but now only need the internet to access them. It is also related to the efficiency of the use of space and time. One of the modern learning media based on digital writing that plays a role in the teaching and learning process is the use of *digital comic* or digital comics.

The definition of a comic according to Siregar et al (2019) is a picture story that is not difficult to understand and interesting. The existence of comics combined with learning materials is believed to expand students' learning inspiration and can also further increase students' interest in learning. Comics have become an alternative reading medium for some people. Comics are still interesting to consume and collect to this day because of the many

published topics, complex stories, and everyday problems expressed in this visual medium (Dimas Arianto Putro, Irwansyah., 2021).

According to Ilhan et al., (2021) digital comics are effective because they can be used anytime and anywhere. Readers are given convenience, and convenience in accessing and downloading it, and are corroborated by previous research conducted by Rahmata et al. (2020). The use of digital comics innovation in the world of education is also expected to increase students' interest in learning. There are no restrictions on the criteria for using digital comics in certain learning so that all educators in all departments are able to implement this method, including mathematics learning.

Basir, et al (2020) revealed that mathematics comics can improve students' mathematical understanding. Comics function as a tool to clarify the content, add value to content understanding, stimulate students' interest and attention, stimulate curiosity, and provide solutions related to overcoming teaching and learning problems. Another advantage is that readers can develop emotional feelings towards the digital math comics presented because they are presented with strong visuals and stories.

Not only advantages, a product that is produced and developed must also have its disadvantages or weaknesses, just like the teaching media developed in this research, *namely Digital Math Comic* also has disadvantages, namely: 1) the cost of printing a book will cost more if it uses images that have a lot of color, 2) not being able to display motion elements on the printed page on *Digital Math Comic*, which is able to support students' imagination, 3) *Digital Math Comic* has a great chance of being lost because of its small size, 4) the distribution and arrangement of teaching materials must be made or designed as attractive and effective as possible so that it takes a little longer in the manufacturing process (Najma, 2022).

The integration carried out by the author to *Digital Math Comic* is based on DENK which stands for Experience, Interaction, Communication, and Reflection which is a guide in the comic flow. Active learning based on the MIKIR approach was developed by the Tanoto Foundation, an institution that is strongly committed to the field of education. The elements of THINKING consist of experience, interaction, communication, and reflection. In a THINKING-based approach, the first element is to experience, namely to do and/or observe activities during the learning process, such as: observation, experiments, interviews, etc.

The second element is interaction, where students engage in the process of exchanging ideas and ideas between two or more people through discussion and responding to other people's ideas and opinions. The third element is communication, where students communicate their ideas, ideas, and feelings to others orally or in writing. Through presentations, communicating the results of the work, reporting the results of group discussions, reporting the results of experiments, and others. And the last one is reflection that is, students reflect on their learning experiences to improve themselves in the future.

The selection of the THINKING base in the application of *Digital Math Comic* is considered to be able to increase students' interest in learning because it makes students directly involved in the problem-solving process using reasoning. Students can feel as if they are also experiencing the story written in the comics, understand the interactions, communication conveyed between characters and each other and can achieve reflection in the core part of the story which becomes memory memory to understand the material taught. Therefore, the use of *Digital Math Comic* media for Rows and Arithmetic Sequences can help in exposing teaching materials to students and improve the quality of active and interactive students, and can support the smooth running of learning activities.

The location of the research taken by the author is located at SMP Muhammadiyah 1 Medan, precisely in Classes VIII Integrated-2 and VIII Integrated-4. Through an interview with Mrs. Khairunnisa, M.Pd. as a Mathematics Teacher in Integrated Class VIII on Monday, November 20, 2023, information was obtained that in Integrated Class VIII they have never used THINK-based *Digital Math Comic* learning media in their learning and that students at SMP Muhammadiyah 1 Medan are less interested in reading material books, further strengthening the reason for students' lack of interest in learning.

This is in line with the low interest in learning students because books are considered a medium that is not very interactive to be able to understand the mathematical context. Therefore, the author is interested in researching "The Development of *THINK-Based Digital Math Comic* to Increase Students' Learning Interest", as a learning media innovation that is fun and easy for students to understand. This will help the learning process to be more active, increase students' interest in learning and achieve learning goals well.

The purpose of this research is to find out the MIKIR-based learning approach, to find out the specifications of *Digital Math Comic* learning media, to find out whether THINK-based *Digital Math Comic* is worth using, to find out the advantages and disadvantages of MIKIR-based *Digital Math Comic*, to find out how *Digital Math Comic* based on THINKING can increase students' interest in learning. While the formulation of the problem in this study is how is the THINKING-based learning approach, How are the specifications of *Digital Math Comic* learning media, Is THINK-based *Digital Math Comic* worth using, What are the advantages and disadvantages of *THINK-based Digital Math Comic*, How THINK-based *Digital Math Comic* can increase students' interest in learning.

METHODS

This research uses an R&D (Research and Development) research method, which is a research method used with the aim of developing or producing a certain product and testing the effectiveness of the product or can also improve the existing product and the product must be accountable (Nana Syaodih, 2017: 164). The products produced must be in accordance with the needs of the reality in the field (Vienna Sanjaya, 2014: 130). This research was designed using the 4-D development research model or called define, design, develop, and dessiminate suggested by Thiagajaran and Semmel (Wiwin, 2016), by going through these 4 stages which were adapted into Indonesian into a 4-P model, namely: definition, design, development, and dissemination.

The place of this research was conducted at SMP Muhammadiyah 1 Medan Jl. Demak No.3, Sei Rengas Permata, Kec . The test subjects in this development research were 37 students in grade VIII Integrated-2 and 34 students in Integrated VIII 4. The total number of students from the two classes is 71 students.

There are two types of data obtained from this development research, namely qualitative data and quantitative data. Where qualitative data itself is data that shows the quality or quality of a process, event, event and so on which can be presented in the form of words or sentences (Ahmad Nizar, 2016: 171). Meanwhile, this quantitative data was obtained from the results of the assessment of media expert lecturers, material expert lecturers, mathematics teachers, and peers. Regarding the learning media, Digital Math Comic was also obtained from the results of the student response questionnaire and the results of the student learning interest questionnaire.

Data collection techniques are a tool used by a researcher to collect data with the aim of making the results better so that the data obtained is easier to process (Milkhatul Hasanah, 2016). The research used in the research on the development of Digital Math Comic based on MIKIR. Meanwhile, the data analysis technique of this study uses descriptive data analysis techniques. The data obtained from the results of the research were analyzed and used to answer the problem formulation regarding whether the learning media developed, namely Digital Math Comic, met the valid criteria or not.

RESULTS AND DISCUSSION

Research Results

The research carried out is development research or called research and development, where a product is produced and developed that can be accounted for its feasibility. In this study , the product produced and developed in the form of a Digital Math Comic based on MIKIR was tested at SMP Muhammadiyah 1 Medan which is located at Jl. Demak No. 3 Medan.

This research focuses on the development of Digital Math Comic and Learning Tool Plans (RPP) based on Experience, Interaction, Communication, and Reflection (MIKIR) activities which aim to increase students' interest in learning.

THINK-Based Learning Approach

There are many learning approaches that can be used in the teaching and learning process. To obtain satisfactory results requires the right approach to convey knowledge or material, so that the results are as expected. One of the relatively new learning approaches is MIKIR, which is a new term in the world of education which stands for "Experiencing Communication and Reflection Interaction" which was pioneered by the Tanoto Foundation in collaboration with the government to launch the MIKIR learning program.

Based on the news released on February 25, 2019 by SUMUT POS entitled "Active Learning and Campus-Based Management Training from Tanoto Foundation, Reference for Lecturers Teaching on Campus" The National Coordinator of the Partner Teacher Education Institute (LPTK), Ajar Budi Kuncoro said, Tanoto Foundation has a program to integrate LPTK with the campus. Today's training is a lecturer training related to active learning, lecturers

have two main tasks, namely preparing prospective lecturers and accompanying lecturers on campus.

With this training, lecturers are expected to be able to teach it to prospective lecturers (students) on campus so that later prospective lecturers can teach professionally. There are still many studies that refer to the THINKING learning approach that has been carried out so far at the elementary school or junior high school level, because the application of the THINKING approach is easier if it is done at the education level at that level. This is also supported by the fact that more teachers receive training from the Tanoto Foundation than lecturers from LPTK.

Specifications of Digital Mart Comic learning media

The specifications of Digital Math Comic learning media are as follows:

1. The physical form of the learning media developed is in the form of digital that can be stored on mobile phones and laptops (PCs) and also in the form of hardcopies

2. The presentation of the content of Digital Math Comic is in the form of mathematics subject matter, namely Arithmetic Rows and Series, complete with sample questions and their discussions as well as practice questions for grade VIII junior high school using the MIKIR basis

3. The Digital Math Comic learning media can be accessed offline or online.

4. Learning reflection videos are available

5. Title "Terracotta Life with Arithmetic Rows and Series"

6. It can be accessed at the website link that is easy to remember and concise https://bit.ly/KomikMatematikaBDA there is also a barcode on the last page of Digital Math Comic.
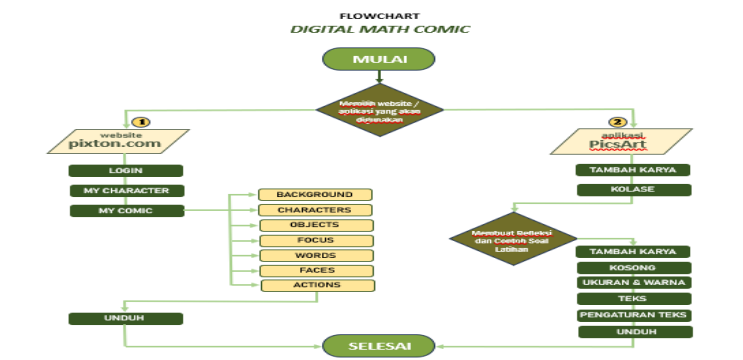

Chart 1. Flow Chart for Digital Math Comic Creation

Digital math comic based THINKING is worth using

It has been validated by Media Expert Lecturers, Material Expert Lecturers, Mathematics Teachers, Peers and passed a series of 4-D stages as follows:

Define Stage Description

In the initial step , ad-efine stage has been carried out which aims to define and establish learning conditions, the process at this defining stage consists of

1. Final preliminary analysis

At the final initial analysis stage, this aims to find out the basic problems contained in mathematics learning at SMP Muhammadiyah 1 Medan. From the results of observation and analysis seen from the perspective of students' cognitive and learning interests, when the learning process takes place when students are given Rows and Series of Arithmetic problems by researchers, many students do not remember the material that has been taught before. Meanwhile, the results of observation and analysis from the point of view of learning media and learning tools at SMP Muhammadiyah 1 Medan, show that the learning media of Mathematics Digital Comics has never been applied, but the learning media used other than the Mathematics book is LKPD, interactive learning videos. They tend to like project-based learning by finding learning concepts and students are invited to create their own learning media. Based on the results of the problem analysis found by researchers at SMP Muhammadiyah 1 Medan, mathematics learning is needed that is able to facilitate students in understanding the material in mathematics learning, in this case the Arithmetic Row and Series material to increase students' interest in learning.

Therefore, the researcher developed a Digital Math Comic learning media that meets the criteria of valid, effective and practical and is arranged as attractive as possible to suit the needs of their age and in accordance with the characteristics of comics for their children. With the choice of this medium and approach, it is hoped that it will be able to improve the quality of Mathematics learning, especially in the material of Rows and Arithmetic Sequences at SMP Muhammadiyah 1 Medan and be able to find the concept of solving problems in the Rows and Arithmetic Sequences material.

2. Student Analysis

The second defining stage is the student analysis stage, where at this stage it is carried out with the aim of finding out the characteristics of the students of SMP Muhammadiyah 1 Medan who are the subject of the research by conducting interviews with mathematics teachers, students, and also conducting direct observations at SMP Muhammadiyah 1 Medan which is carried out by the researcher himself. Although the students are basically in the formal operational phase, due to the lack of interest of the students of SMP Muhammadiyah 1 Medan in reading and understanding the available package books and the lack of interest in learning, the formal operational process does not run properly which results in low and this is in line with the students' inability to solve existing mathematical problems.

The presentation of THINK-based Digital Math Comic that students are able to imagine at the beginning of learning is one of the right solutions to solve problems obtained through research that aims to form and increase students' interest in learning.

3. Task Analysis

The third stage of the definition is the task analysis stage which is carried out to detail the content of a Row and Series Arithmetic material broadly starting from core competencies (KI), basic competencies (KD) and learning indicators in accordance with the curriculum used at SMP Muhammadiyah 1 Medan and in accordance with government regulations, namely Curriculum 2013. As for Class VIII, it still combines the 2013 curriculum with the Independent curriculum withthe sub-material of Rows and Arithmetic Sequences or sub-chapters as follows:

Core Competencies

Table 1. Core Competencies of Arithmetic Rows and Series Materials

Spiritual Attitude	Appreciate and appreciate the religious teachings that he adheres to.
Social Attitudes	Appreciate and appreciate honest, disciplined, responsible , caring (tolerance, mutual cooperation), politeness, confidence in interacting effectively with the environment, society and nature within reach association and existence.
Knowledge	Understand knowledge (factual, conceptual, and procedural) based on his curiosity about science, technology, art, culture related to visible phenomena

	and events
Skills	Trying, processing and presenting in the concrete realm (using, deciphering , assembling and creating) and the abstract realm (writing, reading, calculating, drawing, and composing) according to what is learned in school and other sources that are the same in point of view/ theory.

Basic Competencies and Learning Indicators :

Table 2. Basic Competencies and Indicators of Rows and Series Arithmetic

Basic Competencies	Indicators
1. Appreciate and appreciate the religious teachings that he adheres to	1. Pray before and after the lesson 2. Strengthening faith in God's greatness after seeing events related to statistics and the surrounding environment 3. Be enthusiastic in participating in mathematics learning
2. Have curiosity, confidence, and interest in mathematics and have a belief in the power and usefulness of mathematics, which is formed through learning experiences.	1. Likes to ask questions during the learning process 2. Dare to express your opinion 3. Responsibilities in performing tasks 4. Work together and attach importance to the Group's work results
3. Make generalizations of patterns on number rows and object configuration rows.	1. Students are given motivation and guidance to see, observe, read and rewrite them. They were given impressions and reading materials related to the Arithmetic Line.
4. Troubleshoot problems related to patterns on number rows and object configuration rows	1. Students are formed in several groups to discuss, gather information, re-present, and exchange information about the Arithmetic Row. 2. Students present the results of group or individual work in a classical way, express opinions on the presentations made and then respond back to the group or individual who presents. 3. Teachers and students make conclusions about the things that have been learned regarding the Arithmetic Row. Students are then given the opportunity to ask again about things that they have not yet understood

4. Concept analysis

The fourth stage of define is the analysis stage. The analysis stage is carried out to identify, detail and systematically compile statistical material learned in grade VIII. The material is designed and arranged as attractive as possible, dense but also concise, and designed according to a MIKIR-based approach.

The material of Arithmetic Rows and Rows consists of four main topics , namely: Arithmetic Rows, finding differences (differences), middle values, and Arithmetic Series. The teacher first provides the prerequisite material, namely number patterns by giving meaningful questions to students about number patterns to make it easier for students to conceptualize their thoughts for learning Rows and Arithmetic Sequences later.

5. Destination specifications

The fourth stage of defining is the objective specification stage which is intended to formulate learning indicators and learning objectives based on the core competencies and basic learning competencies of the existing 2013 curriculum Row and Series Arithmetic. So that it can be a reference for researchers in the preparation of Arithmetic Rows and Rows of Rows material in the developed media , namely Digital Math Comic learning media .

Design Stage Description

The second stage of the 4D model by Thiagarajan is the design stage which aims to make a design of the learning media that has been developed by the researcher , namely Digital Math Comic along with a learning implementation plan (RPP) based on THINKING. In this design stage , there are several stages in the process in order to get a valid, effective, and practical product that will be used later, which are as follows:

1. Media Selection

Based on the analysis of the data from observations and interview results that have been conducted first by the researcher, the researcher considers and finally chooses the learning media that is developed to be used in the learning process in the form of a Digital Math Comic and a plan implementation of learning (RPP) based on THINKING to increase students' interest in learning and numeracy literacy skills in Arithmetic Rows and Series materials.

2. Format Selection

At the format selection stage, the researcher compiles and makes a design of the Digital Math Comic learning media along with a learning implementation plan (RPP) that is adjusted to the chosen approach , namely the MIKIR-based approach. In addition , researchers also make research instruments that are used to assess the quality of the learning media produced. The Digital Math Comic produced has the title "Organized Life with Arithmetic Rows and Series" consists of a cover of Digital Math Comic, the subject matter of Arithmetic Rows and Series, examples of problems and discussions of THINKING-based problems , and practice questions of Arithmetic Rows and Rows that are close to life everyday.

Description of the Develop Stage

This stage is carried out with the aim of modifying the Digital Math Comic learning media that has been created in the previous stage. Digital Math Comic based on the MIKIR approach developed will be further refined by conducting instrument validation, product validation, and field trials . The following is an explanation of the development stages:

1. Instrument Validation

The aim is to assess the level of validity and quality of the instrument to be used in the research. The instrument in the form of a Digital Math Comic learning media assessment sheet will go through validation first before being used and in previous research conducted by Safrina in 2019 and Edi Suherman in 2021, it has been declared valid and can be used. For the student learning interest test instrument, a validation process has been carried out on March 18, 2024 by a mathematics expert lecturer named Dr. Fibri Rakhmawati, M.Si. as a lecturer in Mathematics Education at the State Islamic University of North Sumatra.

2. Product Validation

Aims to find out the level of validity of Digital Math Comic and the learning implementation plan that has been developed. Product validation is carried out by media expert lecturers, material expert lecturers, mathematics teachers, and peers. The design of the instrument has been explained before, namely at the design stage and the instrument is in the appendix. Each assessment carried out by the validators is in the form of quantitative and qualitative data with quantitative data in the form of numerical scores given by the

validator and qualitative data in the form of notes or suggestions also provided by the validator.

3. Field Trials

After the Digital Math Comic learning media and its learning implementation plan (RPP) are declared valid and suitable for use based on the results of analysis from the assessments of several validators, the next stage carried out by the researcher is the field trial stage, where at this stage the author conducts a trial of the product that has been produced and developed and validated by the validators to grade VIII students of SMP Muhammadiyah 1 Medan which amounted to 71 students divided into two classes, namely Class VIII Integrated-2 with 37 students and Class VIII Integrated-4 with 34 students.

Description of Dessiminate Stage

At this stage , it will be determined the level of effectiveness of the use of Digital Math Comic learning media and its lesson plans in the learning process .

1. Packaging

The packaging stage of dessiminate aims to produce and develop a product , namely Digital Math Comic learning media based on the THINKING approach . This packaging stage is carried out before Digital Math Comic is used in the research field as a learning medium in learning statistics. The packaging stage goes through several steps that have been discussed in the previous design stage . And at this stage there is also a process of improving the results of the revision of the Digital Math Comic carried out by the validators, the process of unifying the comic pages to make it more systematic, and the process of multiplying the product according to the needs of the researcher in the form of software and hardware.

2. Deployment

This stage of dissemination (dessiminate) is carried out openly in two ways, namely direct dissemination carried out at the research location, namely class VIII of SMP Muhammadiyah 1 Medan and also carried out online dissemination through the author's website with a link https://bit.ly/KomikMatematikaBDA and on the author's Instagram account as well as Facebook, @nurhasanah_jawany with the aim that many people see the product and can be used by others in learning mathematics, especially Arithmetic Row and Series material.

Figure 1. Digital Math Comic

Advantages and Disadvantages of THINK-Based Digital Math Comic (DMC)

Here are some of the advantages of DMC Based on THINKING:

1. Can be accessed online, anywhere and anytime

2. Available offline and printable

3. Attractive design

4. Learning reflection videos are available

5. Update the times by utilizing technological sophistication

6. Innovative based THINKING

7. Integrated with website and barcode

8. Empirically proven to increase students' interest in learning

9. Using a learning approach that is still rarely used, because it was only started in 2018

Here are some of the disadvantages of DMC Based on DENK:

1. There must be an internet network if you want to access directly from the website

2. Limited to only one Mathematics material

THINK-Based Digital Math Comic can Increase Students' Learning Interest

This student learning interest test is divided into two stages, namely the pretest and post test and is also carried out on different days. The pretest in grades VIII Integrated-2 and VIII Integrated-4 SMP Muhammadiyah 1 Medan was held on Thursday, March 28, 2024 and the post test was held in the two classes on Friday, April 26, 2024 with 71 students.

Based on the results of the analysis of students' learning interests, there was an increase in the learning interest of grade VIII students of SMP Muhammadiyah 1 Medan which can be seen through the results of field trials by holding tests before using Digital Math Comic (pretest) and after using Digital Math Comic (postest). With the results of the percentage increase in student learning completeness by 23% from 57% in the pretest to 80% in the post test and the category from less fruitful to good.

Description of Student Response Questionnaire

After the process of learning activities using Digital Math Comic was carried out, the researcher asked students to fill out a student response questionnaire that given by researchers to students. The results of the questionnaire showed an average total number of 67%. This means that there is satisfaction with the students themselves. The results of students' responses to Digital Math Comic developed in the mathematics subject of Row and Series Arithmetic material were obtained on average 82%, meaning "good" from a maximum score of 100% with the interpretation criteria achieved, namely "valid". From these results, it was found that the Digital Math Comic developed by the researcher has very interesting criteria to be used as a learning medium in teaching and learning activities .

Table 3. Student Response Results to Digital Math Comic

In the field trial

No	Research Aspects	Average	Category
1	Presentation of Materials	82 %	Good
2	Content Eligibility	78 %	Good
3	Language	84 %	Good
4	Graphic	84 %	Good
Average		82 %	Good

Discussion

Based on the formulation of the problem raised by the researcher through the results of his observational analysis and based on the results of the research that has been described in the previous section, which was carried out in class VIII with the research object of VIII Integrated-2 and VIII Integrated-4 SMP Muhammadiyah 1 Medan, it will be seen

whether the formulation of the problem submitted in the previous chapter has been answered or not. It will be described in classification according to the points of the problem formulation, which are as follows:

The Validity of Digital Math Comic Based on the THINKING Approach

If examined from the results of the identification of problems in the mathematics learning process in grade VIII of SMP Muhammadiyah 1 Medan, the main goal of the researcher is to increase students' interest in learning and numeracy literacy, especially in the Arithmetic Row and Series material by using learning media that has been selected and developed, namely Digital Math Comic in the learning process. Not only limited to choosing media, but the approach to be used is also considered for its importance in order to achieve the desired goals, therefore the researcher chose the THINK-based approach to be used in developing the Digital Math Comic developed.

The preparation and design of Digital Math Comic is a first step in the statistical learning process carried out, so that the quality and feasibility of Digital Math Comic are highly considered because it will affect the quality of Mathematics learning itself. To determine and assess the quality and feasibility of the results of the development of Digital Math Comic, an objective assessment of validity and effectiveness from several validators is required, with this validators including: media expert lecturers, material expert lecturers, mathematics teachers, and peers. The indicator components of the validation aspect are: language, graphography, feasibility of content and presentation of material.

Based on the analysis of the Digital Math Comic assessment by media expert lecturers, material expert lecturers, mathematics teachers, and peers, an average score of 82% was obtained with a very good classification from an average score of a maximum of 100%. Judging from the average score obtained, it shows that the Digital Math Comic based on the THINKING approach to the Arithmetic Row and Series material has met the grid of aspects of the feasibility of teaching materials according to BSNP, namely in terms of content feasibility, material presentation, language, and graphics. Judging from the classification obtained, it shows that the Digital Math Comic based on THINK-based on the Arithmetic Row and Series material has been suitable for use in the learning process at school by going

through a series of validations carried out by validators who were selected and tested on 71 grade VIII students of SMP Muhammadiyah 1 Medan.

The following are the final results of the digital mathematics comic that has been validated and corrected based on the input of validation experts

Figure 2: Digital Math Comic

Validity and Effectiveness of THINK-Based Learning Implementation Plans (RPP)

After the process of selecting Digital Math Comic learning media used in the Arithmetic Row and Series learning process, the next step taken by the researcher is to compile and design a learning implementation plan (RPP) which is used as a guideline for

activities during learning to be in accordance with the stages of the THINK-based approach and to bring out aspects of students' learning interests that are problematic in this study.

The preparation and design of this lesson plan is a first step in the statistical learning process carried out after the design of Digital Math Comic, so that the quality, feasibility and systematics of the lesson plan are very concerned because it will affect the course of the teaching and learning process activities. To determine and assess the quality and feasibility of the results of the development of the RPP, an objective assessment of validity and effectiveness is required from several validators, with this validators including: mathematics lecturers, teachers experts in the field of curriculum, mathematics teachers, and peers. The indicator components of the validation aspect are: format, content and language.

Based on the analysis of the lesson plan assessment by mathematics lecturers, curriculum expert teachers, mathematics teachers, and peers, an average score of 4.23 was obtained with a very good classification from a maximum average score of 5.00. Judging from the average score obtained, it shows that the THINK-based RPP on the Arithmetic Row and Series material has met the grid of feasibility quality aspects. Judging from the classification obtained, it shows that the THINK-based lesson plan on the Arithmetic Row and Series material has been suitable for use in the learning process in schools by going through a series of validations carried out by the validators who were selected and tested on 71 grade VIII students of SMP Muhammadiyah 1 Medan.

Student Response Questionnaire

The distribution of student response questionnaires to the Digital Math Comic learning media developed by the research subjects was carried out by the research subjects, namely classes VIII Integrated-2 and VIII Integrated-4 with a total of 71 students. Based on the results of the questionnaire, the results were obtained that the Digital Math Comic developed was practical, effective and easy to use by students in learning. This can be seen from the average score of the assessment aspect in the aspect of material presentation received a score of 4.05 with good classification, in the aspect of content feasibility it received a score of 4.2 with good classification, in the linguistic aspect it received a score of 4.3 with a very good classification, and in the graphic aspect it received a score of 4.3 with a very good classification. For the average score of the overall aspect of the Digital Math

Comic assessment obtained from the student response questionnaire, it received a score of 4.2 with a good classification with a maximum score of 5.0

CONCLUSION

Based on the results of the analysis of the research and the results of the discussion on the development of Digital Math Comic learning media based on THINK, Rows and Arithmetic Series materials to increase students' interest in learning, several conclusions can be drawn: **1)** The THINK-based learning approach is a learning approach initiated by the Tanoto Foundation in 2018 with the elements of Experience (M), Interaction (I), Communication (Ki), and Reflection as steps in learning to improve the quality of education. 2) Based on the results of the validation of the product developed, namely Digital Math Comic conducted by the validators, with the assessment results from the media expert lecturer obtaining an average score of 4.05 in the good category, the assessment results from the material expert lecturer obtained a score of 4.3 in the very good category, the assessment results from the mathematics teacher obtained a score of 4.25 in the good category, and the assessment results from peers obtained a score of 4.8 in the very good category. If you look at the scores obtained through the assessment results of the four validators, it can be concluded that the THINK-based Digital Math Comic is declared valid and feasible to be used in the learning process. **3)** Based on the results of the product validation developed, namely the learning implementation plan (RPP) carried out by the validators, with the assessment results from expert lecturers obtaining an average score of 4.1 in the good category, the assessment results from expert teachers in the field of mathematics obtained a score of 4.36 in the very good category, the assessment results from mathematics teachers obtained a score of 4.23 in the very good category, and the results of the assessment from peers obtained a score of 4.23 in the very good category. If you look at the scores obtained through the assessment results of the four validators, it can be concluded that the THINK-based learning implementation plan (RPP) is declared valid and feasible to be used in the learning process of the Arithmetic Row and Series. **4)** Based on the results of the analysis of students' learning interests, there was an increase in the learning interest of grade VIII students of SMP Muhammadiyah 1 Medan which can be seen through the results of field trials by holding tests before using Digital Math Comic (pretest) and after

using Digital Math Comic (postest). With the results of the percentage increase in student learning completeness by 23% from 57% in the pretest to 80% in the post test and the category from less fruitful to good. **5)** From the results of the analysis of the student response questionnaire distributed to students and filled out by the students, the average score was 4.2 with a good category with a maximum score of 5.0. This shows that students like and are interested in the product developed, namely Digital Math Comic. And this THINK-based Digital Math Comic has received a positive response from students to increase students' interest in learning.

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Note:

(1) The article heavily promotes the MIKIR (Mengalami, Interaksi, Komunikasi, Refleksi) approach, yet doesn't provide a comprehensive explanation of its theoretical underpinnings or compare it to other established pedagogical methods. This makes

it difficult to assess the novelty or unique advantages of MIKIR. Therefore, it is recommended to include a detailed discussion of the theoretical foundations of MIKIR, as well as a comparison with other pedagogical approaches, to better highlight its distinctive features and potential benefits.

(2) While the article discusses the development and validation of the digital math comic, it lacks detailed descriptions of the comic itself. Without specifics about the storyline, characters, visual style, or how the MIKIR elements are integrated, it's hard to evaluate the comic's potential effectiveness. Therefore, it is recommended to include sample pages, plot summaries, and an explanation of how the MIKIR approach is embedded within the comic to provide a clearer understanding of its content and instructional value.