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THE DEVELOPMENT OF INTERACTIVE LEARNING MULTIMEDIA BASED ON THE WEBSITE FOR MATHEMATICS' SUBJECT IN JUNIOR HIGH SCHOOL

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Abstract. This research aims to develop interactive learning media based on the website for mathematics subjects in junior high school. The research and development (R&D) method was applied to this research to achieve that goal and the model used is ADDIE. ADDIE model consists of five phases: (1) Analyze, (2) Design, (3) Develop, (4) Implement, and (5) Evaluate. The research was conducted in grade 8 students of SMPS Kristen Makedonia Ngabang with 27 participants and six people for a validity test based on media design experts, media experts, and mathematics content experts. Questionnaire instruments and attitude scales were used to analyze the quantitative and qualitative data. Overall, according to the data analysis (with the frequency range of 1 to 5), it is found that the media design has met very valid criteria with an average value of 4,76. Nonetheless, the analysis result of empirical assessment for individual, small group, and field try procedures for 27 students in SMPS Kristen Makedonia (Makedonia Junior High School) Ngabang grade 8 expressed that the students are very happy to use interactive learning multimedia based on the website with an average value of 6,25 with the frequency range of 1 to 7. Furthermore, according to the result of the effectiveness attitude questionnaire towards media and the pre-treatment and post-treatment analysis that involved 30 students, there was a significant difference as $t_o \geq t_{tabel}$, ($7{,}600 \geq 2{,}045$). Therefore, the interactive learning multimedia based on the website for mathematics subjects in junior high school can be implemented for mathematics-related topics in junior high school.

Keywords: Learning Multimedia; Interactive Learning; Based on the Website

I. INTRODUCTION

Mathematics is one of the important fields of study in education. It is proven that mathematics learning is carried out at all levels of education. In learning mathematics, students are trained continuously to be able to solve problems of everyday life. The mathematical abilities that are trained include the ability to count, think critically, carefully, logically, and thoroughly. *Hence, Mathematics learning is one of the subjects that needs more attention to improve its quality.* Students find mathematics very difficult and a frightening specter (Siregar, 2017; Fahrudin, Zuliana, & Bintoro, 2018). Mathematics which is considered a difficult and unpleasant subject become the main reason that directs the students' attitude who are lazy, avoid and do not want to learn mathematics. The students' attitude describes that they do not like mathematics.

Based on the data of the 2020/2021 New Student Admissions (PPDB) math test scores of SMPS Kristen Makedonia Ngabang (Makedonia Junior High School) showed the average basic numeracy score for students on the alumni path was 37.28, the regular path was 57.53, and the roadshow path was 19.12. The average of all scores from all paths was 37.97. Meanwhile, the average score of students who are selected and accepted at SMPS Kristen Makedonia Ngabang, and currently are in 8 grades, was 48.96. The scope of the basic arithmetic test questions in PPDB only includes addition, subtraction, multiplication, and division. Therefore, it can be concluded that students' numeracy skill is still in the low level.

A simple survey conducted on March 12, 2021, showed that the learning outcomes of 8 grade students were directly proportional to the response of happy attitudes towards mathematics. That means, students who have a happy attitude towards mathematics have good learning outcomes,

and conversely, poor learning outcomes show a displeased attitude towards mathematics. Attitude is very important in the world of education. Students' attitudes are predictors to predict success in learning (Gbore, 2013). According to Susilo & Agustin (2015), there is an influence between attitudes towards mathematics and mathematics learning outcomes in junior high school. If students' attitudes towards mathematics are high, then students' mathematics learning outcomes are high and if students' attitudes toward mathematics are low, then students' mathematics learning outcomes are low. Likewise, Hartanti's findings (2015), that groups of students who have positive attitudes towards mathematics have higher mathematics learning outcomes than groups of students who have negative attitudes towards mathematics. Therefore, attitudes towards mathematics will greatly determine the learning outcomes of mathematics. In line with the problem of students' attitudes who do not like learning mathematics affect student learning outcomes, it is necessary to have multimedia learning innovations for teachers in having learning activity.

In terms of social psychology, according to Lahey (2012, p.538), attitudes as evaluations that predispose us to act and feel in certain ways. That is, attitude as an evaluation that influences a person to act and feel in a certain way. The attitude that is generated is also influenced by past experiences, present situations, and expectations in the future. Attitudes can be formed for the occurrence of desired behavior or actions (Asrul, Ananda, & Rosnita, 2014). The attitude structure has three main components that support each other, namely cognitive-beliefs, emotional-feelings (affective), and dispositions in conative behavior (dispositions to behave) (Lahey, 2012; Azwar, 2016). Also emphasized by Azwar (2016), this is because attitudes have components of trust, feelings and tendencies to behave (Lahey, 2007).

Educational innovation is really important and need to be constructed by the teacher. Therefore, it is very important for teachers to be able to develop interactive multimedia learning. According to Garrand (2006, p.5), multimedia is a combination of many media into a single work where media-altering interactivity and linking are made possible to the user via the computer. According to Wibawanto (2019, p.1.27), online learning is a teaching and learning process in which teaching materials are available and accessible via computers connected to the network and the process is mostly managed through a network. Futhermore, based on Rusman (2018), website-based learning is a learning activity that utilizes web page media (website) which can be accessed via the internet network. Website-based learning or web-based learning is one of the applications of electronic learning (e-learning). The benefits and advantages of using interactive multimedia in learning include: more, innovative and interactive learning systems, able to combine text, images, audio, music, animated images or videos in one unit to achieve learning objectives, increase student motivation during the learning process, able to visualize material that has been difficult to explain only with conventional explanations or teaching aids, and to train students who are more independent in acquiring knowledge (Meyer, 2009; Silaban & Tanjung, 2015; Munir, 2015). Furthermore, Munir (2015) also provides reasons that make learning to be supported by interactive multimedia, namely the message conveyed by the material feels real, can stimulate various senses so that interaction occurs between the senses, visualization of material in multimedia components is easier for students to catch, the learning process is more practical. and controllable, and save time, cost and energy.

The development of this multimedia contains the Pythagorean theorem material. The Pythagorean theorem is one of the materials from the 2013 curriculum of mathematics taught in grade 8 of junior high school. The Pythagorean theorem is an abstract teaching material that requires tools or multimedia. The material for the Pythagorean theorem has sub-materials, namely, the truth of the Pythagorean theorem, identification of Pythagorean triples, sides of right and isosceles triangles, triangles with special angles, and solving real problems in the Pythagorean theorem. This material is in accordance with (a) the characteristics of the multimedia developed, (b) the learning time of the material according to the time of the study, (c) the willingness of mathematics teachers to be involved as research participants, and (d) the multimedia required for learning the Pythagorean theorem is not yet available. The material selection procedure is carried out through (a) needs analysis with interviews and documentary studies on the 2013 curriculum, (b) the feasibility of the material to be translated into multimedia. Thus, it can be explained the relationship between the characteristics of multimedia, the benefits of multimedia, and learning materials.

Research on the development of interactive learning multimedia based on website has been conducted by several researchers. The results of research on the development of learning media based on website, Rhomdani (2017), found that website-based learning media are very practical and interactive to be used as learning media. It is also reinforced by the findings of Oktaria, Zulkardi, & Somakim (2013) that the use of websites can increase students' interest in learning mathematics. Likewise, the findings from Setyadi & Qohar (2017) which show that website-based learning media receive a positive response from every aspect that is assessed so that students are motivated in learning. Therefore, the use of website-based learning media is more likely to increase interest in learning, mathematical abilities, and student learning outcomes.

Previous relevant research using a general design website was limited to delivering material content that was difficult to change the framework and did not yet have interactive features to accommodate the activities of teachers and students. When compared with previous research, this study has several differences. The development of this website offers several features that did not exist before, namely having a material bank, question bank, grade list, and guided activities that can be designed by teachers. The next feature is an interactive website that offers interactive feedback given by students and teachers in the comments column for each material that is launched. So that the development of

this interactive learning multimedia website is expected to offer a more complete learning environment.

Based on previous problems and research, this study aims to develop an interactive multimedia learning based on website for junior high school mathematics subjects. This research is very important to do so that students can be enthusiastic, like, and easily get learning resources for mathematics, especially the Pythagorean theorem material.

II. METHODS

This research was conducted at SMPS Kristen Makedonia, Ngabang, Landak Regency, West Kalimantan, from April 12th to May 31st, 2021. The participants of this study consisted of one teacher as a researcher companion and eighth grade students of the SMPS Kristen Makedonia Ngabang.

The research method used is The Research and Development Method (R&D). ADDIE model was used in developing interactive multimedia learning based on website through 5 phases. According to Branch (2009), the phases of ADDIE development are described in detail as follows:

Analysis Phase:

In this analysis phase, the researcher collects the required data before developing a website-based interactive multimedia learning. It is important to know the main problems faced by teachers and students in learning mathematics in junior high school. The analysis phase is a very important phase to do. The analysis phase must contain literature study (literature review, curriculum review, and relevant research), instructional analysis, and analysis of student characteristics. The three stages of the analysis must contain validating the real and ideal performance gap, knowing the number of students in the study (number of students), knowing the location of the research subject (location of students), knowing the data on the distribution of student abilities or research subjects (experience/Skills levels-Skills that impact potential), knowing the content of the curriculum, knowing the technology that can be used (technology resources), and knowing the facilities owned by students and schools (instructional facilities).

Design Phase:

At the design phase there are stages of planning and product design. Planning activities include plans to develop research and formulate learning objectives. At the design phase by compiling the initial product concept of interactive web-based learning multimedia on the Pythagoras theorem material. The initial product concept design of website-based interactive multimedia learning begins with the initial concept of storyboards, product interfaces, and is designed to be a visual prototype or conceptual product. This initial product concept design is ready to enter the initial product development phase which will be validated by experts.

Development Phase:

The development phase starts from the initial product creation, expert review and revision, as well as three trial stages (conduct a pilot test) accompanied by revisions to produce the final product. Some of the details of the steps carried out include:

Initial Product Development. At the development phase, what is done is to realize the web-based interactive learning multimedia product design that has been designed in the previous phase so that at this phase it produces an initial product.

Expert Review. Expert validation is carried out to determine the feasibility of the interactive learning multimedia concept that has been prepared. Validation involves several professional and experienced experts who can validate the materials, media, and product designs developed.

Revision and Initial Product. After having expert validation, revisions are made based on expert input. The results of the revision become the initial product accompanied by instructions for using website-based interactive multimedia learning. This stage is done to make the product better and feasible to be applied in the individual trial stage (one to one trial).

One-to-one Trial. Individual trials were conducted on 1 (one) student with average ability. This trial is to obtain an initial reaction from the use of products that have been revised from expert validation tests.

Revision of one-to-one Trial. After conducting individual trials, the initial product was revised. Product improvement is carried out by considering input from individual trial students.

Small Group Trial. Small group/class trials were conducted on 6 (six) students. This trial is more complex in terms of input given by students from the experience of using the initial product.

Revision of Small Group Trial. After conducting a small group/class trial, the product was revised again. Product improvement is carried out by considering input from small group trial students.

Field Try. Field trials/large classes were conducted on 20 students. This trial is more extensive and the inputs given by students from the experience of using the initial product are very important to produce the final product.

Revision of Field Try. After conducting field trials/large classes, the product was revised again. Product improvement is carried out by considering input from large group trial students to produce a website-based multimedia learning final product.

The Final Product. The researcher made revisions and improvements from every input from students during the trial, until the final product of interactive multimedia learning based on the website was obtained for junior high school mathematics subjects.

Implementation Phase:

In this phase, the main thing that need to be done is to prepare the teacher and students in using web-based interactive learning multimedia products.

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Prepare The Teacher. Teacher is trained to be able to use website-based interactive multimedia learning as teaching materials.

Prepare The Students. Students are trained to be able to use website-based interactive multimedia learning as teaching materials.

Evaluation Phase:

The evaluation in this study focuses more on whether product development can have good effectiveness for teachers and students in learning. To find out the effectiveness of multimedia, students received an initial attitude questionnaire (cognitive) and pretest questions before using multimedia, treatment of the use of website-based interactive multimedia learning final products, and then a final attitude questionnaire (affective-conative) and posttest questions after using multimedia (both before and after using multimedia). after implementation). This phase is carried out on 30 students. The results of the attitude measurement data were calculated for the total average and the attitude norm scale while the results of the pretest and posttest scores were carried out by a t-test to determine the difference before and after the use of interactive multimedia learning web-based learning.

Data collecting techniques. This research used three data collecting techniques such as interviews, questionnaires, and written tests. In this study, the data collection tools were interview guidance, question items/questionnaire statements, and test questions. Descriptive qualitative data analysis and quantitative analysis is used in this study.

Expert validation questionnaire. Qualitative descriptive data is used by the researcher to show the data analysis of expert validation results in using website-based interactive multimedia learning. The data is presented by tables and graphs. The criteria for the validity of the material, media, and design are as follows:

Table 1. Likert Scale

No	Criteria	Score
1	Excellent	5
2	Good	4
3	Average	3
4	Poor	2
5	Very Poor	1

Here is the formula to calculate the average score;

$$\bar{X} = \frac{\sum X}{N} \quad (1)$$

Where;

$\bar{X}$ = Average Score
$\sum X$ = Total Score
N = Total participants

To find the interval range between categories Widoyoko (2018) using the procedure in (Mering, 2020):

$$i = \frac{highest\ score - lowest\ score}{total\ class} \quad (2)$$

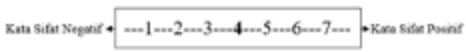
Where;
Highest Score = 5
Lowest Score = 1
Total Class = 4 (criteria)

The interval range is $i = \frac{5-1}{4} = \frac{4}{4} = 1$, thus the categories obtained are: 1.0 – 2 = "Invalid", 2.1 – 3.0 = "Less valid", 3, 1 – 4.0 = "Valid", and 4.1 – 5.0 = "Very Valid". To make it easier to use the validity criteria, it can be seen in table 2 below.

Table 2 Multimedia validity criteria

No	Criteria	Score
1.	Very Valid	4,1 – 5,0
2.	Valid	3,1 – 4,0
3.	Less Valid	2,1 – 3,0
4.	Invalid	1,0 – 2,0

Differential semantics of attitude questionnaire. An attitude statement item towards multimedia is used to measure students' attitudes towards the use of website-based interactive multimedia learning using. The measurement scale uses a semantic differential technique. Negative (unfavorable) adjectives are on the left and positive (favorable) adjectives are on the right (Azwar, 2016, p.172; Periantalo, Fadzlul, & Saputra, 2014). The following format is the differential semantic scaling of two opposite adjectives:



If a scale contains k items, then the individual scores will move between (1 × k = k) to (7 × k = 7k). The closer the score to 7k, the individual's score can be interpreted as more positive or more favorable. Conversely, the closer the score to k, the more negative or unfavorable the attitude is. If the individual score is around 4k, then the intensity is low and indicates that the respondent is neutral (Azwar, 2016, p.174).

To assist in the scaling, intervals between categories of Widoyoko (2018) can also be made using the procedure (in Mering, 2020) from the attitude norms obtained from the respondents. This is the formula to get the interval distance is $i = \frac{7-1}{4} = \frac{6}{4} = 1{,}5$, thus the categories are obtained: 1.0 – 2.5 = "Unhappy", 2.6 – 4.0 = "Less Happy", 4.1 – 5.5 = "Happy", and 5.6 – 7.0 = "Very Happy". To make it easier to use the validity criteria, it can be seen in table 3 below;

Table 3 Student Attitude Norms

No	Kriteria Penilaian	Skor
1.	Very Happy	5,6 – 7,0
2.	Happy	4,1 – 5,5
3.	Less Happy	2,6 – 4,0
4.	Unhappy	1,0 – 2,5

One group pretest – posttest design. To find out how much influence of the use of interactive multimedia, the researcher design one group before and after the use of website-based interactive multimedia. The pretest was conducted before the treatment on using the multimedia. While a posttest was carried out after the treatment on using interactive multimedia learning based on the website. The

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following is the one group pretest-posttest design scheme (Sugiyono, 2016):

Pretest	Treatment	*Posttest*	(3)
O_1	X	O_2	

Where:
X = Treatment
O_1= Pretest conducted before treatment
O_2= Posttest conducted after treatment

T-test. The t-test was conducted to test the differences in the average of the two samples obtained from the learning outcomes before being given treatment and learning outcomes after being given treatment. The t-test conducted for the sample correlated with a small study subject (n≥30) so that the data were single or not grouped. Here are the steps in using t-test; (1) T-test was conducted on a sample of 30 participants; (2) Microsoft Excel is used to calculate the data; (3) The error rate used is 5% (0.05) or 95% confidence level (0.95); (4) Provide conclusions on the results of the t-test. From the results of the comparison of learning outcomes before treatment (pretest) and after being treatment (posttest), it was concluded whether interactive multimedia learning website-based for junior high school mathematics subjects had an influence on the learning process.

Hypothesis;

$H_0: \mu_1 = \mu_2$

$H_a: \mu_1 \neq \mu_2$

With the provision that if $t_o \geq t_{table}$ then H_0 is rejected, it means that there are differences in student learning outcomes before and after using website-based interactive multimedia learning, and vice versa if $t_o < t_{table}$ then H_0 is accepted. For the t_0 test, it can be calculated using the following formulation (Mering, 2020, p.90):

$$t_o = \frac{M_D}{SE_{M_D}} \quad (4)$$

The above formulation can be assisted by the following formulation:

$$M_D = \bar{x}_1 - \bar{x}_2 \quad (5)$$

$$SE_{M_D} = \frac{SD_D}{\sqrt{N-1}} \quad (6)$$

$$SD_D = \sqrt{\frac{\sum D^2}{N} - \left(\frac{\sum D}{N}\right)^2} \quad (7)$$

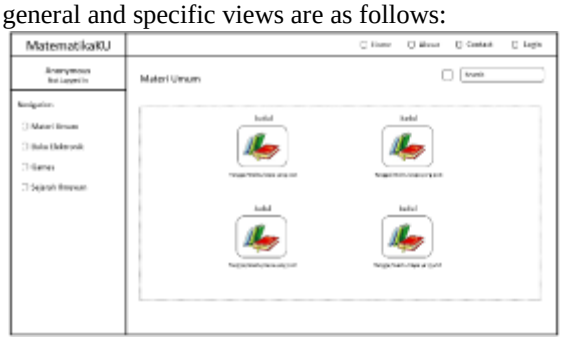
Where;
t_o = observation t value
N = total data
D = score difference $x_1 - x_2$
$\bar{x}_1$= mean initial attitude score before multimedia is used
$\bar{x}_2$ = mean final attitude score after multimedia is used
M_D = *mean* D
SE_{M_D} = *error of measurement standard*
SD_D= deviation standard D (score difference $x_1 - x_2$)

III. Result and Discussion

Result

Analysis Phase. The findings of the literature review show that Mathematics is one of the subjects that students do not like. Therefore, the students tend to have low learning outcomes. In other words, the group of students who had a positive attitude towards mathematics had higher learning outcomes than the group of students who had a negative attitude towards mathematics. 2013 Curriculum is implemented in SMPS Kristen Makedonia Ngabang. Pythagorean Theorem is one of the topics that is taught in even semester of grade 8. The Minimum Completeness Criteria (KKM) is 62 which is applied for all subject in grade 8 including for Mathematics Subject. The development of interactive web-based learning multimedia was developed for Pythagorean Theorem topics which based on the 2013 Curriculum. Field findings also show that 8 grade students age 12-13 years old. Most of the student are discipline, and independent since they live in boarding school model. During the Covid-19 Pandemic, students tend to access internet by their smartphone since having online class and they enjoy it. Moreover, the researcher found that average score for the Mathematics Even Mid-Term Test of Grade 8 students is 53 (with a range of 0-100) and the average score for the Mathematic final Even Semester test is 57 (with a range of 0-100). The total students of grade 8 are 57. There are 86% students (46 people) who are able to have online class while the rest of 14% students (8 people) are having the class by module. The learning method used by the teacher is lecturing, discussion and group activity. Online class is carried out by some platform such as google classroom, google meet, and google form. To support the process of online learning, SMPS Kristen Makedonia provide laptop/computer and internet network. Thus, the students do not have internet access from their home, can be invited to come to the school in order to join the online class.

Design Phase. In this phase, the researcher concern to design the lesson plan, Pythagorean Theorem materials, and set the learning objective that need to be achieve by the students through the use interactive learning multimedia based on the website. The materials are designed based on the Pythagorean Theorem topics in even semester of 8 grade. Blended learning is applied to carried out this material. The media used is the internet with web page access https://matematikaku.com/ , the allocation of learning time is two meetings with the duration of each meeting 3 x 40 minutes. The students are given 25 questions in the form of multiple choice in order to measure their ability. The initial product concept design stage is done by creating a website-based interactive multimedia learning landscape storyboard. The general and specific views are as follows:



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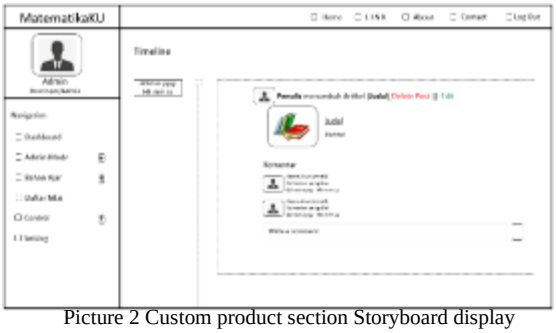
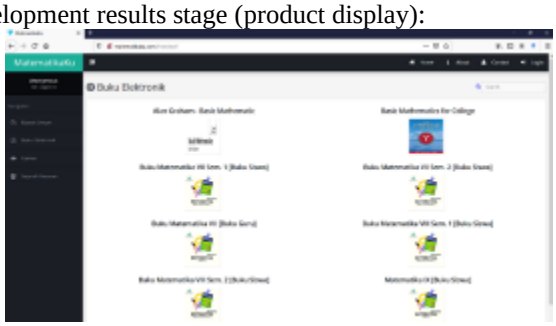
Picture 1 General product section Storyboard display

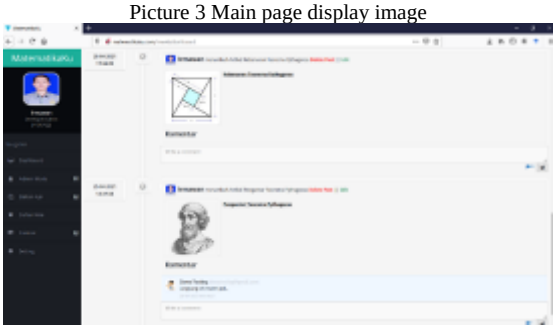


Picture 2 Custom product section Storyboard display

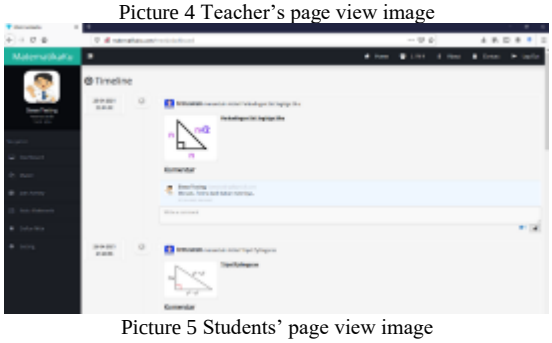
Development Phase. The development phase is started by creating the initial product, expert review and revision, three trial stages (conduct a pilot test) and revisions to produce the final product. Here are some of the details of the development results stage (product display):



Picture 3 Main page display image



Picture 4 Teacher's page view image



Picture 5 Students' page view image

Expert Review. The involved experts consist of 6 people who are experts in the field of contents, learning media and learning design. Validation of the product is performed on April, 26th 2021 until May, 5th 2021. The validation results are shown in the following table;

Table 4 The validation result from expert on content

No	Aspect of Assessment	No	Indicator	A_i
A	Feasibility of content	1	Suitability of basic competencies	4.83
		2	Material accuracy	4.93
		3	Encourage curiosity	4.84
B	Feasibility of Presentation	4	Presentation technique	4.67
		5	Presentation support	4.92
		6	Learning presentation	4.75
C	Feasibility of Contextual	7	Contextual nature	4.17
		8	Contextual component	4.42
Average of content validation				**4.68**

Where:
Ai = Average expert validation score

The result of validation from expert on content shows that Pythagorean Theorem topics in the interactive multimedia based on website is "very valid". The revision is performed based on the inputs given by the experts.

Table 5 The validation result from expert on media

No	Aspect	No	Indicator	A_i
A	Feasibility of usability	1	Easy of accessing the website address	4.92
		2	Easy of use of the website menu	4.92
		3	Efficiency of using website	4.92
		4	Website content updating	4.33
B	Feasibility of functionality	5	Using the menu before logging in	4.89
		6	Use of home menu	5.00
		7	Use of menu about	5.00
		8	Use of log in & log out menu	5.00
		9	Use of L I N K menu	5.00
		10	Use of dashboard menu	5.00
		11	Use of admin mode menu	4.91
		12	Use of the material menu after logging in	5.00
		13	Use of material bank menus and material title hyperlinks	5.00
		14	Using the question bank menu	5.00
		15	Use of the add material menu	4.97
		16	Use the menu add questions	4.93
		17	Use the add activity menu	5.00
		18	Use of the list activity menu	5.00
		19	Use of value list menu	5.00
		20	Using the settings menu	4.92

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		21	Using the search menu	4.83
C	Feasibility of visuality	22	Communication	4.67
		23	Simplicity and attractiveness	4.33
		24	Visual Quality	4.17
		25	Use of mobile media	4.50
		26	Use of audio	4.50
		27	Use of layout	4.75
Average of media validation				**4.85**

Where:
Ai = Average expert validation score

The result of media validation shows that interactive learning multimedia based on website is "very valid". The revision is performed based on the inputs given by the experts.

Table 6 The validation result from expert on learning design

No	Aspect	No	Indicator	A_i
A	Feasibility of Characteristic	1	The suitability of learning theory in interactive learning multimedia	4.83
		2	Learning objectives	5.00
		3	Multimedia learning has an impact on increasing interest in learning in the classroom	5.00
		4	Interactive system	4.83
		5	Specific ways of learning	4.33
B	Feasibility of learning activity design	6	Preliminary activity plan	4.83
		7	Core activity plan	4.83
		8	Closing activity plan	4.83
C	Feasibility Stages of multimedia learning	9	Systematics of interactive learning multimedia	4.33
		10	Continuity of material and sample questions for students	4.83
		11	Continuity of sample questions and practice questions for students	4.83
		12	Continuity of each stage of learning activities	5.00
D	Feasibility Assumed implementation of the design	13	Easy of concept application	4.67
		14	Interactive learning multimedia efficiency	4.67
		15	Improve the attitude of happy learning mathematics	4.67
		16	Improving mathematical ability can be seen from learning outcomes	4.00
E	Feasibility of Assessment strategy	17	Assessment aspect relationship	5.00
		18	Assessment of theoretical material	4.83
Average of learning design validation				**4.74**

Where;
Ai = Average expert validation score

The result of validation from expert on learning design shows that the interactive multimedia based on website for Mathematic subject in junior high school is "very valid". The revision is performed based on the inputs given by the experts

Initial Product Trial

The Result of Individual Trial (one to one trial) and Revision. Individual trial (one to one trial) is conducted after revision done agree with the inputs given by the expert. The implementation of the interactive multimedia based on website for individual trial is done on May, 17th – 18th 2021. It is implemented to a student with average Mathematics ability. The following are the result of individual trial (one-to-one trial):

Table 7 The Result of one-to-one trial

No	Attitude Object Component	Average Total Attitude Score			Average
		Cognitive	Affective	Conative	
1.	Multimedia function	5.50	5.75	6.33	5.68
2.	Easy of use of multimedia	7.00	6.25	6.67	6.64
3.	Multimedia content	6.25	6.71	6.38	6.45
4.	Multimedia display	6.50	6.25	6.75	6.50
	Average	6.31	6.24	6.53	
	Average Score				**6.36**

From the table above, it can be concluded that students show very happy attitude toward the use of interactive multimedia based on website for Mathematics subject in learning Pythagorean Theorem. The inputs given in individual trial are used for product improvement that will be applied in small group trial.

Table 8 The Result of Small Group Trial

No	Attitude Object Component	Average Total Attitude Score			Average
		Cognitive	Affective	Conative	
1.	Multimedia function	6.08	6.25	6.22	6.18
2.	Easy of use of multimedia	6.50	6.50	6.50	6.50
3.	Multimedia content	6.25	6.50	6.54	6.43
4.	Multimedia display	6.58	6.58	6.58	6.58
	Average	6.35	6.46	6.46	
	Average Score				**6.42**

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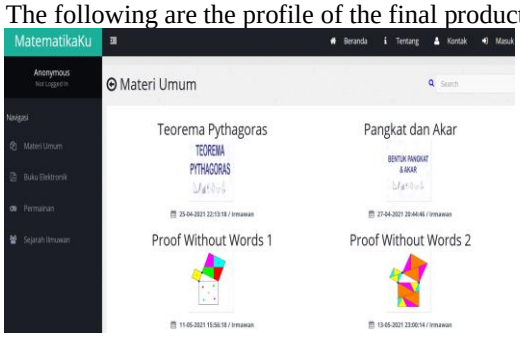
The result of small group trial shows very happy attitude toward the use of interactive multimedia based on website for Mathematics subject in learning Pythagorean Theorem. The inputs given in small group trial are used for product improvement that will be applied in field try.

Table 9 The Result of Field Try

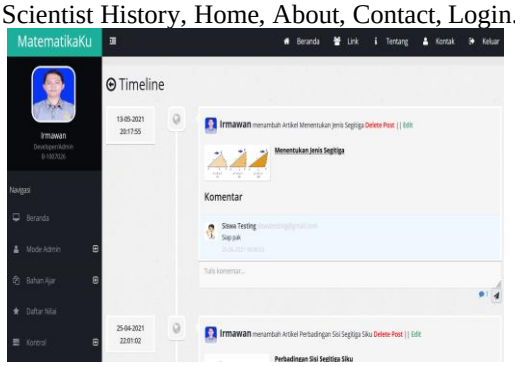
No	Attitude Object Component	Average Total Attitude Score			Average
		Cognitive	Affective	Conative	
1.	Multimedia function	5.15	5.58	5.63	5.45
2.	Easy of use of multimedia	5.83	6.04	6.18	6.02
3.	Multimedia content	5.61	6.22	6.13	5.99
4.	Multimedia display	5.80	6.05	6.19	6.01
Average		5.60	5.97	6.03	
Average Score					**5.87**

Based on the result of field try, it can be concluded that students show very happy attitude toward the use of interactive multimedia based on website for Mathematics subject in learning Pythagorean Theorem. The product improvement is done based on the inputs given in try field. It will become the final product of interactive multimedia based on website for Mathematics subject in Junior High School. The following are the profile of the final product;



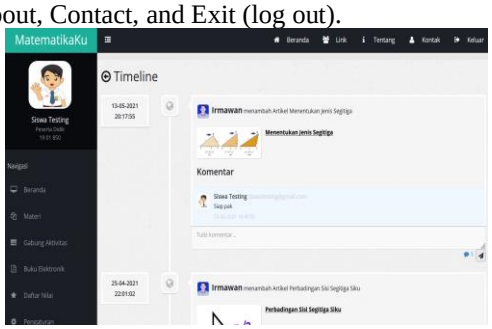
Picture 6 General display on the website before log in

This page contains; General Materials, Electronic Book, Games, Scientist History, Home, About, Contact, Login.



Picture 7 Page view for teachers after logging in.

This page contains; Home Mode Admin (Teacher, Student, Grades), Teaching Materials (Material Bank, Question Bank, Activity List, PDF List), Grade List, Controls (General, Game, History, About, Contact), Settings, Link, About, Contact, and Exit (log out).



Picture 8 Page view for students after logging in.

This page contains; Home, Content, Join, Activity, Grades, Settings, Links, About, Contacts, and Logout (log in).

Implementation Phase. At this phase, the final product that has gone through expert validation, individual trials, small group trials, and large group trials can be implemented. In implementation, preparing teachers and students is the main thing in using interactive learning multimedia based on website products. (1) *Prepare the teacher*. Teachers are trained to be able to use interactive learning multimedia based on website as teaching materials. The teacher training implementation plan are designed with four components, such as identification, tools and materials, time allocation (training schedule, duration: 3 hours), and training implementation. (2) *Prepare the student*. Students are trained to use interactive learning multimedia based on website product as well as the implementation of Pythagorean theorem learning material. The preparation of students is conducted by designing two lesson plans (RPP) which take duration of 4 x 40 minutes each meeting.

Evaluation Phase. At the evaluation phase, each phase of analysis, design, development, and implementation of the ADDIE model has been done simultaneously. The results of the evaluation carried out at each phase will improve the quality of development to the next phase. Thus, the results of the final evaluation in this study focus more on the results of effectiveness after using this product. The results of the effectiveness can be seen in detail in the results of the effectiveness test.

Multimedia Effectiveness

The results of measuring student attitudes. The differential semantic measurement scale was used to measure students' attitudes before and after learning. This attitude measurement was carried out on May, 24th -25th 2021 at SMPS Kristen Makedonia, Ngabang. This measurement was carried out on 30 students in grade 8. The results of measuring student attitudes are as follows:

Table 10 The Result of Student Attitudes

No	Attitude Object Component	Average Total Attitude Score			Average
		Cognitive	Affective	Conative	
1.	Multimedia function	5.83	6.20	6.10	6.04
2.	Easy of use of multimedia	6.18	6.22	6.31	6.24

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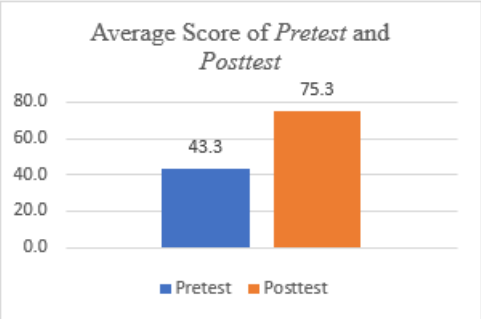
3.	Multimedia content	6.33	6.40	6.38	6.37
4.	Multimedia display	6.38	6.34	6.29	6.34
	Average	6.18	6.29	6.27	
	Average Total Score				**6.25**

The measurement result of attitudes towards the implementation of the final product shows that students are very happy to use interactive multimedia learning based on websites for learning mathematics subject in Pythagorean theorem materials.

The results of measuring student learning outcomes. The acquisition of student learning outcomes is only measured from the cognitive aspect (knowledge). Learning outcomes are divided into two stages, namely pretest and posttest. This pretest stage is carried out by giving 25 multiple choice questions to 30 students of SMPS Kristen Makedonia 8 grade through the google form feature. Students are given 90 minutes to do it. Likewise with the posttest stage which is given to the same student with 90 minutes as well. The learning outcomes for the pretest and posttest are as follows:



Picture 9 pretest and posttest result

T-test analysis is conducted to find out the difference of students' learning outcomes after the pretest and posttest. The t-test calculations are as follows:

t-Test: Paired Two Sample for Means

	Variable 1	***Variable 2***
Mean	43.33333	75.33333
Variance	554.023	224.092
Observations	30	30
Pearson Correlation	0.347876	
Hypothesized Mean Difference	0	
df	29	
t Stat	**-7.59208**	

With *df* 29 (degrees of freedom = N – 1 or 30 – 1 = 29) and the error rate used is 5% (0.05) or 95% confidence level (0.95), it is obtained t_{table} = 2.045. It is known that t_o=-7.60 or 7.60 and t_{table}=2.045, then $t_o > t_{table}$. With the provision that if $t_o \geq t_{table}$ then H_0 is rejected, it means that there is a significant difference in student learning outcomes before and after the use of website-based interactive multimedia learning.

Discussion

The findings of the literature review show that Mathematics is one of the subjects that students do not like. Therefore, the students tend to have low learning outcomes. In other words, groups of students who have positive attitudes towards mathematics have higher mathematics learning outcomes than groups of students who have negative attitudes towards mathematics (Hartanti, 2015; Susilo & Agustin, 2015). Students find mathematics very difficult and a frightening specter (Siregar, 2017; Fahrudin, Zuliana, & Bintoro, 2018). Students are lazy, avoid, and do not want to learn mathematics because mathematics is considered difficult and unpleasant. The situation described above shows that the attitude of students does not like mathematics.

In a relevant research study, it was found the results of research on the development of website-based learning media by Rhomdani (2017), this study found that website-based learning media are very practical and interactive to be used as learning media. Moreover, the results of research from Persada (2017), this study found that website-based learning can improve student learning outcomes. It is also reinforced by the findings of Oktaria, Zulkardi, & Somakim (2013) that the use of websites can increase students' interest in learning mathematics. Futhermore, the findings from Setyadi & Qohar (2017) which show that website-based learning media receive a positive response from every aspect that is assessed so that students are motivated in learning. Therefore, the use of website-based learning media is more likely to increase interest in learning, mathematical abilities, and student learning outcomes. The researcher also found that research that had been done previously using the website only had a general appearance such as learning materials and information presented on the website. To produce products that have renewable elements, this research provides several features that did not exist before, namely having a material bank, question bank, list of values, and guided activities that can be designed by teachers. The next feature is an interactive website that offers interactive feedback given by students and teachers in the comments column for each material that is launched.

To design the initial product concept, the researcher uses a landscape storyboard because it makes it easier to see the interactive multimedia product format clearly. A good storyboard is a form of images that are prepared with an explanation that is not long-winded (Rusman, 2018). The storyboard is made complete from the general display to the special display of the developed product. After designing the storyboard, the initial product development was carried out by realizing website-based interactive multimedia learning products. The product is designed with the CI4 framework and computer programming language. Then buy hosting and

a domain named https://matematikaku.com/ web address. After the product has been designed, the teaching materials for the Pythagorean theorem are published on the website. After the initial product development is carried out, the next phase of development is product validation by experts. The purpose of this product validation is to determine the feasibility of the initial product in the material, media, and design aspects before being tested in the field.

The implementation of interactive multimedia learning based on website was conducted on May, 24th – 25th 2021 for two meetings. At the first meeting, students were given a cognitive attitude questionnaire link on google form after product explanation to the students in order to observe students' attitudes before using interactive multimedia learning based on website. After that, students were given a pretest which was done on a google form to measure students' prior ability before using interactive multimedia learning based on website. Then, the interactive multimedia learning was implemented in two meeting of learning activity based on different lesson plan that had been prepared. At the end of the activity, the researcher gave a posttest which was done on google form to determine students' abilities after using interactive multimedia learning based on website. Then, students were asked to fill in the affective-conative attitude questionnaire link on the google form that had been prepared to determine student attitudes after using the product.

The use of interactive multimedia learning based on the website is intended to help overcome the displeasure and difficulties in learning mathematics in the Pythagorean theorem material. Based on the observations of researchers during the learning process that has been carried out, students are very enthusiastic about the new things they are doing. Students are actively and continuously open every menu and web page. Students also seem happy to participate in learning activities by entering tokens first. In general, students gave a positive response in learning mathematics with the Pythagorean theorem material. Changes in student attitudes can be seen from the acquisition of the total score of students' attitudes is 320.5 from a total score of 357 with 51 items. This means that the total score of 320.5 has an average score of 6.3. It can be concluded that students' attitudes are very happy with the use of interactive multimedia learning based on website for junior high school mathematics subjects. The change in learning attitude shown by the students is related to the use of interactive multimedia learning based on website which provides a learning experience for students. Students feel happy and motivated in learning because of they use of learning multimedia (Khalid, Alias, Razally, Yamin, & Herawan, 2010).

The acquisition of learning outcomes can be seen at the cognitive aspects of the learning process. The success in improving student learning outcomes is indicated by an increase in students' understanding of the learning process using interactive multimedia learning based on website which shown by the result comparison pretest and posttest. Based on the results obtained, it is known that the average pretest score is 43.3, the posttest is 75.3 and the standard of minimum completeness (KKM) for mathematics is 62, which is determined by the school. Thus, the pretest score data shows that there are 24 students who are below the standard of minimum completeness and the score of 6 students meet or above the standard of minimum completeness. Meanwhile, the posttest shows that the scores of 4 students are below the standard while the score of 26 students meet or above the standard of minimum completeness. Existing data shows that the students' ability to master the Pythagorean theorem material has been good, and the learning objectives have been achieved.

From the calculation results of the two tests, it can be seen that there is an increase in the average score of 32 points. In addition, through the t-test of the two-sample paired averages (t-Test: Paired Two Sample for Mean) by manual calculation and using Microsoft Excel, it was obtained -7.60 or 7.60. It means that there is a *significant difference* in student learning outcomes before and after the use of interactive multimedia learning based on website for junior high school mathematics subjects.

The results of measuring the attitudes of students who are very happy with the use of interactive multimedia learning based on website and there is a very significant difference between students' pretest and posttest results, then the interactive multimedia learning based on website for junior high school for mathematics subjects is categorized as very effective. This can also be seen from the results of Caesariani's research (2018), showing that the benefits of interactive multimedia include: students can learn independently and have fun, students' attitudes are enthusiastic and enthusiastic, and improve student learning outcomes. It was also confirmed from the results of research by Parata & Zawawi (2018), that interactive multimedia can increase students' motivation and cognitive learning outcomes. That is, interactive multimedia learning is an effective tool to improve student learning outcomes or achievement (Rajendra & Sudana, 2018; Batubara, 2015; Ayda & Widjajanti, 2014). Therefore, it can be concluded that the use of website-based interactive multimedia learning for junior high school mathematics subjects is categorized as very effective.

IV. CONCLUSION

The results of the research that has been done can be concluded as follows:

The effectiveness of the use of the final product was conducted to know about the students' happy attitude and the significant difference before and after the use of interactive multimedia learning based on the website. The scale for measuring student attitudes uses a semantic differential technique (semantic differential technique). The average score for students' attitudes is 6.25 from a range of 1-7, so that students' attitudes are categorized as very happy toward the use of interactive multimedia learning based on the website. The acquisition of pretest and posttest scores from the use of students' multimedia was measured through the t-test obtained t_o≥t_table, which is 7,600≥2,045. The

results of the t-test shown that there are significant differences in student scores before and after the use of interactive multimedia learning based on the website. Interactive learning multimedia can improve students' cognitive abilities in learning mathematics. The results of the effectiveness test of the use of interactive multimedia learning based on the website carried out through testing the attitudes and values of student learning outcomes can be categorized as very effective.

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