

CHAPTER I

PRELIMINARY

1.1 Background of the Problem

The development of technology in the twenty-first century is now growing very rapidly, not only developing as a medium for social interaction or often called social media, but also developing in the field of education. Almost all components in education involve technology. The teaching and learning process can not be separated from technology. Information technology today, must be integrated in all subjects, not least in mathematics subjects. With the advancement of technology, the development of education in schools is increasingly experiencing change and encouraging various changes. Education in schools has shown rapid development in the areas of curriculum, methodology, equipment, and assessment. Likewise, there have been changes in the field of education administration, organization, personnel (HR), and educational supervision. Therefore, overall it can be said that the changes that occur are a renewal in the education system that concerns all aspects or components that exist (Sanaky, 2013:1)

Talking about the quality of education, can not be separated from the learning process in the classroom. Learning and learning activities in the classroom are actions and abilities that involve each teacher and student together to achieve a goal that improves the quality of education rationally. So it is expected that with the change in the progress of the times in the field of science and technology, it will also support progress and changes to positive aspects in education. With the advancement of science and technology will be able to influence the mindset of educators in facilitating the learning needs of their students, one of which is in the use of learning media. With the existence of interesting learning media such as impressions or displays generated from learning media delivered by teachers using the curriculum. Curriculum is a plan that is prepared to launch the teaching and learning process under the guidance and responsibility of the school or educational institution and its teaching staff, as well as events that occur under the supervision of the school, so in addition to formal culinary activities as well as informal activities. This curriculum is intended to be able to direct education towards the

intended direction and objectives in thorough learning activities. Some of the components in question include: (1) objectives, (2) teaching materials, (3) learning and learning activities, (4) methods, (5) learning tools / media, (6) learning sources, and (7) evaluations (Ekayani,2017).

According to Permendikbud No. 54 of 2013 on Graduate Competency Standards that expected graduate ability qualifications include attitudes, knowledge, and skills. One of the knowledge that must be achieved by students is the mastery of technology, various efforts are made to obtain adequate output in accordance with the expected standards of graduate competence including by planning mathematics learning using effective, interesting and also efficient media, the selection of this media is directed in accordance with the competencies that will be achieved by learners. One of the current media that develops and is widely studied and studied by educators is computer technology with its various programs, programs in the computer can be utilized in learning.

In Indonesia, efforts to develop formal education are also carried out at various levels, ranging from primary, secondary, to national education, as contained in the National Education System Law No. 20 of 2003 Article 3 (Wikipedia.org) which reads: "The purpose of national education is to develop the potential of learners to become human beings who believe and fear God Almighty, be noble, healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible country".

But in reality the quality of education in Indonesia is still relatively low, especially in the field of mathematics. This can be seen from the results of The Third International Mathematics and Science Study (TIMSS) 2015, Where Indonesia is in the position of 45 out of 50 countries with a score of 397 and the score is still below the average international score of 500 (Puspendik.2016). This should be a very important concern for the government to improve the quality of education, both in terms of curriculum, quality of educators, facilities and infrastructure and other matters related to education.

In Indonesia, the government has enacted the 2013 curriculum to be applied at every level of education, but not a few schools that still do not apply it. Many schools have implemented curriculum 2013, but it has not been implemented

effectively. Many issues arise from both the community and schools, especially for teachers. Until now there are still teachers who have a negative perception of the 2013 curriculum so they tend to be reluctant to apply it. Many teachers have not been informed due to the lack of comprehensive socialization regarding the application of this curriculum. Teacher training in implementing learning in accordance with the 2013 curriculum is still uneven, both in the manufacture of RPP and in the maximum use of learning media and props (Siregar, 2017).

Mathematics plays a very important role in everyday life. With mathematics we can solve various problems in life, both simple and complex. In solving math problems, students are not required to be able to calculate and find the right answer quickly, but students need to reason, predict the right problem-solving steps, find a simple formula, and prove it. But most students still find it difficult to understand problems in mathematics, especially problems that are not routine with a little complicated computing (Puspendik.2006).

There are two important reasons why the learning media can enhance the teaching and learning process expressed by Sanaky (2013). The first reason, with regard to the benefits of media in the learning process, among others: (1) learning will attract more students so as to foster learning motivation; (2) The method of learning will be more varied, not solely verbal communication through the teacher's speech of words by the teacher, so that learners do not get bored and the teacher does not run out of energy, if the teacher must teach for every hour of the lesson; (3) The learning material will be clearer in meaning so that it can be better understood by learners and allow learners to master learning goals better; (4) Learners do more learning activities, because not only listen to the teacher's description, but also other activities such as observing, doing, demonstrating, and others.

The second reason, pleasing to the level of thinking of the learner. Human thinking levels follow the stage of development, starting from concrete thinking to abstract, starting from concrete thinking to abstract, starting from simple thinking to complex thinking. So the medium of use of learning media is very closely related to the stage of thinking. By using the medium of learning well, abstract things can be condensed and complex things can be simplified (Sanaky, 2013).

The development of mathematical media in schools is key in the learning process in school. The determination of the development model also greatly affects the activeness of learners in receiving learning materials, the selection of appropriate and innovative development models becomes an obligation for teachers. Teachers must know the characteristics of each class. In addition to the development model, the selection of media in learning also needs to be considered by teachers. Addie-based development model includes the combination of image shapes, graphs, mathematical models, written words, and conclusions that are all generated by combining ideas in solving in one problem. Development Stages by presenting interactive learning media in various forms as in the previous statement can improve the mathematical representation ability of students who are professionally trained in each stage of the Addie-based development model (Sudjana, 2000).

In addition, learning media has a role to influence the learning process in the classroom, both in teachers and learners. Based on the results showed that a person's knowledge is obtained from hearing experience 11%, from vision experience 83%. While memory is in the form of darkening obtained from what is heard 20%, from the experience of what is seen 50%. When viewed from the ability to see higher, the position of interactive learning media is very strategic, because the ability of learning media can: (a) stimulate the learning process, (b) present the original object directly, (c) make things abstract to the concrete, (d) give equal perception, (e) overcome the barriers of time, place, number and distance, (f) represent information consistently, and (g) provide a relaxed learning atmosphere (Sanaky, 2013).

However, despite the importance of tools / media for achieving educational goals, Surayya (2012) He said there are still many educational institutions that are less concerned with a tool/media. Evidently there are many cases of teachers who do not use the media in accordance with the material taught so that students have a lot of difficulty in absorbing and understanding the lessons delivered, teachers have difficulty delivering lesson materials, many students feel bored with certain lessons. This can be identified as a problem of lack of media use in teaching.

This is in line with the state that there are still many teachers who only use a few media even some are completely unable to develop it, resulting in saturation and boredom that infect students in the classroom. Teachers should have media in teaching and managing classes so that learning can be more interesting and even missed, as a result of this condition most students experience boredom and less shrewd material presented, because teachers are more dominant using the lecture method. (Abudullah 2016)

In today's technological era, learning media has many very important roles in supporting the success of learning activities for students. The role of the right learning media can affect learning outcomes because learning media serves to help learners in extracting information, understanding comprehensive learning materials in order, and creating teaching and learning activities comprehensively can shape thinking.

One step to improve students' mathematical abilities is to provide interactive learning with the right Addie development methods. Interactive learning in schools is expected to form systematic attitudes and habits for students so that they are able to understand the picture and concepts about the relationship between the wakes. Therefore, it is very important for teachers to always develop interactive learning methods and media, one of which is to give students the opportunity to be able to learn, one of which is to give students the opportunity to be actively involved in observing, exploring, trying and finding the principles of building flat-sided spaces through creative and communicative learning activities and being able to apply what they learn in their studies. Context of everyday life. In line with this, limas material in mathematics also requires presentation that can attract students' attention and make it easier for students to develop their abilities.

In its development, mathematics is inseparable from the development of science and technology development (IPTEK). By utilizing technology we are also facilitated in solving mathematical problems. Often students find it difficult to understand mathematical materials that are fairly abstract, especially building flat-sided spaces. The materials used by the authors in the study are triangular pyramid, Quadrilateral Pyramid, and Pyramid of the Pentagon.

For this reason, a learning medium is needed as a demonstration tool and visualization of mathematics that can help students in constructing their knowledge and understanding so that students can solve math problems well, one of which is by utilizing GeoGebra software. The use of GeoGebra software can display the Triangle Pyramid, Quadrilateral Pyramid, and Pyramid of the Pentagon from abstract to concrete, complex to simple so that it is easy to understand and learning becomes more quality. (Saputro, dkk., 2015)

The optimal use of learning media can make it easier for students to digest the subject matter. However, not all learning media can be used as the right solution in effective learning process in a quality manner. Therefore, a teacher is required to be more creative and innovative in developing learning media, as well as more selective in the selection of every problem that is easy to understand and choose learning media.

The curriculum that is widely used today is curriculum 2013 (K13). K13 learning system is the student as a center in the learning process, while the teacher only as a facilitator. There are four aspects of assessment in the 2013 Curriculum, namely years, skills, attitudes and behavior. Downsizing of learning materials is done on several subjects such as Indonesian, PPkn, etc. While mathematics is done additions. In accordance with the Regulation of the Minister of Education and Culture number 60 of 2014. The 2013 curriculum was temporarily suspended because it was deemed unprepared and temporarily, was reinstated using the Education Unit Level Curriculum (KTSP). Then in the 2017/2018 school year, it will be re-applied nationally with some revisions that have been made by the Ministry of Education.

The problem that is often found in teaching, especially teaching mathematics is how to present the material to students properly so that effective and efficient results or maximum results, in addition to other problems that are often found is the lack of attention of mathematics teachers to various variations in the use of teaching methods in an effort to improve the quality of teaching properly and regularly.

As for the phenomenon that exists today can be a major factor, in educational institutions in Indonesia very few who use the right media in the

teaching and learning process, most educators, especially math subjects only use whiteboards as tools and media to teach, even though we know all mathematical materials cannot be explained as a whole only through words or through writing only (verbalisme).

Based on the results of observations and interviews of researchers when conducting observations at Labuhan Deli Junior High School in March 2020, the medium used in delivering the material is a book. The book is in the form of package books and Learning Media through Geogebra. In addition, math teachers do not use technology-based learning media in the teaching and learning process. Learning media is one of the most important sources of learning. Mathematics is abstract, so that every student needs to be realized with learning media so that it is easy to understand in the teaching and learning process.

As for the reality in the field, especially in the research place, namely in SMP Negeri 1 Medan, the math learning process still uses a conventional approach (lecture), grouping of each student during group work and lack of use of learning media by all teachers. Teachers are active in explaining the subject matter while students are only as listeners. Students are less included in the management of information, so students are not active in participating in learning activities that take place regularly and for that teachers can motivate students' learning to be low, characterized by the number of students who play alone and joke when learning activities take place regularly. In the learning process the teacher is very limited only to emphasize the cultivation of concepts in the student, regardless of whether the concepts taught have been understood by the student itself in a continuous manner.

Education is a conscious and planned effort to realize the learning atmosphere and learning process so that learners actively develop their potential to experience religious spiritual strength, self-control, personality, intelligence, noble morals, as well as the skills necessary for themselves, society, nation and state. The purpose of national education is to develop the potential of learners to become human beings who believe and fear God Almighty, be noble, healthy, knowledgeable, capable, creative, independent, and become democratic and responsible citizens.

Based on the results of observations teachers are still dominant in the classroom means that students are still less involved in the learning process. Based on interviews with several math teachers of State Junior High School 1 Medan, teachers are still dominant in the classroom. Teachers more often use lecture methods that make students more enthusiastic, giving examples and practice questions that are not much different from the examples given by teachers. Students' attitude towards mathematics tends to be passive, the lack of students involved in math learning is to feel anxious in taking math lessons, and does not have confidence such as not daring to ask if experiencing difficulties, do not dare to express opinions, do not dare to do problems in front of the class, do not dare to answer questions, and the student's math learning results are still optimal and stable. Some students in grade VIII, some students always feel afraid if they will start learning mathematics.

To overcome these weaknesses the use of information technology (IT) in learning is considered one of the appropriate solutions. The utilization of IT in learning brings a change in the tradition or culture of learning in a row. IT learning in learning can be an independent learning system (instructor independent) or can also be combined with a direct learning process (face-to-face in the classroom) that relies on attendance. One way of using technology in learning is the use of technological resources as a medium in successive learning processes (Sugiyono, 2013).

The world of adult education is entering the era of the media world, where learning activities are needed to demand the reduction of lecture methods and replaced with the use of many media. Given the weaknesses in learning that use teachers as the main source of learning, there needs to be regular effort to correct these weaknesses (Emzir, 2015).

As a teacher, teachers should have the ability to design and develop learning media. In developing a computer-assisted mathematical learning medium required a software or software. The selection of software depends on the material to be taught to students. Some of the mathematical software that is ready for use in math learning include: Geogebra, Sketchpad, Maple, Graphmatica, FX Draw Cabri II, Cabri 3D, Matlab, Minitab and so on. These software has special skills in

mathematical learning, for example to align geometry and algebra can be used Geogebra, Sketchpad, Grapmatica, Fx Draw, and Cabri, to align statistics can be used to develop interactive media / multimedia such as adobe flash, blender, swish max, construct (to develop game-based media), stencil (to develop game-based media), and so on.

The reason for geogebra selection is because this software was developed for the process of learning to teach mathematics in school by Markus Honwarter at florida Atlantic University. On the one hand, the Geogebra is a dynamic geometric system. In addition, geogebra is a software that is very helpful for students or teachers in doing tasks or learning mathematics related to geometry, algebra, tables, graphs, statistics and calculus can be more using this software. Many teachers already use this software and recommendations for the use of this software. The reason for choosing Geogebra Software is because this software is able to produce presentations, interactive CDs, and learning CDs in the form of video, text, images, design, audio, interactive evaluation and animation.

To support the Curriculum 2013, the quality of learning is strongly influenced by the learning media used. The more quality the learning media used, the more quality the learning process. (Siswanto, 2012). One of the learning media for students is to bring a fun and interactive atmosphere for students is computer-based media by using flash software with Geogebra.

Geogebra is a software with basic ideas combining geometry, algebra, and calculus that can be used to learn and teach at elementary, junior high, high, and university levels (Hohenwarter, 2008). Geogebra is a software that is almost competitive in all operating systems as long as we have installed Java. Geogebra can be installed freely by visiting the website. For teachers, Geogebra offers an effective opportunity to create an interactive online learning environment that allows students to explore a variety of mathematical concepts (Hohenwarter, 2008).

The advantages of Geogebra is that it has many features so that it is able to make mathematical learning design by using Geogebra Classic software is an important thing to do. However, based on the above description of the teacher's ability to use software, especially Geogebra, is still lacking, so that media can be stored in laptops and mobile phones to make it more practical. The advantages of

Geogebra Classic software compared to other Geogebra is because it is equipped with some features that geogebra versions did not have before it, such as the command symbol when making latex formula is a space that serves to create sentences manually by writing symbols $\backslash;$, Latex Formula is a very different tool bar to the Geogebra Classic 6.

Research and development of learning media is widely done along with the development of technology. One of them is research conducted by Sudjana (2011:99) with the title “Geogebra-Based Interactive Learning Media Development on Flat Side Room Building Materials for Grade VIII Students”. This research resulted in a learning medium based on Geogebra Classic 6 Software on Geometry Materials with valid, effective, and practical criteria.

Geogebra Classic 6 software-based learning media that has been widely developed, especially mathematical learning media in flat side room building materials. The development of media like this can already be accessed on the internet for example through youtube. However, existing media use classic 5 with Latex Formula that manually to create sentences and the rest of the tool bar is no different from classic 6 in the creation of mathematical learning media.

Learning that utilizes Geogebra allows student interaction with students and student interaction with teachers that is done through Geogebra-based learning design that can take the form of writing, sound, color, images, motion, simulation, and so on. This principle used, in line with the principle of learning *operant conditioning*, learns through a series of response stimuli and meaningful learning. (Constructivism).

Paying attention to the various reasons that have been expressed at the beginning, the researcher took the initiative to create an interactive learning media using action script not latex formula, namely learning media based on Geogebra Classic 6 Software for mathematics subjects, especially in the material Build Flat Side Room (Limas). The benefits of Geogebra Classic 6 Software in learning is that learning using geogebra classic 6 software-based learning media will be more interesting and simple for students in following learning.

Based on the background above, the author is encouraged to conduct research that focuses on the development of interactive learning media on solid

geometry (Limas) for class VIII odd semesters with addie (Analysis, Design, Development, Implementation, Evaluation) approach. Therefore, the author conducted a study with the title "Development of Geogebra Classic 6 Based Interactive Learning Media on Solid Geometry".

1.2. Identification of Problems

Based on the description in the background of the above problem, the problems that arise can be identified as follows:

1. There has been no development of interactive learning media based on Geogebra Software material to build flat side space in smp.
2. Teachers are in dire need of learning media used to teach flat-sided room building materials.
3. Low teaching and learning outcomes of teachers towards students in math subjects.
4. The school has not been able to provide learning media materials to build a flat-sided room that is able to display the material with interesting visualizations, which are simple, and complete.
5. Math learning in the classroom is still teacher-centered and students tend to take note of the teacher's explanation and hear the teacher's lecture.

1.3. Scope of Problem

In order for research to be focused, the problems in this research are limited to the development of interactive learning media based on Geogebra Classic 6 Software on flat-sided space building materials (pyramid). The scope of material is very broad that can be included in the learning media, namely to determine the concept of surface area and volume of limas. The ultimate goal of learning is that students can solve problems related to surface area concepts and volumes of limas. Testing of products made only includes: validity, practicality, and effectiveness.

1.4. Formulation of the Problem

Based on background, problem identification and problem limitations above, can be formulated problems as follows:

1. How the validity of geogebra Classic 6-based interactive learning media on solid geometry ?
2. How the practicality of geogebra Classic 6-based interactive learning media on solid geometry ?
3. How effective is geogebra Classic 6-based interactive learning media on solid geometry ?

1.5 Research Purposes

Based on the formulation of the above problem, the goals to be achieved in this study are :

1. To produce interactive learning media development products based on Geogebra Classic 6 on solid geometry with criteria.
 2. Generate impact interactive learning media accompaniment based geogebra Classic 6 with addie model to be able to improve critical thinking skills of junior high school students
 3. Produce an interactive learning model based on Geogebra Classic 6 with an effective ADDIE model to be able to improve the critical thinking skills of junior high school students
 4. Analyze the improvement of junior high school students' critical thinking skills taught with geogebra classic 6-based interactive learning media developed using existing applications
 5. Generate geogebra Classic 6-based interactive learning media syntax with Addie model on solid geometry
- to produce geogebra-based interactive learning media development products on flat-sided space building materials with valid, practical and effective criteria.

1.6. Product Specifications Developed

The product produced in this development is a Geogebra-based interactive learning medium on Solid Geometry of class VIII students, with the following specifications:

1. The learning media is equipped with exercise questions so that students can evaluate the material they learn.
2. This learning medium is in the form of software so that students can use it as a source of self-study.
3. Learning media in the form of files that can be opened at any time and easily stored, can be on DVD, Flash drive, and other storage media .

1.7. Benefits of Research

This research is expected to provide benefits, among others.

1. Theoretically

- a. Being the enrichment of material learning media builds data-sided spaces that are easy for researchers to do in the teaching and learning process .
- b. Provide accurate definitive references to solid geometry.
- c. Theoretically the results of this research are expected to be given a contribution of science in the field of Education to pay more attention to the implementation of meaningful learning for students so that students' learning outcomes can be further improved.
- d. The development of this learning media can have a good impact in the development, improvement and improvement of other Geogebra-based interactive learning media, so that the use of geogebra-based interactive learning media can help improve the quality of learning.

2. Practically

- a. For Educational Institutions (Medan State University)
The results of this study can be used as a good reference material and study for UNIMED students and can be used as a reference for further research.
- b. For the school
 - 1) Provide a complete, accurate and interesting variety of learning media
 - 2) Assist the teacher in delivering the material and can make an alternative learning media with geogebra software software to the mathematical reasoning skills of junior high school students.

- 3) The results of this research are expected to be used by teachers as reference materials for interactive learning media to build solid geometry to add insight and experience regarding the development of Geogebra-based ADDIE development models.
- c. For learners
- 1) Improve Understanding of solid geometry by using fun learning media.
 - 2) Improve mathematical problem solving skills through geogebra software-assisted scientific learning approach.
 - 3) Add Media for learning in addition to package books.
- d. For researchers
- 1) This research provides knowledge related to the development of Geogebra-based interactive learning media in applying mathematical learning approaches and as a provision of researchers as prospective teachers in real formal instusition.
 - 2) As for how to review and create effective and innovative learning media in accordance with technological developments.

1.8. Assumptions and Limitations of Development

1. Development Assumptions

The development of geogebra-based interactive learning media has several assumptions:

- a. The teaching and learning process will be easier because the learning media will clarify the learning message
- b. Provide motivation to students through this geogebra-based interactive learning medium .
- c. This learning medium is a new innovation that can help teachers to provide more interesting materials .

2. Limitations of Development

The development of this learning media is limited to one material, namely Build a Flat Side Room (Limas and Beam). In addition, the trial was only applied to one researcher precisely in class VIII UPT SMP Negeri 1 Medan.

1.9. Operational Definition

Operational definitions are given to avoid differences in interpretation. The definition of operational means as follows :

1. The development of interactive learning media is a series of processes or activities carried out to produce a product in the form of interactive learning media based on existing development theories. The medium in question is an interactive learning medium so that the development theory used is the theory of learning development.
2. Interactive learning media is all teaching tools used to help convey the subject matter in the teaching and learning process so as to facilitate the achievement of learning goals that have been formulated.
3. Development research is a systematic study to design, develop, and evaluate programs, processes, and learning outcomes that must meet the criteria of consistency and effectiveness internally.
4. Geogebra software is a computer program to learn mathematics, especially Geometry and Build flat side space. In addition, the application of geometric systems and build flat-sided spaces dynamically so that they can construct points, vectors, lines, lines, cone slices, even functions change them dynamically.
5. Interactive or interaction is related to two-way communication involving all components to be active and cooperate with each other. In addition, it becomes an alternative to convey the message or content of learning to learners so that there is stimulation of thoughts, feelings, attention, interests, talents and abilities, so as to create a conducive learning environment.
6. Valid, the learning media is said to be valid if the criteria used to state that the learning medium has an adequate degree of validity i.e. the

average value of validity for the overall minimum aspect is in the category is quite valid and the validity value for each aspect is at least in the valid category.

7. Effective, learning media is effective if it meets 3 of 4 indicators, but indicator 1 must be met. The indicators: (1) the ability of learning outcomes, (2) student activities, (3) student responses, and (4) the teacher's ability to manage learning.
8. Practical, the learning medium is said to be practical if the validators state that each of these teaching materials can be used on the ground with minor revisions or without revisions, which have been tested on each validation sheet for learning materials and media.

