

## CHAPTER I

### PRELIMINARY

#### 1.1. Background

Mathematics is an important science that must be mastered to improve the intellectual abilities and skills of students. For this reason, mathematics is a subject that must be studied by students in schools ranging from elementary school to college-level (Revita, 2019). In its development, many mathematical concepts are needed to help solve problems in everyday life, as well as to help humans understand and master social, economic, and natural problems. In learning mathematics, a person is trained to think creatively, critically, and honestly and can apply mathematics in solving a problem in everyday life and in other disciplines (Anggoro, 2015). According to Bernard (2015), one of the goals of learning mathematics is to train ways of thinking and reasoning in drawing conclusions and being able to express opinions with confidence and honesty that arises from someone to solve the problems at hand.

Based on Permendikbud No. 58 of 2016 concerning the guidelines for mathematics subjects, it is stated that mathematics learning is carried out to achieve a more ideal goal, namely the mastery of mathematical skills which are indispensable for understanding the world around them. Mathematics can help organize reasoning, instill values, shape personality, solve problems, and perform certain tasks (Nursisi et al., 2021). Therefore, mathematics is a compulsory subject that is studied at all levels, from elementary school to high school to equip students with the ability to think analytically, logically, critically, creatively, and systematically (Sari & Bernard, 2020).

One of the materials that must be taught to students in learning mathematics at school is statistics. This is supported by the statement from Franklin (Hafiyusholeh, 2015), that, for the last twenty-five years, statistics has become a key component of the mathematics curriculum (Sari & Bernard, 2020). According to Mahmudah (2016), statistics is a science related to collecting, organizing, and processing data (Amalia, 2020). This is in line with the results of Iddo Gal's research (Gal, 2002) that statistical literacy is the main ability required of citizens in community situations that require information, and as an expected result after graduating from school as well as an important component of numeracy and literacy needed by students (Sari & Bernard, 2020).

According to Law no. 20 of 2003, Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious, spiritual strength, self-control, personality, intelligence, noble character, and skills needed by themselves, society, nation. And country. Meanwhile, the Functions and Objectives of National Education are contained in Article 3 of Law no. 20 of 2003 which reads, National education functions to develop capabilities and shape the character and civilization of a dignified nation in the context of educating the nation's life, aiming at developing the potential of students to become human beings who believe and fear God Almighty, have a noble character, are healthy, knowledgeable, capable, creative, independent, and become a democratic and responsible citizen. Education has an important role and strategy for national development. Therefore, the government takes various ways to support education in Indonesia. One of the government's efforts to improve the quality of education is by updating the education curriculum. Renewal of the educational curriculum with the aim of meeting the demands of the times so that the quality of education is better than before. The quality of education depends on the effective learning

process that occurs between educators and students. Students experience a meaningful learning process and are supported by good learning facilities (Nursisi et al., 2021).

According to Suciana et al., (2018:60), one of the important facilities in improving the quality of education is the use of teaching materials. The use of teaching materials can help some of the roles of educators so that educator-centered learning can be reduced (Nursisi et al., 2021). According to Suciana et al., (2018:60), one of the important facilities in improving the quality of education is the use of teaching materials. The use of teaching materials can help some of the roles of educators so that educator-centered learning can be reduced (Nursisi et al., 2021).

Based on the results of interviews with students conducted at the Al-Ulum Terpadu Islamic Junior High School Medan, students want interesting teaching materials that contain lots of pictures and supporting videos because students only learn to use printed books which have very standard language and lack of animation and supporting images so that they are less understood by students. This is also supported by Nursisi, et al (2021) that according to students the textbooks or printed books used have an unattractive appearance and the presentation of material is uninteresting so that students become less motivated in reading textbooks. Therefore, alternative use of other teaching materials is needed that can support the learning process (Nursisi et al., 2021).

Modules are teaching materials that are organized in a systematic and appealing way and contain material content, methods, and evaluations that can be used independently (Tjiptiany et al., 2016). According to the Ministry of National Education (2008:3), the module is a learning tool or facility that contains materials, methods, limitations, and evaluation methods that are designed

systematically and attractively to achieve the expected competencies according to the level of complexity. The module has the advantage of making students have an independent learning experience. Modules can be used during learning at school or at home (Nursisi et al., 2021). According to Ikhtiar (2018), module writing aims to: (1) clarify and facilitate the presentation of messages so that they are not too verbal, (2) overcome the limitations of time, space, and senses, both students and teachers/instructors, and (3) use appropriate and varied, such as increasing students' motivation and passion for learning, developing the ability to interact directly with the environment and other learning resources, enabling students to learn independently according to their abilities and interests and enabling students to measure or evaluate their own learning outcomes (Puspitasari, 2019).

Unlike traditional face-to-face lecture learning, module learning will be more effective, efficient, and relevant. Students must learn independently and solve problems by issuing new ideas in the learning process using modules because the teacher's role is only to distribute modules and direct them to students (Anggoro, 2015). The use of print media has advantages such as being able to be used by students who are in any area because of the shape of a book, then students can easily work directly on the sheet provided, and can make notes on the module page. Besides the advantages, the print module has disadvantages, including not being able to display videos, animations, and music, not being interactive which makes students feel bored quickly, and requiring large printing costs if there are many pictures (Puspitasari, 2019). The disadvantage of printed books is that they cannot be used electronically and require wood-based paper, which harms the environment, especially thick books (Anwas, 2015). Modules must be combined with electronic media, often referred to as electronic modules (e-modules), to reduce the saturation of students learning with modules (Munthe et al., 2020).

In class VII SMP students are taught data presentation techniques such as tables, line charts, bar charts, and pie charts. In line with research conducted by (Maryati & Nanang, 2017) that students experience several difficulties, including: difficulty analyzing and classifying types of data and displaying them in diagrams or tables. The presentation of data is related to real life so that teaching materials related to everyday life are needed. Therefore, students and teachers need media that can support mathematics learning on the topic of presenting data for grade 7 junior high school. So that students can understand and enjoy learning mathematics.

Based on the observations of researchers in class, when learning mathematics is taking place, students tend to be passive and unfocused. There are also students who joke and annoy their friends while studying. To overcome this problem, it is the responsibility of the mathematics teacher to find solutions so that students can concentrate more on learning. The solution obtained is the implementation of a learning step that allows students to be active and understand what they are learning (Dwikoraningrum, 2022). This is supported by (Kristin, 2016) that the increase in good learning outcomes is not only supported by the willingness of students to want to learn well, but the learning methods used by teachers also affect student learning outcomes. Facts in the field there are still some teachers who use learning models that are less attractive to students, thus making students less serious in participating in learning in class. The teacher still dominates the learning process so students are only passive (Kristin, 2016).

The development of science is currently growing rapidly so as to facilitate the learning process. Therefore, there are many facilities to create and create interesting teaching materials and support the learning process. Based on the preliminary study, teaching materials are already available in schools in the form

of printed books from the government, printed books from other publishers, worksheets and modules. However, teaching materials that utilize technology do not yet exist, such as e-modules. In addition, students experience many difficulties in presenting data material. Therefore, alternative teaching materials are needed to be used in mathematics learning, namely e-mathematical modules for data presentation material in the hope that e-modules will become innovative teaching materials that can make students more motivated, not bored while learning (Ramadanti et al., 2021).

The teaching material to be developed is a Digital Mathematics Module on the topic of presenting data. According to Wijayanto and Zuhri (2014), E-module is an electronic learning media that can be run or opened via a computer with a variety of required software blends, containing various materials that are arranged regularly and attractively according to competence and desire. E-module is a display of information in book format that is presented electronically and read by using a computer or other electronic device. According to Najuah et al (2020), the preparation of an e-module requires a special program, but the results obtained are quite innovative because it can display teaching materials that are complete, interesting, interactive and carry good cognitive functions. The components contained in the e-module are cover, introduction or general explanation of the e-module, instructions for using the e-module, learning competencies, concept maps, activity sheets, evaluation sheets, quiz sheets, and others (Ramadanti et al., 2021).

According to Sujanem, Suwindra, & Tika (2012), the integration of ICT in education, especially with regard to web-based learning packaging brings a new revolution and provides opportunities for achieving higher understanding and learning outcomes. According to Abdullah, Herpratiwi, & Tarkono (2013), this is

also in accordance with the results of Abdullah et al's research, where printed teaching materials can be developed into interactive programs including making computer-based interactive modules. In addition to improving student learning outcomes, the use of interactive modules can increase student learning motivation as well. Students' learning motivation can be said to be low when student attitudes appear, such as tending to be busy alone, chatting with friends, there are some students who do homework for other lessons and pay less attention to ongoing learning. This can happen because of the lack of learning media in the learning process which can make it difficult for students to understand the material taught by the teacher in class. The use of e-modules is very effective for increasing student learning motivation, besides that it is also effective for improving student learning outcomes, as well as critical thinking skills because users will experience interaction and be active, for example actively paying attention to pictures, paying attention to writing that varies in color or moves, sounds, animations. , videos and movies. (Puspitasari, 2019).

Recently, eLearning has developed modern strategies such as microlearning (data compressed into small digital learning capsules), which appear to allow for the acquisition of information quickly and effectively (Mateus-Nieves; Moreno, 2021). This digital mathematics module uses a microlearning model, because microlearning is a Micro-studying or MicroLearning study is regularly known as "bite-sized" due to the fact the complete educational the method is detached into small chunks that typically last no longer than a couple of minutes (Giurgiu, 2017). Microlearning divides knowledge into manageable chunks. Nowadays, almost everyone who has access to the Internet benefits from microlearning, including Googling, checking email, reading and watching web content on the Internet (Mohammed et al., 2016).

According to recent research, short content can increase information retention by 20%. Giving students a large amount of content all at once results in very little interaction between the information and the learner. As a result, the content may exceed working memory capacity, leading to uncertainty in the learning environment. Another problem is that knowing what to expect with newly introduced information is critical for better retention (Giurgiu, 2017).

Microlearning courses are divided into distinctive stages or modules that have to be surpassed so that you can complete the course. By regularly passing these modules, the student is self-stimulated not to leave the course and complete it. This keeps them hooked so that they experience the procedure, encourages them to keep gaining knowledge, and encourages them to keep learning, even encouraging them to take new courses. Students spend less time in the learning process than in a face-to-face course. The contents of a microlearning course are short, occupying the learner only a few minutes a day. This formula is considered a breakthrough for learners who want to know quickly and not take long to acquire it (Mateus-Nieves & Ferney, 2021).

Generally, in traditional learning, the teacher is the centre of gaining knowledge of the process, and the students are frequently passive learners. Therefore, the teacher handiest taught what was within the ebook, and students inquired about listening to the lessons and paying attention with nearly negligible participation in the class. Although, in the Microlearning approach, we all are the centre of the studying process inside the class. the students can use many distinct techniques and teaching tools throughout the class session, which include: giving stories associated with the subject, academic movies, school books, flashcards, posters, gambling and activities (Mohammed et al., 2016).



This research is in line with the study conducted by Mohammed et al (2018) with the title of The Effectiveness of Microlearning to Improve Students' Learning Ability, and the results show that using Microlearning method can improve student's learning ability for up to 18% compared to traditional method. And research conducted by Triwahyuningtyas, Dyah, et al. (2020) with the title The problem-based learning e-module of planes using Kvisoft Flipbook Maker for elementary school students, the results show the results of the effectiveness test for the e-module that has been developed is 90.47 with the "Good" category because the mean score of the students' test results already passed the minimum criteria or higher than 70.00.

Based on the above background, in terms of the framework above, Development digital module based on Microlearning for 7th graders is important and practical to build, as it is regarded to be able to overcome students' difficulties in learning mathematics on the topic of Data Presentation.

### **1.2. Problem Identification**

1. Students are passive when learning mathematics
2. Al-Ulum Integrated Islamic Middle School in Medan does not use digital teaching materials
3. Students need creative and innovative teaching materials
4. Students need teaching materials that use animation, videos, and others so that students don't feel bored when studying.

### **1.3. Scope of Study**

Based on the background of the problem, the scope of the study is the development of Microlearning-based Mathematics Digital Modules on Statistics topics in 7<sup>th</sup> graders.

#### 1.4. Research Questions

Based on the identification of problems, the problem formulation in this research is:

1. How is the validity of Microlearning-based Mathematics Digital Modules on Statistics topics in 7<sup>th</sup> graders?
2. How is the practicality Microlearning-based Mathematics Digital Modules on Statistics topics in 7<sup>th</sup> graders?
3. How is the effectivity of Microlearning-based Mathematics Digital Modules on Statistics topics in 7<sup>th</sup> graders?

#### 1.5. Scope of Problem

Based on the formulation of the problem above, researcher limit the problem in this study are:

1. Development of Microlearning-based Mathematics Digital Modules.
2. The material used in this module is Statistics material for seventh-graders.

#### 1.6. Study Objectives

The objectives to be achieved in this study are stated as follows:

1. Knowing the validity of Microlearning-based Mathematics Digital Modules on Statistics topics in 7<sup>th</sup> graders
2. Knowing the practicality of Microlearning-based Mathematics Digital Modules on Statistics topics in 7<sup>th</sup> graders
3. Knowing the effectivity of Microlearning-based Mathematics Digital Modules on Statistics topics in 7<sup>th</sup> graders

#### 1.7. Research Purposes

The comes about of this research is anticipated to supply the taking after benefits:

1. For the teachers, provide feedback to teachers to help them choose the best learning medium for their students in order to improve their math learning outcomes and accomplish their goals.
2. For the students, this research product's outcomes are projected to be a creative and unique learning resource for students, motivating them to learn mathematics.
3. For the researcher, adding knowledge about how to create digital modules that will be important in the future.
4. For others research, can be used as a reference for developing more creative and innovative digital modules.

### **1.8. Operational Definition**

The operational definitions contained in this study are as follows

1. Development is an activity that aims to produce a valid and effective product.
2. Microlearning is a method of delivering material in the teaching and learning process where the material is delivered briefly but is given several supporting media such as videos, infographics, etc.
3. Modules are printed teaching materials that are systematically designed with instructions for self-study so that learning participants can learn independently.
4. Digital modules are digital-based teaching materials that are designed to be attractive and innovative to make it easier for learning participants to learn independently wherever and whenever that can be accessed online and offline on a gadget or smartphone.
5. Statistics is the study of how to collect, compile, present, analyze and represent data.