CHAPTER I
INTRODUCTION

1.1 Background of the Problem

The development of digital technology is now taking an important role in the integral development process in individual life at school and in society. This digitalization can affect various aspects of life, one of which is the field of education which is able to rebuild education so that it becomes more qualified for the nation's children (Wulandari, 2023). In the 21st century, it demands the quality of self and human performance by competing and making adjustments to be reliable and qualified to realize a developed country (Yusmar & Rizka, 2023).

In achieving this quality in the nation's children, of course, requires the right strategy. One of them is that students must be able to balance knowledge and current technological advances. With the advancement of existing technology and balancing it with knowledge is not merely to keep up with the times, but also to expect learning comfort for students (Emilya & Mufit, 2024). Thus educators are also expected to be able to keep pace with existing technological developments in the realization of learner development.

In realizing the development of good information technology in the world of education, of course, it requires support from infrastructure that can provide internet access with sufficient speed, the existence of Human Resources (HR) factors related to human brain to be able to master existing technology, the existence of content and application factors that can provide freedom of information conveyed to the right people, places and times so that it is conveyed appropriately (Sari et al, 2023).

In responding to the rapid development of technology that can make it easier for someone to learn new things, it is necessary to start the learning process in the classroom. With the existence of this technology, education will also be far developed if done properly and optimally. With a variety of information that can be obtained on various platforms, it will be able to bridge communication between teachers and students so that the knowledge gained through this learning process can be carried out properly. This is supported by cybernetic learning theory.

Cybernetic learning theory itself is a learning theory that is more concerned with the learning process using technology to be able to obtain information quickly and precisely so as to improve the ability of students to receive information (Yunus, 2018). With this learning theory, it demands a global community in improving higher quality education through the use of technology in learning and facilitating access to a variety of information and learning difficulties when teachers are not present (Yunus, 2018). According to cybernetic theory that in the learning process the most important thing is the information system of what the learner will learn, while the learning process itself will be determined from the information system so that in learning itself there is not only one type of learning method for all situations (Hamid, 2009).

In balancing education with existing technology, it can be done by delivering material or science with the right strategy to make it more interesting and fun, besides that the subject matter can be delivered with methods and materials that are in accordance with the times (Hendrastomo & Nur, 2018). In this case there are teaching materials needed by teachers in supporting the existing learning process. One of them is teaching materials that are used, both in the learning process and during the assessment process.

Teaching materials are an important part that supports the learning process which contains directions or signs that will be used on the material to be studied which will help and guide the teacher in carrying out learning activities (Djono, 2023). This teaching material is used to be able to achieve student competence by containing many things which include knowledge, skills and even attitudes which become a good reference in student learning (Wahyudi, 2022). The form of teaching materials is quite varied which consists of 4 parts, including audio, visual, audio visual and interactive (Trinaldi et al, 2022). Audio-based teaching materials are teaching materials that are used by listening. Visual teaching materials are teaching materials that are used by viewing only. Audiovisual teaching materials are complex teaching materials that are equipped with display and sound. Meanwhile, interactive teaching materials display a combination of audio, video images and text into a complete unit.

To compile teaching materials, there are several criteria in choosing teaching materials to be used, among others; (1) Relevance (psychologically and sociologically); (2) Complexity; (3) Rational/scientific; (4) Functional; (5) Up to date; and (6) Comprehensive/balance (MKDP, 2011). The presence of criteria in the teaching materials used will assist in the absorption of learning materials independently. However, currently the teaching materials that have only relied on packet books as a source which is not in accordance with the real experience of students in their environment so that this makes it less informative (Trinaldi et al., 2022). Some important changes are needed in the use of teaching materials that are used based on Information and Communication Technology.

Information and communication technology-based teaching materials are all teaching materials displayed using technological devices that are visualized in visual, audio and interactive forms such as multimedia presentations, interactive multimedia, e-modules, e-books, Computer Assisted Instruction (CAI), animation and android-based (Emilya & Mufit, 2024). The use of information and communication technology-based teaching materials is quite flexible where these teaching materials can be accessed via cellphones, computers, and laptops so that students can easily manage lesson hours well and can even be repeated at home. With this information and communication technology-based teaching material, it can make it easier for educators to convey learning by reducing double or ambiguous meaning in its delivery and students can absorb learning easily (Astuti, 2018). This digital-based teaching material can be designed and designed to adjust the learning object so that it can be accessed directly by individual students so that it makes it easier for students to understand the material independently and more efficiently in learning.

The reproductive system material itself is quite complex in studying biological processes to be able to give birth to new individuals through the reproductive process. Azizah et al (2023) stated that the reproductive system is part of the body system of living things that are used to reproduce or are responsible for the continuity of a generation. Basically, this reproductive system physiologically works effectively without affecting other systems in the body. This biological process can be studied to be able to gain a variety of knowledge in the continuity of

living things that are not only centered on the process but how the organs work together in giving birth to new individuals. Reproductive system material cannot be understood if only through verbal depiction because it is quite abstract, therefore it needs the right strategy in delivering the reproductive system material to students, for example through the use of information and communication technology-based teaching materials.

Based on the results of observations and interviews conducted with biology teachers in class XI of SMA Negeri 12 Medan, basically the use of teaching materials based on information and communication technology is not always used but depends on the material to be taught. Usually teachers and students will use WhatsApp media as a communication tool when conveying some information or teaching materials. For biology teachers, the use of teaching materials based on information and communication technology is very important to be able to support students' knowledge and be able to help in adjusting students' abilities to current developments in the field of technology so that this requires students not to be blind to the existence of technology, especially in supporting their learning process. This is supported by research conducted by Trinaldi et al. (2022) which states that information and communication technology-based teaching materials are an important point in the learning process which is the transformation of knowledge from not knowing to knowing. By utilizing online learning it can support and maximize teaching and learning activities (Trinaldi et al., 2022).

Basically, the use of technology and communication-based teaching materials in class XI of SMA Negeri 12 Medan is used according to the material and conditions that occur in the learning process. During the learning process, biology teachers usually use technology and communication-based teaching materials such as; animated videos, e-modules, articles, blogs or learning websites, YouTube, educational games and others. While during the assessment process, biology teachers use several applications or assessment websites such as; gform, quiz, kahoot, wordwall, live worksheet, and others. While during the assessment process, biology teachers use several applications or web assessments for such as; gform, quiz, kahoot, wordwall, live worksheet, and others.

Through the results of interviews conducted with 2 biology teachers who teach in class XI stated that basically the use of information and communication technology-based teaching materials is certainly very important to be used in the learning process that can support students' knowledge that harmonizes with current technological developments. But of course there are some obstacles experienced in the process of utilizing information and communication technology-based teaching materials experienced, among others; (1) Teachers have difficulty in adjusting teaching materials to the academic background and learning style of students; (2) Limitations of electronic devices/mobile phones owned by students; (3) Limitations of supporting facilities and infrastructure; and (4) Teachers' creativity in developing technology-based teaching materials is not optimal.

Basically, the use of information and communication technology-based teaching materials for biology teachers at SMA Negeri 12 Medan is quite common and almost all teachers are able to use technology in delivering learning materials. However, of course, there are still some senior teachers who still have difficulty in understanding the operation of technology in the learning process and in the assessment process. In addition, the use of information and communication technology-based teaching materials is still relatively less diverse or there is no renewal in the use of the technology itself, so that students still do not have many new experiences or new learning in the use of technology in the learning process and in the assessment process. So there needs to be more focus on the use of information and communication technology in the learning process and in the assessment process.

The reproductive system material itself is one of the materials that has various biological processes on a micro scale and is often abstract for students, so the use of information and communication technology-based teaching materials is very helpful in improving students' understanding and knowledge. This is done by visualizing the processes contained in the material either through animated videos or 3D simulations to make it easier to understand. Students are also not passive in receiving materials or can be more interactive in the learning process and this information and communication technology which is broad in nature can be accessed anywhere using the Smartphone they have. In addition, this reproductive

system material is material contained in the independent curriculum where schools are relatively new to using the curriculum, so this reproductive system material is new material studied in grade XI at this time so that this is a challenge faced by biology teachers in selecting teaching materials based on information and communication technology that are used must be maximized to help improve students' skills and abilities in learning. This is supported by research (Maskur & Safitri, 2021) which states that the use of teaching materials based on information and communication technology can improve students' learning abilities by 83.3% in the learning process. So that students will be broader in carrying out learning activities with confidence.

Several obstacles that are certainly faced by teachers and students as a result of the use of information and communication technology-based teaching materials are supported by Safira's research (2021) which states that in online learning itself there are many problems in the use of information and communication technology, for example in teaching materials starting from the preparation of teachers, students and parents as well as the facilities and costs used in utilizing the technology. In addition, research (Trinaldi et al, 2022) states that students themselves need more help when using teaching materials where the use of information and communication technology-based teaching materials on the other hand can cause children to have difficulty using them because each individual has different abilities. Thus, it is considered important to conduct research with the title **"Analysis of the Utilization of Teaching Materials Based on Information and Communication Technology on the Material of the Reproductive System of Students In Class XI Senior High School 12 Medan".**

1.2 Problem Identification

Based on the background previously described, there are several problems identified in this study, among others;

1. Biology teachers have difficulty in adjusting teaching materials to the academic background and learning style of students.
2. Biology teachers' creativity in developing information and communication technology-based teaching materials is not optimal.
3. Limited electronic devices/mobile phones owned by students.

4. Limited facilities and infrastructure that support the biology learning process including the reproductive system material.

1.3 Scope of Research

The scope of the research to be conducted includes;

1. The subjects of this research were the XI grade students of SMA Negeri 12 Medan.
2. Analysis of technology information and communication technology-based teaching materials used in the learning process, focusing on the use of animated videos.
3. Analysis of information and communication technology-based teaching materials used in the assessment process, focusing on the use of the Quizizz platform.
4. This research will use data collection techniques, namely observation, interviews, questionnaires, and documentation.

1.4 Problem Limitation

Based on the problem identification that has been described, there are several problem limitations in this study, including the following:

1. The teaching materials to be analyzed are teaching materials used during the learning process and the assessment process in biology subjects.
2. The biology material studied is limited to reproductive system material for grade XI students according to the independent curriculum.

1.5 Problem Formulation

Based on the background previously described, there are several problem formulations in this study, including:

1. How is the utilization of information and communication technology-based teaching materials by biology teachers in the learning process of reproductive system material in class XI at SMA Negeri 12 Medan?
2. How is the utilization of information and communication technology-based teaching materials by biology teachers in the process of assessing reproductive system material in class XI at SMA Negeri 12 Medan?

3. What are the obstacles faced by teachers and students in utilizing information and communication technology-based teaching materials in the learning process and assessment process when studying reproductive system materials in class XI at SMA Negeri 12 Medan?

1.6 Research Purposes

Based on the problem formulation previously described, there are several objectives of the research conducted, among others:

1. To analyze how the utilization of information and communication technology-based teaching materials by biology teachers in the learning process of reproductive system material in class XI at SMA Negeri 12 Medan.
2. To analyze how the utilization of information and communication technology-based teaching materials by biology teachers in the process of assessing reproductive system materials in class XI at SMA Negeri 12 Medan.
3. To analyze the obstacles faced by biology teachers and students in utilizing information and communication technology-based teaching materials in the learning process and assessment process when studying reproductive system material in class XI at SMA Negeri 12 Medan.

1.7 Benefits of Research

Based on the implementation of the research objectives that have been described, it is expected that several benefits will be obtained after this research is carried out, among others;

1. For teachers, this research can help in providing references in the utilization of information and communication technology-based teaching materials used by biology teachers in reproductive system material.
2. For students, this research can help in improving the ability to understand reproductive system material with the help of technology in the learning process.
3. For schools, the results of this study can be used as a reference in the use of teaching materials that are more focused, especially on technology-based teaching materials that can be used by teachers using existing facilities and infrastructure at school.

4. For readers, the results and information obtained through this research can be used as a source of information and a source of reference in the learning process.

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