

CHAPTER I

INTRODUCTION

1.1. Background of the Study

Preparing pre-service teachers to enhance the use of technology appropriately for teaching and learning is important in 21st century. As digital era, technological advancements have made 21st century known as influx of information from various sources (Tunjera and Chigona, 2020). According to Oktamarsetyani and Paidi (2019), in order to prepare teachers in 21st century, pre-service teachers need to utilize technology for information and communication with their students in order to prepare pre-service teachers as professionals in the future. This already been discussed by Singh (2008) in his book, as he believes knowledge about technology will help teacher to critically aware in increasing the quality of education.

However, technological knowledge in Indonesia is a case which requires attention. Technological advancement in Indonesia is not evenly develop due to several reasons such as geographical condition, monetary budget and human resources (Yuberti, 2015). Sifting our attention to education sectors, technological knowledge of teachers still not out main priority to take care. An international survey, Programme for International Student Assessment (PISA) by Organization for Economic Cooperation and Development (OECD), shows that in Indonesia still concern about the quality and the lack of material resources at school rather than teachers' improvement (OECD, 2019). This leads to questioning how technological profiles of Indonesian teachers.

It is clear that teacher's lack of knowledge in technology cannot be tolerate and this shall be applied to as early as pre-service teacher. As a facilitator, teacher stands to distribute the knowledge to fulfil the needs of proper education for students (Senjaya, 2015). Therefore, with future of education relies on pre-service teacher, attention needs to be given to prepare pre-service teacher to become more aware about utilizing technology for educational purposes. The issues now have

changed from whether or not a teacher capable to what would a teachers do to utilize the teaching and learning activity with technology (Carpenter et al., 2020).

It's undeniable that pre-service teachers in the 21st century must meet certain standards. One crucial requirement is technological and digital literacy, which includes integrating technology into teaching and learning activities (Kim et al., 2019). Experts emphasize that emerging frameworks for technology integration in education must be carefully developed (Kumar and Daniel, 2016). These frameworks offer diverse, scaffolded approaches that assist teachers in implementing their teaching goals (Danielson, 2007). To prepare pre-service teachers for maintaining high-quality education, the TPACK (Technological Pedagogical and Content Knowledge) framework is identified as essential for meeting the necessary qualifications and aligning with technology integration expectations in education.

TPACK is a framework designed to integrate technology effectively into education. In educational research, TPACK is recognized as a theoretical framework that explains the knowledge teachers need to combine technological knowledge, pedagogy, and content (Mishra et al., 2016). TPACK serves as a valuable tool for designing teacher education experiences and assessing teacher knowledge in technology integration (Baran et al., 2011). Implementing TPACK can also help address challenges faced by science teachers. It describes the types of knowledge teachers need to teach effectively with technology. Mastery of these three types of knowledge is essential for pre-service teachers in the 21st century to ensure quality and professionalism (Yohana, 2020).

Research in Indonesia indicates that TPACK integration can enhance students' learning abilities through a more effective, efficient, and engaging learning process (Sintawati and Indriani, 2019). However, Agustina et al. (2018) found that biology teachers struggle with integrating TPACK due to a lack of conceptual and practical understanding. Oktamarsetyani and Paidi (2019) concluded that Biology Education students at Ahmad Dahlan University have inadequate skills in preparing learning plans because pre-service teachers do not optimally use technology due to insufficient TPACK implementation. Aryati (2018) revealed that many pre-service teachers find it challenging to align teaching

materials with objectives and to organize learning steps, again due to a lack of understanding.

It is clear that ability to implement TPACK in classroom by Indonesian teacher is poor due to lack of understanding and preparation. To overcome these issues, biology education student's pre-service teacher needs to prepare their knowledge in TPACK. To know pre-service teachers' perception of TPACK is essential so that in the future a preparation to anticipate all issues regarding the TPACK implementation once the pre-service teacher teaching in classroom. In the future, data obtained regarding the pre-service teacher's perception of TPACK will ultimately become the tools of assessment and improvement since the profile might help the lecturer to prepare said biology education student to become more aware of the technology integration in education.

From the elaboration, there is a need for analysis of TPACK perception of Biology Education Students in Universitas Negeri Medan as a pre-service teacher. The analysis of TPACK perception Biology Education Students will help to reveal what is the weakness or strength, relationship between TPACK understanding to a study result, ability to make a lesson plan, also for the anticipation before conducting real teaching as pre-service teachers.

Therefore, researcher is interested in conducting analytical research on TPACK perception in Biology Education Student as pre-service teachers. It is intended to investigate the perception of students on seven components of TPACK, namely Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), and Technological Pedagogical Content Knowledge (TPACK). Moving from that, the researcher raised the title **“Biology Education Pre-service Teacher Perception and understanding on Technological Pedagogical and Content Knowledge (TPACK) Framework”**.

1.2. Problem Identification

Based on the background given previously, therefore can be identified the problem in this research are as follows:

1. The lack of information about Technological Pedagogical and Content Knowledge (TPACK) framework which very important to own by teacher and pre-service teacher in 21st century.
2. The lack of information regarding TPACK perception and understanding of Biology Education Student of Universitas Negeri Medan.
3. The lack of information about student' implementation on technology integration concept in teaching-learning activity.

1.3. Scope of the Study

Based on previous problem identification there are wide area to study, therefore Researcher limit the study by giving the scope to put matters in order which are:

1. This study focusses on obtaining information regarding TPACK perception of Biology Education Student year 2022 as pre-service teacher.
2. This study focusses on obtaining information regarding TPACK understanding of Biology Education Student year 2022 as pre-service teacher.
3. The study is limited to the Biology Education Student as pre-service teacher of Universitas Negeri Medan.

1.4. Research Questions

Based on the background of the problem above, the problem formulations in this study are:

1. What is the Biology Education Student of Universitas Negeri Medan perception on Technological Pedagogical and Content Knowledge (TPACK) as pre-service teacher in 21st century?

2. What is the Biology Education Student of Universitas Negeri Medan understanding on Technological Pedagogical and Content Knowledge (TPACK) as pre-service teacher in 21st century?
3. Is there any implementation of TPACK in a lesson plan created by Biology Education Students of Universitas Negeri Medan?

1.5. Scope of Problems

There is wide area of problems and not yet operational, thus to limit the problems later to be answer by this study researcher limit the problems by giving the scope, which are:

1. This research only to obtain the information about perception and understanding of Biology Education Student of Universitas Negeri Medan regarding TPACK Framework.
2. This research only conducted to investigate perception and understanding of the seven components of TPACK, namely Technological Knowledge (TK), Pedagogical Knowledge (PK), Content Knowledge (CK), Technological Pedagogical Knowledge (TPK), Technological Content Knowledge (TCK), Pedagogical Content Knowledge (PCK), and Technological Pedagogical Content Knowledge (TPACK) from Biology Education Student of Universitas Negeri Medan
3. This research conducted to see if there are any implementation of TPACK in making a lesson plan.

1.6. Study Objectives

As for the Purposes, this study purposed to:

1. To obtain information about the perception of Biology Education Student of Universitas Negeri Medan regarding Technological Pedagogical and Content Knowledge (TPACK) as pre-service teacher in 21st century.
2. To obtain information about the understanding of Biology Education Student of Universitas Negeri Medan regarding Technological Pedagogical and Content Knowledge (TPACK) as pre-service teacher in 21st century

3. To explore if there is any implementation of TPACK in making of lesson plan of Biology Education Student of Universitas Negeri Medan as a pre-service teacher in 21st century.

1.7. Benefits of the Study

The benefits of this study are:

1.7.1. Theoretical Benefit

1. Research is expected to help improving the quality of Biology Education Students in carrying out microteaching activities.
2. Give an overview to the lecturer of Biology Education about Biology Education student difficulties, especially regarding the problem of integration technology in education.
3. As a means of development, implementation and study of theory and science in building human resources, especially in the scope of teaching and education personnel.
4. To make sure that the Technology Integration can be applied to prepare pre-service teacher for 21st century.

1.7.2. Practical Benefit

1. For Universitas Negeri Medan:
 1. To help by give an addition to TPACK related study for the undergraduate program of Biology Department, Mathematics and Natural Science Faculty of Universitas Negeri Medan which potentially opening future research to develop TPACK implementation.
 2. To give addition to the literature for Universitas Negeri Medan regarding analysis of TPACK specially for undergraduate program of Biology Department, Math and Science Faculty of Universitas Negeri Medan which can be develop for future research.

2. For the Author:

1. To learn from the findings of the research on how the perception and understanding of Biology Education Students as pre-service teacher in TPACK.
2. To have a development in teaching ability specifically in terms of implementing TPACK.

1.8. Operational Definition

In this study, the terms will be explained in order to avoid misinterpretation of each term used in this study, these terms are defined as follows:

1. TPACK stands for Technology Pedagogical and Content Knowledge.
2. TPACK is a framework that identifies knowledge, teachers need to teach effectively with a technology framework.
3. Perception is how biology education student year 2022 view, translate and interpreting information, which in this case TPACK framework.
4. Understanding is the extent to which biology education students of the 2022 cohort grasp, comprehend, and can apply the information related to the TPACK framework.
5. Pre-service teacher is an education student of a college institution, in this case Biology Education Student of Universitas Negeri Medan.
6. Pedagogy is knowledge possessed by teachers in understanding student characteristics, how to teach properly based on student characteristics in the form of learning methods, and organize class.
7. Content is the teacher's knowledge of the content of the teaching materials.
8. Technology is knowledge which includes the use, application, purpose and function of technology in learning. The technology referred to in this research includes multimedia learning tools that function as a support in the activity process.
9. Preparation for 21st century is to prepare for the vast globalization, vast development of technology and information, uncertain events which all and all influence the human activity as a whole.