CHAPTER I
INTRODUCTION

1.1 The Background of The Study

Misconception researches indicate that students have considerable degree of misconceptions related to biological concepts. Many concept in biology are abstract and difficult to understand especially about the various terms, abstract and complicated process in biology. At this point, there is a need to identify the sources of those misconceptions. Misconceptions may originate from certain experiences that are commonly shared by many students. Some of them rooted in everyday experiences. For instance, in our society there is a common belief that there should not be flowers in the bedrooms. Furthermore, in daily life,we add word 'fish' behind dolphin and seal which imply that they are fish rather than mammals.

The study of misconception in biology are not the novel research. Misconceptions may impede the understanding of the biology concepts, because many biological concepts are closely interrelated so that misconceptions of one concept will distract the comprehension of another concept. Previous studies have investigated that many misconceptions that occur in the biology topic. They are including misconceptions about the cell biology (Kara, 2008; Boo, 2007), photosynthesis (Kose, 2008), circulatory (Pelaez, 2005; Yip, 2010), human respiratoy system (Michael, 1999), genetics (Long, 2008) and evolution (Nelson, 2008; Yates, 2014).

A large number of prior studies reported that many conceptional problems concerning circulatory and respiratory system (Bajd, 2010; Cliff, 2006; Michael *et al*., 2002; Tekkaya, 2002). However, detailed research related to biology student

teachers' misconceptions about circulatory and respiratory system was rarely found. If higher education curriculum designers knew students' misconceptions, it might be helpful to prepare effective teaching strategies. Teachers can play an important role in teaching scientific concepts and, from a constructivist perspective, students should gain meaningful knowledge about biological concepts like circulatory and respiratory system. Biologically literate students should be able to use and apply basic biological concepts when considering biological problems or issues.

The concept of the circulatory system and respiratory system is extremely important in biology because it is the key to learning the basic life processes. The concept of the circulatory system and respiratory system is also related one to another. The circulatory system and respiratory system work closely together within the body. Oxygen, which is an essential part of the metabolic process of nearly all cells, is gathered through the respiratory system and transported through the bodies of complex organisms, such as humans, through the circulatory system. These two systems also work together to eliminate carbon dioxide, which is a metabolic waste product (Prokop, 2006).

A review of the research literature shows that several studies have been conducted involving misconceptions about the circulatory system.One of the most frequent misconceptions in this topic can be stated as follows: "The heart has the function to store, filter, prepare or clean the blood"(Tekkaya, 2002). Özgür (2012) conducted a study with various grades of students to identify their alternative conceptions about the human blood circulatory system. The findings of the study indicated several alternative conceptions related to the structure of blood,function

of blood, structure of the heart, function of the heart, circulatory pattern, circulatory/ respiratory relationship and closed circulation. Similar to students, biology teachers were found to hold misconceptions in the same topic (Yip, 2010). Such misconceptions held by teachers were transmitted to their students through the questions that the teachers asked.

Many students even adults have misconceptions about respiration. In everyday life we say that we breathe with our lungs, fish breathe with gills and amphibians breathe through their skin. This process is not breathing but inspiration and expiration, exchange of the air. Inhaled air, high in oxygen and low in carbon dioxide, travels through the respiratory tract deep into the terminal portions of the lungs; this is inspiration. There, oxygen diffuses across the lung surface into the blood. From the lungs, oxygenated blood is carried to the heart and then, via the systemic circulatory system, to all part of the body. The real biologically accepted definition of breathing is, in fact, at the cellular level. Many investigations show that this topic is very difficult to understand (Bajd, 2010). Uzoamaka (2014) found that student's error and misconceptions of respiration were partly contributed by the teacher's and partly by students' lack of understanding of the conceptual areas of respiration themselves. The result was discussed and its implication to biology education was given through the finding of the study showed that conceptual errors exist between students and their teachers.

Studies related to misconceptions are being conducted seriously all over the world. Indonesia has numerous research related to misconceptions such as in physics (Wilantara, 2003),work and energy Khasanah (2010). In biology itself

include the topic of animal classification (Panggabean, 2011), circulatory system (Rabitah, 2011), cells (Gultom, 2011), respiratory system and excretory system (Purba, 2011). In Indonesia studies related to students' misconceptions and teachers' misconceptions in biology are being done but rarely found in biology student teachers . Whereas the study of misconception in student teachers is also crucial to be implemented. The consideration of misconception that occurred in the teacher begins when they were the student teachers. Purba (2011) reported that 68.95% biology education students have misconceptions on the concept of cell biology. Earlier study of misconceptions on the teacher candidates will prevent misconceptions when they become the teacher someday. Therefore, a study of student teachers' misconceptions has great significance.

Biology education students of FMIPA Unimed are teacher candidates. For prospective teachers, students should be able to gather information and apply basic right concepts of biology when facing problems or issues concerning biology. Lack of knowledge and teachers' mastery on the learning concept will lead to the lack details of the lessons presentation that can lead to misconceptions when they become the teachers in the future and for their own students.

Students who have misconceptions will hold a concept which they believed to be true and this will lead to misconceptions are stable and resistant to change. Misconceptions can disrupt the learning process due to incorrect logic when studying new right concepts. Misconception is considered latent obstacles because its existence is generally not detected when it is not being challenged with other misconceptions. If misconception is not removed, misconceptions will

have a negative impact on future learning especially when they learn about the fundamental topics such as circulatory system and respiratory system.

Biology education students of FMIPA Unimed learn circulatory system and respiratory system in course namely *Animal Physiology* and *Human Anatomy and Phsyology*. Students come to college with varying background of education and experience with ideas about and explanation of the natural physiology, most students enter the physiology classroom with one or more fundamental misconceptions about circulatory and respiratory physiology. The students harbour misconception and still hold the wrong concept make them face the difficulties in learning circulatory system and respiratory system.

Most of biology education students in FMIPA Unimed still rely to the information that was delivered by the lectures and also text book from the college. The students are rare having another text book even to borrow in the library. The students are expected to more actively explore their critical and analytical thinking about the concept about circulatory system and respiratory system. The lack of interest and curiosity of students to learn and explore further depth about circulatory system and respiratory system are the main factors in misconception

The result of preliminary interview stated that in learning the topic of circulatory system and respiratory system, most students of biology education in Unimed have the impediments to mastery the concepts, although it is considered that circulatory system and respiratory system are not the difficult topic. Most of them still confuse about the differences between arteries and veins, the location gas exchange, that take place in alveolus, even they still confuse the relationship between circulatory system and respiratory system in oxygen transport. The

impact of this situation resulted that half of students were not passed in the formative test related the topic circulatory system and respiratory system and in a third of students got C in course human anatomy and physiology and animal physiology.

The investigation of misconceptions in Biology student teachers has been a substantive feature of the work of the Science Education research community**.** The importance of investigating misconceptions is emphasised by the number of student teachers that possess misconceptions and are transferring these misconceptions to the minds of the students they teach . For student teachers in particular, misconceptions are a concern as they may leave their initial teacher education program without having found a way of dealing with this issue. The quality of student achievement is nowadays increasingly understood to depend on the quality of the teachers . Therefore, in order to improve ecience education, it is imperative that teachers find a satisfactory way to identify and amend misconceptions that they may have during their teacher education courses (Galvin and Grady, 2012).

Although the previous studies related to misconceptions are numerous and had been accomplished but the study on misconceptions are still needed in the educational world. We are expected to realize that misconception is the root of obstacles in the teaching learning process. The educators are in charged to conduct the study about the problems of learning that caused by misconceptions. The study of misconception is still important and has a role for the improvement of the learning quality.

1.2. The Problem of the Study

According to the background of the study description,the problems are identified as follows: (1) The presence of misconceptions on the concept of circulatory system and respiratory system in biology education students; (2) The misconceptions of biology education students of FMIPA Unimed in the concept of circulatory system and respiratory system related to the structures and function of each organ and the various scientific terms; (3) Misconceptions of of biology education students of FMIPA Unimed could possibly be originated from their preliminary knwoledges and personal experiences from the background of education, the lack of students' curiosity to explore the informations in various literatures circulatory system and respiratory system related to the topic circulatory system and respiratory system; (4) The effect of misconceptions in biology education students of FMIPA Unimed leads to the unstisfactory learning achievement in human and animal a physiology courses; and (5) Misconceptions can bring the negative effects for biology education students who will later be biology teachers who also deliver their misconceptions to their students

1.3. The Scope of the Study

Based on the problem of the study, the scope of the study is intended to discuss such as the following: (1) Misconception of biology education students batch of 2012 and 2013 in the topic of circulatory system and respiratory system ; (2) The identification of concepts in which the biology education students are found to possess misconception in Faculty of Mathemathic and Natural Sciences State University of Medan; (3) The causes of misconceptions on biology

education students of Faculty of Mathemathic and Natural Sciences State University of Medan.

1.4. The Formulation of The Study

The problems of this research are formulated in questions such as the following:

1) What percentage of biology education students have misconceptions about circulatory system and respiratory system in Faculty of Mathemathic and Natural Sciences State University of Medan?
2) Which concepts do biology education students hold misconceptions about circulatory system and respiratory system in Faculty of Mathemathic and Natural Sciences State University of Medan?
3) What are the causes of misconceptions on circulatory and respiratory system of biology education students in Faculty of Mathemathic and Natural Sciences State University of Medan?

1.5. The Objectives of The Study

Based on the background of the study,the objectives are intended:

1) to obtain the percentage of misconceptions of biology education students about circulatory system and respiratory system in Faculty of Mathemathic and Natural Sciences State University of Medan.
2) to identify misconceptions on the concepts of circulatory and respiratory system that are found on biology education students in Faculty of Mathemathic and Natural Sciences State University of Medan.

3) to investigate the causes of misconception of biology education students about circulatory and respiratory system in Faculty of Mathemathic and Natural Sciences State University of Medan.

1.6. The Significance of The Study

These research findings are hoped to be useful as the following :

1. Theoretically, the results of this study are expected to contribute ideas and reference materials for lecturers, teachers, lecturers, managers of educational institutions and further researchers who want to know more about the explanation of the misconceptions.
2. Practically, the result of this study is expected to be the informations to improve the quality of learning and equip students and teachers with the necessary conceptual knowledge in solving scientific problems. In addition, the results of this study are also expected to follow through in changing misconceptions on biology education students of the Faculty of Mathematics and Natural Sciences, State University of Medan.