CHAPTER I
INTRODUCTION

1.1   Background

Technology involvement, today plays a very important role in our life, especially in the science field. The important role of technology is used for developing character, improving quality of life, and sharpening people's knowledge, all educators both teacher and students have to be familiar with technology to assist the learning process (Mardiana, 2018). It is also supported by Bañez & Yedra (2019) who stated that integrating technology in the education field is popularly used to enhance the students' interest and to innovate teachers' instructional practices. Since in science education the concept is drawn theoretically, suitable learning media is needed to explain the abstract concept for students' understanding. Collaborating technology and science can support the students to learn because it can make human work easier and less time-consuming to be more effective (Raja & Nagasubramani, 2018).

Moreover, at this time there is a pandemic caused by the corona virus. This situation requires technology to play more role in the learning process. This is because human interaction activities cannot be carried out directly. The new policy by the government instructs to partially closed the educational institution and conduct it into online learning as prevention the spreading of corona virus (UNESCO, 2020). The teacher needs to determine the proper strategy for the learning system because conducting the distance learning in long-term home isolation program tend to create poor interaction effect and low learning investment (Yang et al., 2020). Therefore, the strategy that needs to use during online learning is to involve the students during the learning activity to engage them to learn and make it more student-centered. Students center allows them to gain the ability to acquire deep learning and to increase the quality of learning (Antika, 2014). Meanwhile, the weakness of online learning makes the lesson mostly oriented by the teacher and students are passively only watching the teacher explanation, this situation happened because the interaction between teacher and student is bordered by the screen (Erol & Danyal, 2020).

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In this era, the purpose of the system of science education is to enhance students' ability to acquire information without let the students directly gain the information from the teachers (Putri *et al*., 2018). To facilitate the activity by involving the students, one method that can be used is inquiry-based learning. This is in line with a statement by Alper (2018) who stated that Inquiry-based learning is students oriented approach where the teacher guides the students and collaborates with them actively to discover the information to support their investigation. Inquiry is beneficial for students to create more memorable learning activities (Haidar *et a*l., 2020). Inquiry learning provides space, opportunities, and drive to work formally and systematically to gather facts and actual evidence, just like scientists do (Khoiri et al., 2020). Thus, inquiry-based learning was chosen to be a method, where the students' activity is involved during the learning process to gather the information rather than directly transferred by the teacher.

Inquiry-based learning leads to the understanding of phenomena through thinking activity such as scientific procedures that are made up of three components: concepts, principles, and universally applicable theories (Siregar et al., 2019). The mastery of scientific inquiry skills and content knowledge is emphasized as a bridge to achieve the current practice of the science learning process (Sarioglan & Gedik, 2020). Scientific inquiry skills are a crucial skill for understanding the nature of science through a hands-on approach, as well as a technique in solving the problem and assisting the students in acquiring 21st-century abilities (Lederman et al., 2019). However, in a study, it is still indicated that there are still many students who do not have good scientific inquiry skills to support mastery of substantive concepts, even when they were in 7th grade (Mahdiannur et al., 2020).

Implementing one method in the classroom is the strategy to reach the goals, where the students are able to understand a concept from the material that has been taught. If there are distinctions before and after students learn the topic, it can be indicated that the learning process is successful (Suwarni et al., 2018). The capacity to master a concept is critical because concepts act as the foundation for many mental activities, including the development of principles and generalizations (Shidiq et al., 2017). Students' concept mastery refers to the ability to identify and

apply the benefits of learning in their daily life. Ibrohim *et al.* (2020) stated that students' concept mastery showed a low score because they have difficulty during the learning process (Ibrohim *et al.*, 2020). Concept mastery in the form of cognitive performance is now one of the most crucial ways of assessing the performance of natural science learning. The method of learning natural science concepts will be effective if students will simplify abstract materials and make them easier to grasp, perceive, and incorporate in everyday life (Baumfalk *et al.*, 2019).

Regulating these findings in online teaching media is one of the solutions to overcome this problem. Learning management system has been utilized in several school such as google classroom and moodle, however neither of these platform able to integratet the inquiry-based system. So that the media is still lacking in involving students' thinking processes. An innovation to facing this problem is by implementing the web-based inquiry to help the learning activity that is involving students' activity through the website. Web-Based Inquiry learning gives the students the opportunity to investigate the learning scientifically. This website provides phases of inquiry learning such as formulating questions, formulating a hypothesis, planning an experiment, analyzing the data, and making a conclusion (Yasin et al., 2021). The investigation can be done through the website. By conducting scientific investigations, students can determine their problems, find information, propose alternative solutions, and evaluate the information obtained

The Web-based inquiry science environment offers a framework for students to collaborate on inquiry-based science projects using evidence and resources from the sources on the internet. Research conducted by Manoj (2010) resulted that the web inquiry science environments give more information into the classroom which engages the students' motivation and their cognitive outcomes. The web-based guided inquiry was proven as a useful teaching material, because the content was applied successfully, effortlessly, and liked by the teacher and students (Ormancı & Çepni, 2019). The web-based collaborative concept mapping can effectively support group interaction in a web-based learning environment. (Wang *et al.*, 2017). Students' knowledge integration is significantly improved after implementing the web-based inquiry (Ulus & Oner, 2020).

The topic that chosen for this research is coordination and response. There are lots of study discussed the topic related with the human activity to help clearing the concept of how our bodies function work. Coordination and response teach the students how human can create an action by analyzing the process inside the body. The conceptual aspect needed to be taught for students to open up the point of view, that there are a lots of thing inside human body that can be studied. This topic also has an experiment to build the awareness to do protection for human body such as reaction time experiment. Therefore, this topic can support the students to understand and comprehend the concept of coordination to create a response by analyzed it scientifically.

The study opens up the benefit of Web-based Inquiry Learning in terms of skill and conceptual understanding. Different from the research that has been done, this research has begun with the new website named Web-Based Inquiry Learning (WBIL) can be accessed through **http://learn-app.ddns.net/** which is able to let the students do work scientifically and find the answer by themselves. However, this research focuses on students' science inquiry skills and conceptual mastery of coordination and response topics. Therefore, the thesis proposed to carry out an analysis entitled "Students' Science Inquiry Skills And Concept Mastery by The Implementation Of Web-Based Inquiry Learning On Coordination And Response Topic" This research could be one of the references to online learning, particularly in the field of science or biology subject.

1.2   Research Problem

Based on the background stated, the research problem of this study is "Students' Science Inquiry Skills and Concept Mastery by The Implementation of Web-Based Inquiry Learning on Coordination and Response Topic"

1.3   Research Question

Detailing the research problem, this research attempt to investigate the following questions:

1) How is the implementation of web-based inquiry in learning coordination and response topics?

2) How is the students' science inquiry by implementing web-based inquiry learning on Coordination and Response topic?

3) How is the impact of web-based inquiry toward students' concept mastery in Coordination and Response topic?

1.4   Limitation of Problem

To make this research detail and avoid to misinformation, the problem is limited as follow:

1) Web-Based Inquiry Activity

The website used in this research is web-based inquiry learning (WIBL) developed by Alifa (2020) which provide 5 phases inquiry included 1) Formualting questions, 2) Formulating hypothesis, 3) Planning experiment, 4) Analyzing data, and 5) Making conclusion.

2) Students' Science Inquiry Skill

In this research, the guided inquiry learning referred to a student-centered learning approach that focuses on science inquiry skills, which allow students to do scientifically. There are several phases of inquiry learning, but this research is limited to only 5 aspects after being adapted from Ješková et al (2018) and Wenning (2007), which are formulating questions, formulating a hypothesis, planning an experiment, analyzing data, and making a conclusion.

3) Students' Concept Mastery

In this study, students ' ability to master the concept is limited to four cognitive domain levels based on Bloom's revised taxonomy (Anderson & Krathwohl, 2001) which consisted of C1 (Remembering), C2 (Understanding), C3 (Applying), and C4 (Analysing). This level cognitive is considered until four level cognitive due to the situation and based on syllabus.

4) Coordination and Response

The main topic in this research is coordination and response which is limited by the Cambridge curriculum stated in IGCSE Syllabus. The sub

optic also focuses on nervous control in humans, neuron structure and function, and the reflex arc.

1.5   Research Objective

Elaborating from the research problem that has been proposed, the objectives of this research are:

1) To investigate the implementation of web-based inquiry in learning coordination and response.
2) To investigate the students' science inquiry skills by implementing the web-based inquiry on coordination and response topic
3) To investigate the impact of web-based inquiry toward students' concept mastery on coordination and response topics.

1.6   Research Benefit

The result of this research is expected to give good benefits to certain parties as follow:

1) Students

    Students can have the experience to explore the learning processes through web-based inquiry activities to acquire better science inquiry skills and concept mastery.

2) Teachers

    This study could be used as a reference for learning media during the pandemic situation. The teacher can use this web to guide and involve to think inquiry during the online process.

3) Another researcher

    The results of this research are expected as a reference that can be used by another researcher to conduct further research with different topic in biology as well as physics and chemistry.

1.7   Organizational Structure of Research Paper

1) Chapter I: Introduction

This chapter consists of the background of the research, research problem, research question, research objectives, research benefits, limitation of the problem, and the organizational structure of the research.

2) Chapter II: Literature Review

This chapter consists of the literature on web-based inquiry, guided inquiry learning, science inquiry skill, concept mastery, with the main topic which is chosen, coordination and response topic, and relevant research.

3) Chapter III: Research Methodology

This chapter consists of the method that is used to investigate this research paper, including research method and research design, population and sample, operational definition, research instrument, instrument analysis, data collection, data analysis technique, research procedure, and research scheme.

4) Chapter IV: Result and Discussion

This chapter consists of the result and the discussion about the finding during the research.

5) Chapter V: Conclusion and Recommendation

This chapter consists of the conclusion and recommendation of this research which can be used for future research.