CHAPTER I

INTRODUCTION

1.1 Background

Critical thinking skills have long been one of the main objectives of learning. This is also expressly stated in the 2013 National Curriculum that critical thinking skills are the main competency in learning (Permendikbud, 2013). Based on the Regulation of the Minister of Education and Culture of the Republic of Indonesia, the skills that must be possessed by students are thinking and acting which consist of creative, productive, critical, independent, collaborative and communicative (Kemendikbud, 2016). Critical thinking also become one of the most essential skills in the 21st Century (Alismail & McGuire, 2015). This is because critical thinking exemplifies higher order thinking skills and has contributed to the moral development, social development, and scientific development (Tita Kartika et al., 2020).

Critical thinking skills involved the ability to solve problems, make decisions, analyze and evaluate information and practice evidence-based communication. According to Ennis (2018) critical thinking skills are reasonable and reflective thinking skills focusing on beliefs and decisions to be made. Saido et al., (2015) state that critical, reasoning, reflective, and science process skills are activities that promote the development thinking skills which is the central goal of science education. Students are able to think critically and reason if they are able to apply their knowledge to new conditions that they have never recognized (Lestari & Annizar, 2020). Trained students critical thinking will be able to help them achieve success in their learning process (Kurniasih & Hakim, 2020) and are able to solve problems in everyday life and prepare them to be successful in life (Cahyono et al., 2023).

In the 2018 PISA (Program for International Student Assessment) data organized by the OECD (Organization for Economic Co-operation and Development), Indonesia is ranked 73 out of 78 countries involved. PISA is often used as a reference to determine the quality of world education by measuring the literacy skills in reading science and mathematics of 15-year-old students from working on questions that require problem-solving abilities and reasoning abilities

(Lestari & Annizar, 2020). According to Norrizqa (2021) scientific literacy in PISA that achieves high-level thinking skills can directly review critical thinking skills because it contains knowledge in Bloom's taxonomy in the domain of applying, analyzing, and evaluating knowledge in everyday life, which encourages the ability to create something.

According to Mahapoonyanont (2012) factors affecting the critical thinking skills of students in basic education institutions consisted of teaching methods, education media, education atmosphere, student reading ability, student motivation and attitude in learning, student intention to study, and student emotional intellect. This is corroborated by Rubini et al., (2019) among all factors, the use of media in learning is very potential to build critical thinking skills and problem solving.

The term "media" is closely related to the term "technology" which comes from the Latin *tekne* (art) and *logos* (science). In general, technology is a tool used to help people in their daily activities. In terms of education, technology applies problem-solving methods to be able to solve problems rationally (Tafonao et al., 2020). In a narrow sense, educational technology is educational media, namely technology used as a tool in education to make it more effective, efficient and effective (Karpagavalli, 2014).

Based on the preliminary research conducted at one of international junior high school in Bandung, after conducting a field observation, information was obtained that in the learning process, teachers usually using learning media that have been provided by the Pearson international curriculum which includes e-modules, power points, and learning videos. As for the result of an interview with one of the science teachers at the school, the use of technology in the learning process for student individually was quite limited and only a few times due to create a conducive learning environment. If they don’t really need gadgets in learning, the teacher sets rules to collect them in teacher’s desk. The science teacher at the school also explained that the learning process that have been occur this time even with technology-based media, are not able to fully accommodate and facilitate students’ critical thinking because learning is often centered on teacher as the conveyer of material and students are given the opportunity to evaluate their understanding in the form of written test every end of unit.

Even though the use of technology in science learning is needed. As in the sub-topic of the causes of earthquake in the earthquake topic, if students are only told and taught about plate movements that cause earthquakes without knowing what the plates look like and how that movement occurs, then their senses cannot perceive abstract things that are unfamiliar to them in everyday life. In this case, the use of technology will make students more able to synthesize and elaborate on the knowledge they have learned. Previously, the earthquake in the earth topic in grade 7 and 8 at one of the international junior high school in Bandung was delivered in the form of lectures by the teacher and featuring power points related to the material.

Even though the learning media used are technology based, the transferring information of the earthquake in the earth topic in the form of lecturing by teacher and shown of power point only involves the students sense of sight and hearing. So that the ability of students to remember and explore material is less that the transferring information that can make students interact with their learning media.

Based in this preliminary research, learning media is needed which can involves of student sense of sight, hearing, and encourage them to be active in the learning process by facilitates students critical thinking skill. One of the learning media that can be used is chatbot or chatterbot where there will be a link between interaction with technology, content or learning topic, and whether or not students are facilitated to think critically through the learning media. Chatbots in the field of education can be developed as a medium that can provide instant information as requested by users at any time and can be accessed via a smartphone or computer, and can be developed to create interactive quizzes & automatic question and answer (Laksana & Fiangga, 2022).

In this study, the researchers created a chatbot called Chavabot that can facilitate students' critical thinking skills in earthquakes and mitigation topic. This chatbot was designed based on knowledge regarding the numerous possible benefits of chatbots that can be produced as supporting facilities. The study's focus on earthquakes stems from the need to considerably prevent and lessen the effects of catastrophic occurrences that may be fatal (Hariyono et al., 2016). It also alludes to Indonesia's geographical location, which makes it vulnerable to disasters that can

result in fatalities, environmental harm, property loss, and psychological effects (Permenkes, 2014). The development of learning media is required to be able to visualize the subject matter in order to provide more students an understanding and acquire an overview of the natural phenomena and the mechanism of natural disasters. This relates to the abstract mechanism of natural phenomena in this topic.

1.2 Research Problem

Based on the background which already stated, this study research problem is "How does the development of Chavabot as a Learning Media that can facilitate Student Critical Thinking Skill in Earthquakes and Mitigation topic?" from the research problem, this research attempts to seek the following questions:

1) How are the stages of development of 'Chavabot' that can facilitate students critical thinking in earthquakes and mitigation topic?
2) What are the results of the experts' judgment of the content, design, and critical thinking aspects of 'Chavabot' that can facilitate students critical thinking in earthquakes and mitigation topic?
3) How do students and teachers respond to Chavabot as a learning media that can facilitate students critical thinking in earthquakes and mitigation topic?

1.3 Operational Definition

In order to avoid misunderstanding in this study, the following terminology of the operational definition is described:

1.3.1 The Characteristics in the Development of 'Chavabot' Learning Media

Chavabot learning media is a website-based chatbot that simulates conversations with users via verbal text as commands. The development of Chavabot learning media follows the stages of the ADDIE model. In the analysis phase, needs analysis, topic analysis, and student characteristic analysis are carried out which will become input for the design and development stage. At the design stage, storyboards and flowcharts are made which are the reference for the development process. The development process includes the realization of the blueprint at the design stage. Furthermore, the learning media that has been developed are assessed by experts to then be included in the revision before implementation. Media experts and content experts assess learning media using an assessment rubric

with four assessment gradients consisting of a media rubric, content rubric, and critical thinking indicator rubric.

1.3.2 Student Critical Thinking

The critical thinking indicators used in this study consist of 5 critical thinking indicator points proposed by Ennis (2018). These indicators are used to facilitate students in critical thinking through learning media. From the five indicators, six sub-indicators were selected which included: Basic clarification (analyze arguments & ask and answer clarification questions), basis for decision (observe and judge observation reports), inference (make and judge value judgments), advanced clarification (attributes and judge unstated assumptions), and non-constitutive, but helpful (employ rhetorical strategies). These five indicators serve as a reference for creating content that can facilitate students' critical thinking skills from learning media. To see whether students are facilitated to think critically, it analyzed through the rubric of expert judgment results, and questionnaire responses from science teachers and students.

1.3.3 Expert Judgment Towards Chavabot Learning Media

Expert judgment is a validity and feasibility test carried out by selecting experts in the field of each research variable to assess each category of aspects in the media that has been developed. Experts assess through the rubric that has been made. The data obtained are processed using the Aiken's V formula and become material for revision before the learning media is implemented. In this study, there were two areas of expert selected, the first of which was an expert in the field of media development, namely a lecturer from the computer science department. These experts are assessed through the learning media design rubric which includes the categories of audio, animation, color matching, content and media placement, font type, font size, navigation, and information structure. The second expert is an expert in science education, namely the lecturers majoring in the international program on science education. These experts are assessed three different types of rubrics, namely content rubrics, design rubrics, and also critical thinking rubrics. In the content rubric, the aspect categories that are assessed are the

accuracy and veracity of the content. The design rubric is the same as that given to the expert of media development. As for the critical thinking rubric, five critical thinking indicators from Ennis (2018) are assessed.

1.3.4 Teachers Response Towards Chavabot Learning Media

The teacher response is the readability and feasibility test which was administered to science teachers after they used the learning media. The readability and feasibility level of the learning materials can have an impact on how science teachers perceive the learning media, including how easy or difficult it is to follow the instructions or interaction flow or even how clearly the learning materials may not be appropriate for the intended development. Teachers give responses through questionnaires with the Likert scale and written review, and the average percentage of the results is assessed as the readability and feasibility of the responses from science teachers.

1.3.5 Students Response Towards Chavabot Learning Media

Students' responses include the student perception response after using the learning media. It is also the readability and feasibility of the learning media that can measure students experience, student opinion through design, content, and critical thinking skill category aspects in the learning media. The readability and feasibility of students' perception responses are assessed by the questionnaire and are measured by Likert scale, written review, and the average percentage of the questionnaire result.

1.4 Limitation of Problem

In order to make the research focused, the research will be limited to as follows:

1) Chavabot as Learning Media

Chavabot in this study is the first version of learning media developed to facilitate students' critical thinking skills in the earthquake and mitigation topic. Chavabot consists of fixed response buttons and keywords programmed to trigger specific responses. It is built with five choices of learning subtopics, one quiz button, and one fun room button containing games that sharpen memory, additional learning videos, and songs related to the material. Chavabot is a website-based chatbot so it can

be accessed on gadgets with a URL address and does not require a companion application to access it. Regarding that, the development of Chavabot as a learning media is the main focus of this study.

2) Facilitating Students' Critical Thinking

In this study, the critical thinking indicators used include 5 critical thinking indicator points proposed by (Ennis, 2018). From the five indicators, six sub-indicators were selected which included: Basic clarification (analyze arguments & ask and answer clarification questions), basis for decision (observe and judge observation reports), inference (make and judge value judgments), advanced clarification (attributes and judge unstated assumptions), and non-constitutive, but helpful (employ rhetorical strategies). These indicators are used as a guide in creating content that can facilitate students in critical thinking and also one of the points analyzed by the assessment of experts, and questionnaires of science teachers and students. This study is limited to the stage of developing learning media and in its implementation the researcher collects data to find out student responses whether this learning media facilitates them to think critically or not, this is measured through a questionnaire.

3) Earthquake and Mitigation Topic

The topic on this research is limited by containing earthquakes and mitigation which includes the process of earthquake occurrence, earthquake measurement, earthquake magnitude, and earthquake mitigation. This topic proposed for 7 and 8 grade students.

1.5 Research Objectives

The objective of the research defines below:

1) To design and develop 'Chavabot' that can facilitate student critical thinking in earthquakes and mitigation topic.
2) To analyze the expert's judgment on content, design, and critical thinking aspect of 'Chavabot' that can facilitate student critical thinking in earthquakes and mitigation topic.
3) To analyze the student's and teachers' responses towards 'Chavabot'

that can facilitate student critical thinking in earthquakes and mitigation topic.

1.6 Research Benefit

The result of this study is expected to have benefits as follow:

1) For teachers

   The teacher will be able to use it as learning media to help teaching earthquake and mitigation topic. Earthquake and mitigation topic are not a hard topic for students to understand, however, the concept is sometimes underestimated by students especially in junior high school. Chavabot can be used as an alternative for independent learning or even in class. Teachers can take advantage of the "quiz" button menu in Chavabot which contains practice questions to measure students' ability to understand the material.

2) For students

   The benefit of this research for students is they can learn science in a new and interactive way. Students can interact with technology and get interesting learning experiences from learning packaged in gamification on Chavabot. Through Chavabot, students are expected to be able to learn concepts of earthquake and mitigation while explore their critical thinking skill at the same time. It also more convenient, since students can access the learning media anywhere and anytime as long as they are able to connect to the internet. Furthermore, students can improve their skill in using technology.

3) For others researcher

   The study can be used as reference to develop a chatbot for learning media. The design of the Chavabot can be evaluated in term of strength and weakness. It also can be evaluated to prove whether the Chavabot can help students develop their critical thinking skill.

1.7 Organization of Research Paper

There are five chapters in this research. The following is a description of the organizational structure of this research:

1) The first chapter is introduction which is in this chapter several point

will be explained such us the background of this research, the research problem and the question, the limitation of the research, operational definition, objective of the research, research benefit, and the organization of this research.

2) The second chapter is literature review which is in this chapter contains the theory of the research variable. It begins from the explanation of chatbot as learning media, students' critical thinking, until the explanation of earthquake and mitigation topic.
3) The third chapter is about research methodology where in this chapter consist of research method and design, population and sampling, hypothesis and assumption, research instrument, data analysis, and the procedure of this research.
4) The fourth chapter is the results and discussion which contains the implementation of the results of the research design that has been made before, the results of judgment from experts, questionnaire responses from teachers and students, as well as the interpretation of the data obtained.
5) The fifth chapter includes conclusions, implications, and suggestions which describe the summarize of research findings, and the recommendation for others researcher.