# CHAPTER I
# INTRODUCTION

## 1.1 Background

Natural Science is an interdisciplinary life sciences major, with courses in biology, chemistry and physics. Natural Sciences concerned with how to find out (inquiry) about the nature systematically, so that natural science is not for a mastery of knowledge; facts, concepts or principles, but also a process of discovery (BSNP, 2006).

Biology as a science provide a variety of learning experiences to understand the concepts and scientific process includes observing, hypothesizing, using of tools and materials well and right, considering the security and safety, asking questions, classifying and interpreting data, communicating findings orally or written, discovering and sifting the relevant factual information to test the ideas or solve daily problems (BSNP, 2006). Biology is science have to learn and practice directly.

The common problem of education is that the majority of students tend to memorize learning material but they do not understand the concept correctly, not able to apply theory and concept in the solving the problem (Wina, 2006). This supported by Trianto (2009) that students are only memorize the concept and less apply those concept in daily life. These case are inconsistent with the educational goals, teaching and learning activities are direct for mental formation that affect cognitive development and helps student aware the thinking process. It includes basic skills, knowledge, attitudes and motivations.

Studies of learning biology revealed that in high school had a lot of experience difficulties. The main reasons for learning difficulties were the nature of the topic, teacher's style of teaching, student's style learning and studying habits, student's negative feelings and attitudes towards the topic and a lack of resources. The characteristics of biological science include many abstract concepts, events, topics and facts that students have to learn (Cimer, 2012). Lazarowitz and Penso (1992) reported that high school students difficult to learn

physiological processes that need analyzing, reasoning and critical thinking skill. Human circulatory system topic is categorized difficult to comprehend because its complicated characteristics which deal with complex mechanism.

Through the implementation of PPLT (Integrated Field Experience Program) 2012/2013 in SMA Negeri 2 Balige, many student experienced difficulty in learning biology. The result of Mid Semester test revealed that about 40 % of student's score under the CMC (Criteria Minimum Completeness) which is less than 75. Seen from list set value (DKN), that class XI IA, student achievement in human circulatory system topic is about 50% below the value 75. Another biology teacher, said that is probably caused by some reason, such as the deadline for complementing all learning material. Those students with low score indicated that they have not mastered the subject. The interview result from several student said that biology lesson disinterest because contain a lot of concepts, various biological events that cannot be seen by the naked eye, some concepts are too abstract and full memorization. Chiepetta and Fillman (1998) state that the learn material through memorization, prevents meaningful learning (Cimer, 2012). Generally, biology lesson still carry out through teacher's lectures or teacher-centered lessons. Even, in SMA Negeri 2 Balige still dominated by teacher-centered learning so that student focus on teacher, does not accustoming to think critically (Tarigan, 2012). Critical thinking skills is one type of thinking skill that will be achieved if students are more involved in the learning process (Permendiknas RI No. 22 Tahun 2006).

According to Wina (2006), one of teacher's mistake in class is does not attempt to find out the student prior knowledge and stimulate student critical thinking skill. The above reasons suggest that biology teachers should enable students to understand the concepts of biology and its applications to daily life. Science education researches have established that student's alternative conceptions in science is very tenacious and traditional instruction is not very effective in promoting conceptual understanding.

To highlight of evidence of above research studies, designing new instructions is needed to improve biology achievement. Effective instructional

strategies by promoting the active role of the learner and the facilitative role of the teacher become essential. Teacher should find out the best way to convey the concepts to be taught so that students can remember longer and learn how to relate it to real life. Teacher should choose and use teaching and learning method to improve student learning achievement and critical thinking.

Bybee (2006), in research conference about *Biological Sciences Curriculum Study (BSCS)* wrote that students come to the classroom with preconceptions about how the world works. If their initial understanding is not engaged, they may fail to grasp the new concepts and information, or they may learn them for the purposes of a test but revert to their preconceptions outside the classroom. This supported by Prain (2009) teacher need to know the prior knowledge and student's understanding of concepts in learning that can do in various ways, such as test, query, and interview. This study follows the principles of constructivist learning. Learning is process to construct knowledge through real experiences from the field. So, teachers should make biology lessons interest and attractive for students to learn more effectively. Teachers might accomplish this by using visual materials, teaching through practical experiment, giving examples from student's daily lives, linking the topics to each other (Cimer, 2012).

The POE strategy provides more effective teaching strategy. POE (*Predict–Observe–Explain*) is learning strategy which developed to find out student's understanding about concept with constructivist approach. Özemir *et al* (2011) wrote that one of the ways to promote student's attitudes toward science is to use laboratory in science courses. Methods can be used to think about results of experiments for students in laboratory. The POE strategy was firstly developed by White and Gunstone (1992). In the POE strategy, students are asked to do experiments for the prediction, then make the observation and description and then ask to compare their observations with the predictions (cited in White and Gunstone, 1992; Çepni and Çil, 2009; Liew, 2004; Köse et al., 2003).

Furthermore, according to Slavin (2004) cooperative learning very effective in solving the problems encountered in the effort to enable students to learn. According to the Johnson & Johnson model, cooperative learning is

instruction that involves students working in teams to accomplish a common goal Cooperative learning can be used in for any type of assignment that can be given to students in lecture classes, laboratories, or project-based courses (Felder and Brent, 2007). Cooper (1995) argues that putting students in group learning situations is the best way to foster critical thinking. Think-Pair-Share is one of cooperative learning strategies students are prompted to think about a topic or problem, record their ideas, pair with a neighbor, and share their ideas.

Previous studies was conducted POE strategy in high school in the subjects of physics states that POE can improve student's mastery of concepts in the material on the pressure and creative thinking skills, including Kusrinaningrum (2012), in her research entitled *The Effectiveness of Using POE Strategy (Predict, Observe and Explain) for Increasing the Critical and Creative Thinking Skills for students at SMP N 1 Karangtengah on Pressure Subject of Natural Science Learning* concluded that the the learning strategy using POE was effective to increase the critical and creative thinking skills. Wui –Tsai (2005) on their studies "*Effect of constructivist-oriented on elementary school student cognitive structures"*, applied POE strategy in constructivist-oriented biological learning to enhance students' conceptual learning and knowledge construction. Manurung (2011) in her research was applying POE models assisted with multimedia to make learning process more interesting, interactive, and facilitate the understanding of the students so that they can think critically and use the scientific method to solve problems. And the result shows the increasing of student learning outcome.

While, Berutu (2011), in her research in comparing between NHT (*Numbered head Together*) and TPS (*Think- Pair-Share*) that result of student learning outcomes in TPS (*Think-Pair-Share*) teaching is better than NHT (*Numbered Head Together*). Ifamuyiwa, A. S and Onakoya, S.K (2013) in their research " *Impact of Think-Pair-Share Instructional Strategy on Students' Achievement in Secondary School Mathematics*" showed that there was significant main impact of treatment (Think-Pair-Share) on the student's achievement. Siahaan, H. L (2013) also examine *Pengaruh Model Pembelajaran Think – Pair*

*– Share Terhadap hasil belajar siswa Menggunakan Peta Pikiran Terhadap Siswa Kelas X SMU Pada Pokok Bahasan Struktur Atom* revealed that Think – Pair – Share has significant effect on student's learning achievement.

Based on the problems described above, the researcher compare those two learning models on student learning achievement, activity and critical thinking skill on Human Circulatory System. The study was entitled "**The Comparison between POE (*Predict-Observe-Explain*) with TPS (*Think–Pair–Share*) Learning Model on Student's Learning Achievement, Activity and Critical Thinking on Human Circulatory System Grade XI SMA Negeri 2 Balige Academic Year 2013/2014***"*

## 1.2 Problems Identification

Based on the background of the problem, the problem can be identified :

1. The learning achievement of student's SMA Negeri 2 Balige is low.
2. The classes are still teacher centered.
3. Students are directed only to memorize information without needs of understanding and applying.
4. Less of learning process during biology lesson.

## 1.3 Scope of Study

The scope of study, namely:

1. Learning topic taught in this research is Human Circulatory system in Grade XI Natural Science SMAN 2 Balige at A.Y. 2013/2014.
2. The implementation of POE (Predict – Observe – Explain) model and TPS (Think – Pair – Share)learning model.
3. Comparison of student's learning achievement, activity, and critical thinking that taught by POE (*Predict-Observe-Explain*) and TPS (*Think – Pair – Share*) Learning Model on Human Circulatory System in class XI SMA Negeri 2 Balige at Academic Year 2013/2014.

## 1.4 Research Questions

From the background and the extent of the problems above, the questions can be formulated:

1. Is student's learning achievement taught using POE (*Predict-Observe-Explain*) higher than student's achievement taught using TPS (*Think–Pair– Share*)?
2. Is student's learning activity taught using POE (*Predict-Observe-Explain*) higher than student's learning activity taught using TPS (*Think–Pair-Share*)?
3. Is student's critical thinking skill taught using POE (*Predict-Observe-Explain*) higher than student's critical thinking skill taught using TPS (*Think – Pair – Share*)?

## 1.5 Purpose of Research

This research aim to compare student's learning achievement, activity and critical thinking skill taught by POE (*Predict-Observe-Explain*) with TPS (*Think – Pair – Share*) Learning Model.

## 1.6 Significances of Research

These research significances are for:

1. Teachers (Educator):
   - As an input in teaching especially in the high school biology teachers teaching in class XI Natural Science
   - As an alternative for teachers who teach science in selecting and determining learning strategies.
2. Students:

   POE and TPS learning strategies require students to study concretely the knowledge of the existence of the current study, expected to motivate students to actively involved in learning activities that can improve mastery of concepts and their understanding of the biological material, in particular physiological concept of human circulatory system .

**1.7 Operational definition**

Critical thinking in this research defined as a process of intelligent conceptualization, implementation, analysis, synthesis, and generated the information by observation experience, reflection and reasoning.

When students think critically, they will show the processes as follows submit the questions, knowing the difference between the observations and conclusions, provide an explanation and interpretation, and make observations and predictions. Learning achievement is student's mastery learning, as the result of student's cognitive test on Human Circulatory System.

Predict-Observe-Explain (POE) carries out three tasks. First, students must predict the outcome of some event or situation and must justify their prediction (P:Predict). Second, they describe what they see happen (O: Observe). Finally, they must reconcile any discrepancy between prediction and observation (E:Explain).

Think-Pair-Share (TPS) is one of cooperative learning strategies students are prompted to think about a topic or problem and record their ideas, the pair with friend, and share their ideas. Both of these stimulate student's critical thinking and interactive lesson.