CHAPTER I

INTRODUCTION

1.1. Background of the Problem

In facing the 21st century, Human Resources (HR) must have the ability to think critically in solving a problem, making decisions, working together, communicating, literate in information and communication technology (ICT), as well as personal and social responsibility. This is appropriate with the demands of the 2013 Curriculum which requires students to be active, develop the ability to think critically, systematically, objectively, chronologically, and creatively in the learning process. Critical thinking skills can be trained by applying an assessment instrument based on higher-order thinking skills (Jannah, K., & Pahlevi, T., 2020).

Critical thinking is one of the higher order thinking skills (HOTS). Critical thinking includes the ability to analyze, evaluate and create. Analysis is the ability to think in specializing certain aspects; Evaluation or considering is the ability to think in making decisions based on matters relating to the real world; and creative is the ability to think in building broad insights owned by these students. So students are directed to learn more actively and have higher-order thinking skills (Umami, *et.al*., 2021). Students with high-order thinking skills are expected to be able to obtain a solution of a problem (Desiriah, E., & Setyarsih, W., 2021). In higher order thinking, what is meant by thinking is not only stating facts, but also understanding facts, then connecting facts, categorizing facts, manipulating facts and using facts in new situations to solve a problem (Rodiana, S., & Pahlevi, T., 2020).

Barnett and Francis stated that giving HOTS questions could make students understand the material presented in more depth. In the context of assessment HOTS questions can be used to measure (1) inter-concept understanding skills, (2) information integration and processing, (3) search for related information obtained, (4) the process of using information to solve problems (problem solving) and (5) the ability to find new ideas from the information (Ministry of Education and Culture, 2019) (Desiriah, E., & Setyarsih, W., 2021).

HOTS is an instrument that is deliberately designed to measure high-level thinking skills. So the HOTS-based questions contain cognitive domains from C4 to C6. So, the HOTS questions can be oriented to each subject (Saraswati, P., & Agustika, G., 2020). These HOTS skills are a form of refinement that must be implemented in the 2013 revised 2017 curriculum as a structured effort in dealing with the Industrial Revolution in the 21st Century (Kuswari, *et.al*., 2021).

Students really need high-level thinking skills in solving a problem in everyday life, especially those that are complex, if learning in schools is not able to provide provisions and knowledge to students so that they are skilled at higher-order thinking then it will produce graduates who are likely to be less prepared to deal with various problems that arise in the real world (Maulidia, F., & Pahlevi, T., 2020).

Center on the Developing, Harvard University states there are some basics in the formation of thinking skills require a learning system that can build students to have HOTS abilities. Higher Order Thinking Skills or interpreted as high-order thinking skills, is a new learning dimension that can be applied by educators in Indonesia and internationally (Maulidia, F., & Pahlevi, T., 2020).

In addition to having high-order thinking skills, students in the 21st century must also be scientifically literate or scientifically literate. Scientific literacy is the ability to identify questions, acquire new knowledge, explain scientific phenomena and draw conclusions based on scientific facts and evidence regarding scientific concepts. Scientific literacy can also be interpreted as a science and understanding of scientific concepts and processes that enable a person to make a decision based on the knowledge they have so that scientific literacy will be able to play an active role in all aspects of life, especially in the field of science they are involved in (Hasasiyah, *et.al*., 2019).

Several international studies have been conducted to measure students' literacy abilities, including the Program for International Student Assessment (PISA). The Program for International Student Assessment (PISA) is a study that aims to determine the results of the education system related to the literacy abilities of 15 year old students. PISA studies were conducted in several developed and developing countries starting in 2000 at intervals of three years. The areas of study studied and

assessed include reading literacy, mathematical literacy, and scientific literacy (Hasasiyah, *et.al*., 2019).

Indonesia is one of the countries participating in the International PISA study, but the achievements of Indonesian students are still in the low category compared to other countries and have not experienced a significant increase in the last 5 periods (Putri, *et.al*., 2018). Based on the results of the 2018 Program for International Student Assessment (PISA) study, Indonesia ranks 75th out of 80 countries in the aspect of scientific literacy with an average of 396 and an average understanding of cognitive domains C5 and C6 of 0.08% (Lestari , D., & Setyarsih, W., 2020).

The main factor that causes the low scientific literacy of students in Indonesia is the lack of training of students in solving a complex problem or they are still not trained in solving problems with characteristics such as PISA questions. In fact, to increase scientific literacy or scientific literacy, teachers also need evaluation tools based on scientific literacy. Teachers often ignore scientific literacy-based evaluation tools because they do not understand how to make these evaluation tools (Hasasiyah, *et.al*., 2019).

In the 2013 Curriculum learning system there are three components that are interconnected and cannot be separated. These components are the objectives of the learning itself, the process of implementing and evaluating learning. Learning objectives are made in the direction of learning activities and the assessment process. In teaching and learning activities, assessment is an important matter, because by assessing the learning process students can find out whether or not the learning objectives that have been formulated and desired in the standard minimum completeness criteria can be determined. With this assessment system, educators can find out how efficient the techniques used are in the learning process (Umami, *et.al*., 2021).

Assessment is an important thing that is done by educators to get results from the learning process of students during learning. Assessment is one of the four tasks of educators in carrying out learning, where these tasks consist of planning, implementing, assessing learning success, and providing guidance to students. Assessment is seen as an important factor when it comes to achieving successful learning processes and outcomes, the implementation of the assessment must be able

to provide information to teachers in improving teaching and learning activities and ensuring students achieve maximum learning. In the learning aspect, research instruments with this type of test can be used as a tool to measure learning outcomes (Maulidia, F., & Pahlevi, T., 2020).

Assessment of students must be in accordance with assessment standards, because assessment standards are closely related to procedures, mechanisms, and learning outcomes assessment instruments. The ability to assess must be familiar and mastered by all educators. Therefore, in the assessment required methods or techniques and instruments. This must be considered and prepared in the process of an assessment of student learning outcomes, so that later the learning objectives can be achieved (Hariono, *et.al*., 2021).

Learning objectives are of course prepared by the teacher, so as a teacher it is necessary to develop learning objectives appropriately. So, the learning objectives are able to increase the quality of education and will advance human resources. A teacher must be able to carry out and use assessments, assess processes, and learning outcomes. Educational assessment is a method of collecting and processing information to determine learning outcomes (Regulation of the Minister of National Education of the Republic of Indonesia Number 20 of 2007). Assessment of learning outcomes is carried out in order to determine learning progress, monitor the learning process, improve learning outcomes and then to determine achievement in learning (Aisah, S., & Pahlevi, T., 2020).

A teacher in carrying out an assessment does not just give questions to students, but must follow up as a learning need. And in conducting assessments, teachers also need assessment instruments in the form of questions that test cognitive, affective, and psychomotor abilities. However, in most schools there are still problems related to questions that only measure memory, resulting in a lack of training students' higher-order thinking skills, the cause of the problem is that they are still limited in working on HOTS-based questions and teachers are still lacking in developing HOTS-based questions. In training students to work on questions with HOTS characteristics, it is necessary to develop HOTS-based assessment instruments related to cognitive abilities including analyzing, evaluating, and creating. Because

the development of higher-order thinking skills have been become a major topic at this time (Aisah, S., & Pahlevi, T., 2020).

Assessment of the cognitive domain itself is a process of gathering information about students' thinking abilities, which is integrated with their mastery of knowledge. In more detail, the Development Directorate Team (2017) describes that cognitive domain assessment is the process of collecting and processing information to measure the process and results of achieving student competencies in the form of a combination of mastery of cognitive processes (thinking skills) remembering, understanding, applying, analyzing, evaluating, and create with factual, conceptual, procedural, and metacognitive knowledge (Putri, H., *et.al*., 2022).

On the cognitive aspect, based on the 2013 curriculum document, there is an emphasis on competence in the realm of attitudes, cognitive skills, psychomotor skills, and knowledge for an educational unit and subject which is marked by the number of basic competence in a subject. The learning process is based on efforts to master competence at a satisfactory level by taking into account the characteristics of competency content where knowledge is content that is complete (mastery) (Juliandita, E., *et.al*., 2016).

Based on the observation results show that, the development of cognitive assessment instruments themselves is still rarely carried out which of course affects student learning outcomes. Where, the assessment tool used by the teacher still refers to the measurement of Low Order Thinking Skill (LOT) and also Medium Order Thinking Skill (MOT). However, it is possible to do a combination of the two levels of thinking, namely LOT and MOD. Determining the quality of the items in addition to having to be valid and reliable must also pay attention to the level of thinking ability in accordance with the demands of the 2013 Curriculum which directs learning and assessment towards HOTS (High Order Thinking Skill). However, in reality there are still items used to test cognitive abilities that do not pay attention to higher order thinking skills.

A good test instrument can actually improve the quality of the assessment results, namely being able to find out the ability profile of students. Assessment using a written test is most often used to determine students' cognitive abilities. Skill-

oriented learning instruments are important to develop. Thinking skills can be developed through a conditioning to think. Therefore, it takes a process of practicing thinking through answering questions that is oriented towards higher-order thinking skills so that students are able to follow developments in science and technology (Tarliany, E., *et.al*., 2019).

In the research that will be conducted, the assessment that will be used is the HOTS-Literacy assessment. The HOTS-Literacy assessment is an assessment that presents test questions at a high cognitive level to students so that they can improve their critical thinking and creative thinking skills. HOTS assessment has three main principles, namely (1) giving stimulus in the form of text or other forms, (2) giving new problems that have not been given in class, (3) giving questions with different types of difficulties and different cognitive levels (Desiriah, E., & Setyarsih, W., 2021). Thus, the use of the HOTS-Literacy assessment instrument is considered a means of increasing students' ability to understand material and can be used by a teacher in evaluating their learning.

Based on the problems described above, researchers are interested in developing a cognitive assessment tools based HOTS-Literacy. This research is expected to be able to design assessment tools and get good response by material experts, teachers and students. So the researchers proposed a study entitled **"Development of HOTS Literacy Based Cognitive Assessment Tools on Acid Base Material"**.

1.2. Identification of Problems

Based on the description of the background above, the scope of this study is:

1. Low level thinking skills of students.
2. The assessment tool used by the teacher is still combine at LOT, MOT and a little HOT.
3. Lack of availability of assessment tools at C4 to C6 levels.
4. It is necessary to develop HOTS Literacy based cognitive assessment tools.

1.3. Scope of Research

The scope of this research is as follow:

1. The development of HOTS Literacy based cognitive assessment tools was developed by using 4D model.
2. The development of HOTS Literacy based cognitive assessment tools only for acid base material and the instrument is in the form of multiple choices accompanied by the reason for the answer.

1.4. Scope of Problem

To obtain a clearer and more focused picture of the problem formulated, the writer will provide the following problem limitations:

1. The HOTS-Literacy based test instrument developed is a test instrument from C4-C6 levels based on Bloom's Taxonomy.
2. The quality of instruments used based on validation by material experts and teachers follows BSNP feasibility standards.

1.5. Formulation of Problem

The formulations of the problems in this research are:

1. What are the results of analysis cognitive assessment tools used by teacher in the school?
2. How to develop HOTS Literacy based cognitive assessement tools on acid base material?
3. What is the feasibility level of HOTS Literacy based cognitive assessment tools on acid base material based on the BSNP?
4. How students response to HOTS Literacy based cognitive assessment tools on acid base material?

1.6. Objectives of Research

Basically this research aims to find answers to the problems that have been stated above, in detail the objectives of this research are:

1. To obtain the results of analysis cognitive assessment tools used by teacher in the school.
2. To develop HOTS Literacy based cognitive assessement tools on acid base material.
3. To know the feasibility level of HOTS Literacy based cognitive assessment tools on acid base material based on the BSNP.
4. To find out students response to HOTS Literacy based cognitive assessment tools on acid base material.

1.7. Benefits of Research

1.7.1. Theoretically

To develop HOTS Literacy based cognitive assessment tools, as information and reference material in the development of HOTS Literacy based cognitive assessment tools on acid-base material.

1.7.2. Practically

1. For Teachers

The results of this study can later provide input to teachers in making and selecting better assessment tools to facilitate and encourage students to think higher-orderly.

2. For Students

Instruments can be used as material for practice questions in training HOTS-Literacy and can improve students' high-level thinking skills, especially in acid-base material.

3. For School

Can apply HOTS Literacy based cognitive assessment tools to improve student achievement so can improve the quality of learning.

4. For Researcher

Can add insight, ability and provide new experience to researchers in making HOTS-Literacy based assessment tools and obtain research results for making a final project report.