

CHAPTER I

INTRODUCTION

1.1 Background

Quality of education is one of the global action plans set out in the sustainable development goals agreed by world leaders, including Indonesia. This is intended to ensure an inclusive and equitable quality of education and improve lifelong learning opportunities for everyone. Improving the quality of learners will support sustainable development and answer the challenges in this globalization era. Learning activities are designed to be centered on students to be able to improve the ability to think critically, creatively, problem solver and be able to collaborate well.

The 21st century is a century of science that is widespread in the era of information and technology that is developing. These challenges must be faced by students and teachers in order to survive, especially in the learning process. Scientific literacy skills are urgently needed to survive the 21st century problems in contextual problem solving. Based on these objectives, education should focus on scientific literacy as stated by the National Research Council (2001). Scientific literacy according to PISA (Programme for International Student Assessment) is an activity of understanding and making decisions based on evidence in nature based on scientific knowledge, ability to identify questions, and draw conclusions (Sui & Ho, 2010). This ability can help the application of learners' knowledge to solve problems in the personal, social and global spheres (OECD, 2014). In addition, Suratsih (2010) stated that scientific literacy is also important in the world of work that will be faced by students. Scientific literacy is divided into 3 large dimensions, namely content, processes, and science context/application.

Science education has been applied in Indonesia for many years, but the results for Indonesia on the international evaluation, especially in the field of scientific literacy are still lacking. Through the PISA (Programme for International Student Assessment) program in 2015 the results of science,

reading and math literacy skills of Indonesian students at the age of 15 years on average were ranked 62, 61, and 63 out of 69 countries evaluated (OECD, 2014). Based on the study results, the average value of student scientific literacy skills of senior high school in each scientific competency is, 22.66 for competence to explain phenomena scientifically, 47.15 for evaluating and designing scientific investigations competence, and 28.44 for the competence to interpret scientific data and evidence (Sutrisna & Anhar, 2020). Scientific literacy skills is not only influenced by learning models but some of the factors that influence students' scientific literacy results are the selection of learning books and the low scientific literacy of students (Rusilowati et al., 2016).

Science textbook usually present the material in text form to be memorized by students rather than present the processes for involving students about how the knowledge is acquired. Most of the scientific literacy indicators in textbook are taught by reading and writing only (Rokhmah et al., 2017). Adisendjaja (2010) reported the results of his research on three science teaching books analyzed stating that the proportion between science content, science process ability and science context ability in the teaching materials he studied is still relatively low. The dimensions of knowledge (content) aspects only reached 13.34%, 14.44% in the process dimension, and 15.32% in the context dimension. The low dimension of content is due to learning tends to emphasize understanding through memorization in remembering. So there needs to be an emphasis on teaching materials. Other studies obtained the results of scientific literacy analysis in the class X high school chemistry textbook in Bener Meriah District has an unbalanced proportion (Anbiya et al., 2018).

Chemistry is one of the important branches of science that leads students to find out what is happening around them (Sirhan, 2007). Chemistry studies everything related to the composition, properties, structure, dynamics, transformation and energetics of a substance. The development of teaching material based on scientific literacy in thermochemical topic for chemistry students in university shown good readability value with the percentage of about

83.79%, which averages the good application of scientific literacy in textbook make students more easy to understand (Sutiani et al., 2020).

The other topics in chemistry is acid base which is a learning material that requires an integrated understanding into many chemical concepts such as particle characteristics in a material, the properties and composition of solutions, atomic structures, ion and covalent bonds, symbols, formulas and equations of reactions, ionization and equilibrium (Sheppard et al., 2006). Based on the results of interviews conducted by Purnama et al., (2016) it was obtained that the lowest chemical finish value for class XI is acid base material. The need for a deeper understanding of the concept of acid base can be overcome, one of which is by providing teaching materials that can be arranged to the needs and abilities of students.

Teaching materials that can be arranged based on the needs and abilities of students can be in the form of modules. The module has self instructional characteristics, which can help students to learn independently (Cahyadi, 2019). According to Nurdyansyah & Fahyuni (2016), learning with modules allows students to quickly complete one or more basic competencies than other teaching materials. To improve the quality of learning needs to be supported by the use of technology-based learning media. Electronic module or e-module is one of the technology-based learning innovations from print modules that can make the learning process more interesting, interactive, can be done anywhere and anytime, and can improve the quality of learning better. E-module is packed with more concrete presentation of materials and equipped with learning simulation support (Sholeha et al., 2018).

Based on the explanation above, the researcher interested in growing and improving students' scientific literacy skills in solving a problem by presenting teaching materials that are closely related to aspects of scientific literacy that are equipped with technological and societal issues. Several acid base modules have been developed before with the application of scientific literacy as a whole in a single material. E-Module based on scientific literacy that will be developed by

researchers will apply all four aspects of scientific literacy skills to all indicators of alkaline acid material that equipped with information about science issues and supported by the use of other sources using technology that other researchers have never applied with entitled "**The Development of Acid Base E-Module Based on Scientific Literacy**".

1.2 Problem Identification

Based on the background of the problem that has been stated above, the problem can be identified as follows:

1. The level of Indonesian students' scientific literacy skill based on PISA 2009, 2012, and 2015 are still bellow the average of the OECD Standard
2. Difficulties of students in the study of acid base material
3. Lack of teaching materials on acid base material arranged based on aspects of scientific literacy

1.3 Research Scope

The limitations of problems in this research are as follows:

1. The focus material in this research is acid base solution in class XI
2. Developing e-modules of acid base material from several sources based on the aspects of scientific literacy
3. Modules will be reviewed and validated by 3 chemistry lecturers and 2 chemistry teachers until e-modules are obtained based on scientific literacy
4. Modules will be assessed by 2 chemistry teachers and 20 students
5. This research only reached the revision stage based on limited field testing results to get the readability value

1.4 Problem Statement

Based on the background of the problem and the identification of the problem, the problem formulation in this study is as follows:

1. How is the feasibility level of grade XI chemistry teaching materials in acid base material in high school based on scientific literacy aspects?

2. How is the feasibility level of e-module development result based on scientific literacy and BSNP from validator assessment?
3. How do teachers respond to e-modules development result based on scientific literacy on acid base material?
4. How do students respond to e-modules development result based on scientific literacy on acid base material?

1.5 Research Objectives

The objectives of this study are:

1. Knowing the advantages and disadvantages of teaching materials used by students based on scientific literacy aspects
2. Knowing the feasibility level of acid base e-modules development result based on scientific literacy and BSNP from validator assessment results
3. Knowing the teacher's response of acid base e-module development result based on scientific literacy
4. Knowing students' response of acid base e-module development result based on scientific literacy

1.6 Research Benefits

The benefits to be achieved in this research are as follows:

1. The development of e-modules based on scientific literacy in acid base material can be used as a reference for learning resources in Indonesia
2. The development of e-modules based on scientific literacy in acid base material can improve students' scientific literacy skills

1.7 Operational Definitions

1. Learning E-module is a set of learning tools or tools containing materials, methods, limitations, and how to evaluate systematically and interestingly designed to achieve the expected competencies in accordance with the level of complexity (Depdiknas, 2008). Various components of electronic modules presented online with text and images, videos, simulations, and feedback questions (Suarsana & Mahayukti, 2013).

2. Scientific literacy defined by the OECD (Organization for Economic Cooperation and Development) is as the ability to deduce and solve problems about nature and the interaction between nature and society (Nbina & Obomanu, 2010).

3. Scientific literacy-based learning modules must have several basic categories. The basic categories are science as a body of knowledge, science as the nature of investigation, science as a way of thinking, and interaction of science, technology, and society (Chiappetta et al., 1991). Rusilowati et al., (2016) adds in the category of interaction with the environment.

4. Feasibility

Feasibility of acid base e-module based on scientific literacy is a criterion for determining modules and consideration materials in making decisions, whether to accept or reject from the planned idea. The feasibility of e-module development results is measured based on the feasibility of teaching materials set by BSNP and feasibility based on aspects of science literacy which include aspects of science as body of knowledge, science as a way of thinking, science as a way of investigating, and the interaction of science, technology and society. The module development feasibility standard that must be achieved is 4.17 to 5.00.

5. Students and Teacher Response

The teacher and student's response to an acid base e-module based on scientific literacy is a reaction or answer or response from the module user. Teacher and student responses are measured using assessment questionnaires by looking at the display aspects, material aspects, and benefit aspects of the module.