CHAPTER I
INTRODUCTION

1.1. Background

According to Arifin (2012), assessment is an activity that is carried out to give a variety of continuous and complete information about the processes and achievements that students have attained. The assessment is done to measure the attainment of student learning outcomes, so that students' weaknesses and strengths may be identified during the learning process. Teachers and students now can focus on what needs to be improved and reflect on what they accomplished throughout the class.

Because one of the assessments can be done using a test, the teacher must create a test instrument. However, numerous incorrect practices in the preparation of test instruments have been discovered in schools thus far. Many incidents reveal that teacher do not follow protocols while preparing instruments, such as (1) arranging test instruments without using a draft. The teacher instantly selects questions from the question collection book; (2) the teacher does not consider the proportion of the difficulty level of the questions; (3) no evaluation of the prepared items was performed; and (4) test procedures and item analysis were not performed (Ali & Khaeruddin, 2012). In a study conducted by Mustari (2016) in three schools in Bandar Lampung in 2016, it was discovered that teachers only used assessment instruments in the form of cognitive test kits that were used from year to year with no updates, so teachers were uninformed of the validity constructs and quality of cognitive tests used as instruments for students' thinking skills.

According to Minister of Education and Culture Regulation No. 104 of 2014, teacher' assessment objectives in the knowledge aspect should include thinking skills and the dimensions of knowledge developed according to Anderson and Krathwol's processing, namely thinking skills consisting of the ability knowing, understand, apply, analyze, evaluate, and create, as well as dimensions knowledge consisting of factual, conceptual, procedural, and

metacognitive. Procedural knowledge and metacognitive knowledge are two types of knowledge that got less attention in the old taxonomy. To fulfill national education standards, every student in school must have factual, conceptual, procedural, and metacognitive knowledge, and teachers as educators must be encouraged to produce test instruments to measure students' knowledge, which has been neglected thus far.

Core Competency 3 of the Kurikulum 2013 requires SMA/MA students to have dimensions of factual, conceptual, procedural, and metacognitive knowledge based on students' curiosity about science, as well as applying procedural knowledge in specific fields of science in accordance with students' talents and interests in problem solving, because students with procedural knowledge will be able to understand how to do something and choose the right criteria to use skills with the rigors of the curriculum (Kemendikbud, 2018).

In the kurikulum merdeka for general outcomes and understanding of physics, students are expected to be able to apply the concepts and principles of the Topic taught in phase F, one of which is fluid dynamic topic. Applying concepts will be possible if students have procedural knowledge. In process skills, five of the seven process skills that students are expected to have above, if juxtaposed with indicators of procedural knowledge, will have similarities. The expected process skills are to develop students' procedural knowledge so that students have procedural knowledge. From the above, it can be seen that the kurikulum merdeka expects students to have and develop procedural knowledge, so instrument test based on procedural knowledge are needed to support this (Kemenristekdikti, 2022).

According to Kuswana (2012), procedural knowledge is knowledge of how to accomplish something, such as knowledge of skills, algorithms, techniques, and methods that are collectively referred to as processes or may be defined as a set of stages. Anderson and Krathwol (2001) classify procedural knowledge into three subtypes: knowledge of skills and algorithms, knowledge of procedures and methods relevant to a certain subject, and knowledge of criteria to evaluate when a process is acceptable to apply. Kilpatrick and Findell (2001)

categorize procedural knowledge indicators into three categories: general procedural knowledge, when and how to utilize processes appropriately, and completing procedures flexibly, accurately, and efficiently.

According to the finding of interviews with Physics teacher Mrs. Santi, the Physics at SMA PAB 8 Saentis. According to the findings of the interview with Ms. Santi, the learning model utilized is problem solving and the questions for learning evaluation is taken from a textbook. Questions are used to assess students' memory, factual information, and conceptual understanding. Despite learning utilizing problem-solving models, the test instrument employed was unable to assess students' procedural knowledge, metacognitive, and critical thinking. The problem-solving learning process necessitates procedural knowledge, but the teacher lacks a test instrument based on procedural knowledge to assess students' procedural knowledge. Nevertheless, students' basic physics understanding remains insufficient, as evidenced by their difficulties completing math problems and their lack of enthusiasm for learning physics.

The researchers conducted preliminary observations and unstructured interviews with 10 students from SMA PAB 8 Saentis class X and XI to complement the teacher interviews. According to the results of the interview, the questions presented by the teacher were regarded as tough since they differed from the examples of questions given by the teacher during the learning process. During the researcher's early observations, it was discovered that students had trouble answering questions that were marginally modified from the examples supplied by the teacher. Students always ask the teacher to explain the sequence of each stage they take to solve a problem. This demonstrates students' lack of grasp of approaches and procedures for correctly solving problems, as well as students' continued reliance on the teacher to solve difficulties. This means that students' basic knowledge and procedural knowledge are still lacking, as evidenced by their inability to explain or justify one method of solving a given problem and their lack of understanding of the reasons for applying certain theories, processes, or laws during the problem solving process.

According to the findings of interviews with teachers and students, as well as preliminary observations at SMA PAB 8 Saentis, the learning model used by teachers supports the development of test instrument based on procedural knowledge, but there is a lack of good test instruments to determine the extent of students' procedural knowledge. Students' procedural knowledge is required for the learning process and problem solving.

Because there is no test instrument accessible to determine mastery of procedural knowledge in dynamic fluid topic, it appears that there is an opportunity to construct test instrument based on procedural knowledge based on the description of the problem's background. The topic of dynamic fluid topic was chosen for this study because it contains topic with difficult problems and there are four aspects of knowledge that may be measured, namely factual, conceptual, procedural, and metacognitive knowledge. Nevertheless, only procedural knowledge was generated in this study. Procedural knowledge in dynamic fluid topic includes the process of how a dynamic fluid phenomenon can occur around us. Therefore, researchers will conduct research with the title The Development of Test Instrument Based on Procedural Knowledge of Fluid Dynamic Topic in SMA.

1.2. Problem Identification

Based on the background that has been stated, several problems can be identified as follows:

1. There are no test based on procedural knowledge of Fluid dynamics topic SMA in accordance with the revised Bloom's taxonomy that can support the achievement of physics learning objectives
2. There are no test based on procedural knowledge of Fluid dynamics topic SMA with standardized tests that are tested for validity, reliability, discriminating power and difficulty level

1.3. Scope

Based on the problem identification, the scope of this research is as follows:

1. Develop a test instrument based on procedural knowledge of Fluid dynamic in SMA
2. The test instrument is in the form of an essay test by reviewing the validity, reliability, discriminating power and difficulty level

1.4. Problem Formulation

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

1. How to develop a test instrument to determine the mastery of procedural knowledge in accordance with the revised Bloom's taxonomy on Fluid dynamic topic in SMA?
2. How is the quality of the development of test instruments based on procedural knowledge of Fluid dynamic topic in terms of validity, reliability, discriminating power, difficulty level and student respons?
3. How is the analysis of students' procedural knowledge based on the result of test implementing?

1.5. Problem Limitation

Based on problem identification and problem formulation, it is necessary to limit the problem so that the research will be clearer and more measurable. The problem limitations of this research are as follows:

1. Procedural knowledge tests can be developed on every topic of Physics in high school with complexity concept, but in this research it is limited to the topic of Fluid dynamic
2. Preparation of test instruments based on procedural knowledge in the form of essay tests
3. Product testing of test instruments based on procedural knowledge was tested on SMA

4. The output of this research is Essay Test Based on Procedural Knowledge of Fluid Dynamic

1.6. Research Objectives

Based on the probem formulation above, this research generally aims to develop a test instrument based on procedural knowledge on the Fluid Dynamic topic at SMA. However, it specifically this research objective as follows:

1. Describe the process of developing test instruments based on procedural knowledge in accordance with the revised Bloom's taxonomy of Fluid dynamic topic
2. Identify the quality of the test instrument based on procedural knowledge of Fluid dynamic topic in term of validity, reliability, discriminating power difficulty level and student respons
3. Analyzing the students' procedural knowledge based on the result of test implementing

1.7. Research Benefit

This research is expected to provide benefits in the world of education, including the following:

1. Theoretical Benefits

   The results of this study are expected to be used as a reference by teachers and education circles about test instruments based on procedural knowledge and item analysis so that they can improve the quality of education through an evaluation system of learning outcomes. In addition, the results of this study can be used as a reference and consideration in related research in the future.
2. Practical Benefits
   a. Produce good test instruments in terms of validity, reliability, discriminating power, and difficulty level for learning evaluation tools, especially tests based on procedural knowledge on Fluid dynamic topic
   b. Provide information related to the development of test instruments based on procedural knowledge of Fluid dynamic topic

c. Can determine analysis of students' procedural knowledge based on the result of test implementing?

1.8. Operational Definition

To clarify and avoid mistakes in the terms used in this research, the authors make operational definitions, as follows:

1. Research Development is a process for developing a product or improving a product in the form of existing hardware or software that can be accounted for (Sukmadinata, 2015).
2. A test is a tool used to measure a situation with certain rules whose work depends on the instructions given (Arikunto, 2016: 67).
3. Procedural knowledge is knowledge of how to do something from completing fairly routine exercises to solving new problems and often takes the form of a series of stages to be followed which includes knowledge of skills, algorithms, techniques, and methods collectively known as procedures (Anderson & Krathwohl, 2001).
4. Assessment is the activity of interpreting the data of measurement results about the skills possessed by students after participating in learning activities (Widoyoko, 2017).
5. Validity is a concept related to the extent to which the determination and accuracy of a measuring instrument in performing its measuring function (Sudaryono, 2012: 140).
6. Reliability is the consistency and constancy of a test instrument which, when tested many times, will give constant results (Widoyoko, 2017).
7. Discriminating Power is a measurement of the extent to which an item test is able to distinguish students who have mastered competence from students who have not mastered competence based on certain criteria (Arifin, 2012)
8. Difficulty level is the opportunity to correctly answer a question at a certain level of ability which is usually expressed in the form of an index (Sudaryono, 2012).