CHAPTER I
INTRODUCTION

1.1. Background

Learning is a process or method that is carried out so that someone can carry out learning activities. One of the duties of the teacher in the learning process is to assess every activity that is carried out in the learning process (Arifin Zainal, 2016). Assessment is one component that cannot be separated from the learning process. According to Arifin Zainal (2016) Assessment is a systematic and continuous process or activity to gather information about the learning process and outcomes of students in order to make decisions based on certain criteria and considerations. One of the steps to support the success of the assessment system is to prepare a tool or instrument in the form of a test that meets the requirements of a quality test. In general, the test is defined as a tool used to measure knowledge or mastery of a measuring object of a certain set of content and material (Djaali & Muljono, 2008)

According to (Arikunto Suharsimi, 2017) a test is a tool or procedure used to find out or measure something in an atmosphere, in a predetermined manner and rules. According to Arifin Zainal (2016) the test is a tool that contains a series of tasks that must be done or questions that must be answered by students to measure a certain aspect of behavior. From the above definitions, a conclusion is drawn that the test is a measurement tool in the form of questions, commands, and instructions submitted to students to get responses in accordance with these instructions. On the basis of this response, the scores obtained by students can be determined. Thus, the test function is as a measuring tool. In the learning achievement test, the behavioral aspect to be measured is the level of students' ability to master the subjects that have been delivered. A good test is a test that meets the requirements of validity, reliability, practicality, objectivity, economics and usefulness. Therefore, to get a good test, the test must be tested first and the results analyzed so that it meets these requirements (Arifin Zainal, 2016).

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Based on the form of students' answers, the test can be divided into three types, namely written tests, oral tests, and action tests. The written test has two forms, namely the form of description and the objective form (Arifin Zainal, 2016). The objective test is one type of learning outcome test which consists of items that can be answered by the testee by selecting one or more answers from among several possible answers that have been paired with each item, or by writing (fill in) answers in the form of certain words or symbols in the space provided for each item in question (Suwarto, 2012). The objective test consists of several forms, namely true-false tests, multiple choice tests, matchmaking tests, and complete or short answer tests (Arifin Zainal, 2016). The objective test that is widely used in the evaluation of student learning outcomes in schools is a multiple choice objective test. Multiple choice form test questions can be used to measure learning outcomes that are more complex and with regard to aspects of memory, understanding, application, analysis, synthesis, and evaluation (Arifin Zainal, 2016). A multiple choice test is a test consisting of a part of the information (stem) and a part of possible answers or alternatives (options), the possible answer (option) consists of one correct answer, namely the answer key (Arikunto Suharsimi, 2018).

Based on this, this test instrument is adjusted to the characteristics and objectives of the learning material in the form of questions that are in the realm of conceptual knowledge of the Revised Bloom Taxonomy theory where the test is standardized through test eligibility testing. Anderson & Krathwohl's revised Bloom's Taxonomy is the result of an improvement in the description of Bloom's Taxonomy thinking process. Based on the results of research by Anderson and Krathwohl, it was found that the cognitive domain improvement in the old Bloom's Taxonomy was obtained. Nouns in Bloom's Taxonomy turn into verbs in the revised Bloom's Taxonomy. In addition, in Anderson and Krathwohl's revision of Bloom's taxonomy, the cognitive domain dimensions consist of two (only one in Bloom's Taxonomy), namely the knowledge dimension (knowledge dimension) and the cognitive process dimension (cognitive process dimension) where the knowledge dimension is divided into four, namely the factual knowledge

dimension. , dimensions of conceptual knowledge, dimensions of procedural knowledge and dimensions of metacognitive knowledge. While the dimensions of the cognitive process are divided into six categories, namely the ability to remember (C1), understand (C2) and apply (C3) including the ability to think at a lower level (lower order thinking) and the ability to analyze (C4), evaluate (C5) and create (C6). including higher order thinking skills (Anderson *et al.*, 2001).

The dimensions of knowledge and the dimensions of the cognitive process are formulated in a learning objective matrix, meaning that each dimension of knowledge, whether factual knowledge, conceptual knowledge, procedural knowledge and metacognitive knowledge has its own cognitive process dimensions. In the learning evaluation design, educators can apply these four dimensions of knowledge so that students have the opportunity to build and train their knowledge (Bakar & Tanjung, 2019).

For physics learning, students often do not learn to apply the facts and ideas they learn in class in order to understand their experiences in everyday life. This is called the problem of damp knowledge, namely students without mastering a lot of factual knowledge but in fact they do not understand it deeply or do not integrate or do not organize it systematically and strictly. The combination of conceptual knowledge and deep understanding can help students to translate what they have learned into real life, so that they can overcome some of the problems of inert knowledge (Anderson *et al.*, 2001). Therefore, it is very important for students to have conceptual knowledge, because most students only know general knowledge and do not understand conceptual knowledge. Because most students only know general knowledge and do not understand conceptual knowledge. Conceptual knowledge is indispensable in an effort to solve problems (Streveler *et al.*, 2008). So that to solve a problem, students must be able to understand, connect facts so that a broader idea is formed which is reflected in one's knowledge. According to Vosniadou (2007), to understand advanced scientific concepts from various disciplines, students cannot rely on rote memorization. Conceptual understanding is very important in Physics because researchers attribute failures in Physics to a lack of proper conceptual understanding.

According to Jackman (1999), students must be provided with basic physics concepts to build on the rest of their knowledge.

Conceptual knowledge is knowledge about the interrelationships between the elements of basic knowledge that function together. Conceptual knowledge includes three types, namely classification and category knowledge, principle knowledge and generalizations, and knowledge of models, theories, and structures (Anderson *et al.*, 2001). Conceptual knowledge is one of the dimensions of knowledge that needs to be built and trained in students even though in the process it cannot be separated from the role of other dimensions of knowledge such as factual, procedural and metacognitive knowledge (Bakar & Tanjung, 2019). Conceptual knowledge is considered important in the activity of a person's cognitive abilities in a scientific discipline. So, the teacher must understand how the level of questions that should be given to students. Where the level of the questions is based on Bloom's taxonomy which corresponds to the lowest to the highest level, which consists of six levels, namely remembering, understanding, applying, analyzing, evaluating and creating. Classification of types and dimensions of cognitive processes is an indicator and measure of cognitive levels in the preparation of questions. based on conceptual knowledge. With the level of questions like this, it will make it easier for a teacher to make questions that will be given to students as a test of learning outcomes and students' abilities in solving these questions.

Based on the results of interviews with physics teachers at SMA Negeri 2 Percut Sei Tuan it was found that there was no standardized conceptual knowledge test available in schools. In general, teachers still gave physics learning outcomes tests which included general knowledge. And most students only know general knowledge about physics lessons proven by most students answering the test correctly whose answers are already in the physics textbook. The test instrument used still measures the memorization aspect only so that students do not understand the concepts and theories that exist in the lesson. In addition, the tests used in schools that have been made by the teacher still do not meet good test criteria because the tests made have not been validated, and are

tested because the time in developing questions in accordance with the evaluation theory takes quite a long time so it is difficult to do.

The preparation and development of tests are intended to obtain valid tests, so that the measurement results can reflect the results or learning achievements achieved by each individual test participant after participating in teaching and learning activities (Sudaryono, 2012). The learning evaluation instrument developed was focused on a conceptual understanding test based on conceptual knowledge based on the development carried out by Anderson from the taxonomy bloom theory. This test aims to show the level of ability and success of students in mastering and understanding the content of the subject matter. The instrument to be developed in this study is a multiple choice test to measure students' conceptual knowledge skills.

The results of research conducted by (Wilda & Sahyar, 2019) aim to develop objective test questions for the Higher Order Thinking Skill physics material temperature and heat with 32 accepted questions and 18 rejected questions. Research conducted by (Mustari, 2016) shows that the development of cognitive instruments in the form of multiple choice test questions is effective for measuring the cognitive abilities of high school / MA students on Static Fluid material with a very good category. (Hadijah & Anggereni, 2016) in their research at the Special Public High School Jeneponto, class XI on Impulse and Momentum material stated that the cognitive learning outcome test instrument that had been developed met the valid category. Research conducted by (Nurfillaili et al., 2016) in their research at the Special Public High School Jeneponto in Class XI on Business and Energy material that after going through the test shows a high validation value given by the two validators, namely meeting good qualifications, including validity, reliability, level of difficulty, discriminating power and deceptive effectiveness. This shows that the learning outcome test instrument developed is feasible to use. However, the development of conceptual knowledge tests is still rarely done. Therefore, the development of objective tests of conceptual knowledge of physics is needed to measure or test understanding and

measure the level of conceptual knowledge in physics material, especially in mechanical waves.

Based on the above background, the researchers are interested in conducting research with the title: **"The Development of Objective Tests For Conceptual Knowledge Of Mechanical Waves Topic In High School".**

1.2. Problem Identification

Based on the background of the problem described above, the relevant problems to the research can be identified, including :

1 Unavailability of standardized conceptual knowledge questions in schools.
2 The teacher still gives a test of learning physics learning outcomes which includes general knowledge.
3 The test instrument used still measures aspects of memorization so that students do not understand the concepts and theories that exist in the lesson.

1.3. Research Scope

Based on the background of the problem above, the scope of this research is: "Developing an objective test of the conceptual knowledge of physics on mechanical wave" .

1.4. Problem Formulation

Based on problem identification above, so the problem formulation are :
1. How is the validity of the conceptual knowledge objective test instrument on Mechanical Waves material in senior high school that has been developed?
2. How is the reliability of the conceptual knowledge objective test instrument on Mechanical Waves material in senior high school that has been developed?

3. How is the level of difficulty of the conceptual knowledge objective test instrument on the Mechanical Wave material in senior high school that has been developed?

4. How is the discrimination index of the conceptual knowledge objective test instrument on Mechanical Wave material in senior high school that has been developed?

5. How is the distractor efficiency of the conceptual knowledge objective test instrument on the Mechanical Wave material in senior high school that has been developed?

1.5. Problem Scope

Based on the problem identification above, the researcher limits the research problem, namely :

1. This research is focused on the aspects of validity, reliability, level of difficulty, distinguishing power, and deceitful effectiveness of the objective test of conceptual knowledge on mechanical wave material by focusing on conceptual knowledge.

2. The developed test instrument is in the form of multiple choice that focuses on mechanical waves.

1.6. Research Objectives

Based on the problem formulation of the research, the objectives of the research are to :

1. To determine the validity of the conceptual knowledge objective test instrument on the Mechanical Waves material in senior high school that has been developed.

2. To determine the reliability of the conceptual knowledge objective test instrument on the Mechanical Waves material in senior high school that has been developed.

3. To determine the level of difficulty of the conceptual knowledge objective test instrument on the Mechanical Waves material in senior high school that has been developed.

4. To determine the discrimination index of the conceptual knowledge objective test instrument on the Mechanical Waves material in senior high school that has been developed.

5. To determine the distractor effiency of the conceptual knowledge objective test instrument on the Mechanical Waves material in senior high school that has been developed.

1.7. Research Benefits

The benefits expected from this research are:

1. For students, it can be used as information about the abilities of each student at the conceptual level of knowledge.

2. For teachers, as an alternative evaluation tool to find out students 'abilities, especially in the dimensions of conceptual knowledge and the conceptual knowledge objective test questions that have been developed can be a reference in conducting assessments to find out students' conceptual knowledge.

3. For institutions / schools, objective test questions that have been developed can be a reference to increase student conceptual knowledge so that it can help improve school quality.

4. For other researchers, this research can be a reference if you want to do the same research.

1.8. Operational Definition

In order to avoid mistakes and misunderstandings in the desired meaning in this study, the authors make an operational defination as follows :

1. The test consists of items that can be answered by selecting the correct alternative from a number of available alternatives (Suwarto, 2012).

2. Conceptual knowledge is knowledge about the interrelations between the basic elements in a larger structure that allows them to function together (Andrerson *et al.*, 2001).

3. Validity is the level of determination of an evaluation tool in measuring what should be measured (Arikunto Suharsimi, 2018).

4. Reliability is the extent of consistency or consistency of dimension effects with the same take a look at at unique times (Arifin Zainal, 2016).

5. Difficulty Index is the opportunity to answer correctly a question at a certain ability level (Arikunto Suharsimi, 2017).

6. Discriminating power is the size of the quantity to which an item is able to distinguish students who have mastered abilities from college students who've now not or do now not grasp skills based on sure standards (Arifin Zainal, 2016).

7. The effectiveness of the deceiver is the function of the deceiver in making test takers fooled with the aid of opportunity answers (Arikunto Suharsimi, 2017).