CHAPTER II
LITERATURE STUDY

2.1 Learning Theory

2.1.1 Definition of Learning Theory

Theory is a series of interrelated parts or variables, definitions and propositions that present a systematic view of phenomena by determining relationships among variables, by determining relationships among variables, with the intent of explaining natural phenomena.

According to Slavin (2008), learning is a process of acquiring skills derived from experience. Learning is a system in which there are various interrelated elements resulting in behavioral changes. Meanwhile, according to in Watkins (2008) understanding of learning is a process undertaken by humans to gain a variety of competencies, skills, and attitude. These competencies, skills and attitudes are gained gradually and continuously from infancy to old age through a series of lifelong learning processes.

Thus learning can be concluded series of activities or activities made consciously by a person and lead to changes in him in the form of the addition of knowledge or skills based on the senses and experience. Therefore if after learning learners there is no change in positive behavior in the sense of not having new skills and knowledge insight is not increased then it can be said that the learning is not perfect.

As for the intended learning According to Gagne, Briggs, and wagner in Watkins (2008) is a series of activities designed to enable the learning process in students. Meanwhile, according to Law No. 20 of 2003 on Sisdiknas, learning is the process of interaction of learners with educators and learning resources in a learning environment.

So learning is a process of interaction of learners with educators and learning resources in a learning environment. Learning is an aid provided by educators in order to occur the process of acquisition of knowledge and knowledge. So can understanding Learning theory is an attempt to describe how humans learn, thus helping us all understand the complex inhern process of

learning. In addition, the definition of Learning Theory is a theory in which there are procedures for applying teaching and learning activities between teachers and students, the design of learning methods that will be implemented in the classroom or outside the classroom.

2.1.2 Types of Learning Theory

In the process of teaching learning, mastering a teacher and how to deliver it is a very essential requirement. Mastery of teachers on subject matter and classroom management is very important, but not enough to produce optimal learning. In addition to mastering mathematics materials teachers should master the theories of learning, in order to lead learners to participate intellectually in learning, so that learning becomes meaningful for students. This is in accordance with the contents of the attachment of the Regulation of the Minister of National Education (Permendiknas) No. 16 of 2007 on Academic Qualification Standards and Teacher Competency which states that the mastery of learning theories and principles of learning that educate to be one element of pedagogic competence that must be owned by teachers.

If a teacher will apply a theory of learning in the process of teaching and learning, then the teacher must understand the ins and outs of learning theory so that the next can well design the form of teaching and learning process will be implemented. Psychology of learning or called Learning Theory is a theory that studies the development of intellectual (mental) students. The following explanation summarizes the different types of learning Theory, among others:

2.1.2.1 Behavioristic Learning Theory

According to behavioristic theory, learning is a change in behavior as a result of the interaction between the stimulus (stimulus) and the response (response). In other words, learning is a form of change that students experience in their ability to behave in new ways as a result of the interaction between stimulus and response. A person is considered to have learned something if he can show changes in his behavior.

According to this theory the most important thing is the input (input) in the form of stimulus and output (output) in the form of response. According to this toeri, what happens between the stimulus and the response is considered unimportant because it can not be observed and can not be measured. What can be observed is the stimulus and response. Therefore, whatever the teacher (stimulus) and what the student produces (response), everything must be observable and measurable. This theory prioritizes measurement, because measurement is an important thing to see the occurrence of changes in the behavior. Another factor that is also considered important is the strengthening factor. Reinforcement is anything that can strengthen the emergence of a response. When the strengthening is added then the response will be stronger. Similarly, if the strengthening is reduced then the responspun will be strengthened. Thus, reinforcement is an important form of stimulus given (added) or eliminated (reduced) to allow for a response.

Behaviorism is a misguided flow of psychology that views the individual only from the side of physical phenomena, and ignores the mental aspects. In other words, behaviorism does not recognize the intelligence, talents, interests and feelings of individuals in a learning. Learning events simply train reflexes in such a way as to become a habit that is controlled by the individual.

2.1.2.2 Cognitive Learning Theory

In contrast to behavioristic theory, cognitive theory is more concerned with the learning process than the learning outcomes. This theory says that learning does not merely involve the relationship between stimulus and response, but a person's behavior is determined by his perceptions and understanding of situations related to his learning objectives. Cognitive theory also emphasizes that parts of a situation are interconnected with the entire context of the situation. This theory holds that learning is an internal process that includes memory, information processing, emotions, and other psychological aspects. Learning is an activity that involves a very complex process of thinking. Some views on cognitive theory, including:

1. Piaget's developmental theory

Piaget is one of the figures touted as a pioneer of the flow of constructivism. One of his many thought contributions is used as a reference for understanding individual cognitive development: the theory of individual developmental stages.

According to Piaget, cognitive development is a genetic process, which is a process based on the biological mechanisms of the development of the nervous system. With the increasing age of a person, the more complex the composition of nerve cells and the more the ability. Piaget does not see cognitive development as something that can be defined quantitatively. He concludes that the power of mind or mental strength of children of different ages will differ also qualitatively. According to Piaget, the learning process will occur when following the stages of assimilation, accommodation, and equilibrium (balancing between assimilation and accommodation).

2. Learning theory according to Bruner

In view of the learning process, Bruner emphasized the influence of culture on one's behavior. In his theory, "free discovery learning" he says that the learning process will run well and creatively if the teacher gives the students the opportunity to find a concept, theory, rule, or understanding through the examples he encounters in his life. According to Bruner one's cognitive development can be improved by composing the subject matter and presenting it according to the stage of the person's development.

The conceptual model of Bruner's concept explains that concept formation and conceptual understanding are two distinct categorizing activities that require different thinking processes. According to him, the learning that has been given in the school much emphasizes the development of analytical skills, lacking the ability to develop intuitive thinking. Though intuitive thinking is very important to study the field of science, because every discipline has concepts, principles, and procedures that must be understood before anyone can learn. A good way to learn is to understand concepts, meanings, and relationships, through intuitive processes and finally to a conclusion (discovery learning).

3. Ausubel meaningful learning theory

According to Ausubel, learning should be a meaningful assimilation for students. The material studied is assimilated and linked to the knowledge that students already have in the form of a cognitive structure. This theory focuses heavily on the conception that the acquisition and retention of new knowledge is a function of the cognitive structure that students have.

The essence of learning according to cognitive theory is a learning activity related to information arrangement, perceptual reorganization, and internal processes. Or in other words, learning is a perception and understanding, which is not always in the form of behavior that can be observed or measured. Assuming that everyone has had the knowledge and experience that has been arranged in the form of cognitive structure that dipilkinya. The learning process will work well if the subject matter or new information adapts to the cognitive structure that a person possesses.

2.1.2.3 Contractual Learning Theory

Constructivism is a method of learning that emphasizes more on process and freedom in exploring knowledge and effort in constructing experiences or in other words this theory provides activeness to students to learn to find their own competence, knowledge or technology, and other things needed to develop himself. In the learning process too, giving the opportunity to students to express their ideas with their own language, to think about the experience so that students become more creative and imaginative and can create a conducive learning environment.

The formation of knowledge according to constructivist views the subject to actively create cognitive structures in their interactions with the environment. With the aid of this cognitive structure, the subject composes the notion of reality. Cognitive interaction will occur as far as reality is structured through the cognitive structure created by the subject itself. The cognitive structure must always be altered and adapted according to the demands of the environment and the

changing organism. The process of adjustment occurs continuously through the process of reconstruction.

The nature of constructivist learning by Brooks & Brooks in Degeng says that knowledge is non-objective, temporary, constantly changing, and uncertain. Learning is seen as the compilation of knowledge from concrete experiences, collaborative activities, and reflections and interpretations. Teaching means organizing the environment so that learners are motivated in exploring meaning and appreciating uncertainty. On this basis then the learner will have a different understanding of the knowledge stuck in his experience, and the perspective used in interpreting it.

This theory emphasizes the development of deeper concepts and insights, knowledge as an active construction made by students. If a person does not actively build his knowledge, even if old age still will not develop knowledge. A knowledge is assumed to be true if knowledge is useful for dealing with and solving appropriate problems or phenomena. Knowledge can not be transferred simply, but must be interpreted by each person individually. Knowledge is not something that already exists, but a process that develops continually. In this process the activity of a person is very decisive development of knowledge.

2.1.2.4 Humanistic Learning Theory

According to humanistic theory, the learning process must be initiated and devoted to the interests of humanizing humanity itself. Therefore, the theory of humanistic learning is more abstract and more closely related to the field of philosophical studies, personality theory, and psychotherapy, rather than the field of study of learning psychology. Humanistic theories are very concerned with the content learned from the learning process itself and more berbiacara about educational concepts to form the ideal person, and about the learning process in the most ideal form.

Motivational factors and emotional experiences are very important in learning events, because without the motivation and desire of the learning side, there will be no assimilation of new knowledge into the cognitive structure that

has been owned. Humanistic theory argues that any theory of learning can be utilized, as long as the goal is to humanize human beings to achieve self-actualization, self-understanding, and self-realization of people who learn, optimally. Humanistic theory is very eclectic that utilizes or summarizes the various theories of learning with the aim to humanize humans and achieve the desired goal because it can not be denied that each theory has advantages and disadvantages.

2.1.2.5 Cybernetic Learning Theory

Cybernetic learning theory is a relatively new theory of learning compared to the theories discussed earlier. According to this theory, learning is information processing. The learning process is important in this theory, but more important is the processed information system that students will learn. Another assumption is that no single learning process is ideal for any situation, and that is suitable for all students. Because the way learning is determined by the information system.

Cybernetic stage as a theory of learning is often criticized for more emphasis on information systems to be studied, while how the learning process takes place within the individual is determined by the information system studied. This theory views humans as information processors, thinkers, and creators. Based on that, it is assumed that human beings are capable of processing, storing, and organizing information.

2.2 Teaching Materials

2.2.1 Definition of Teaching Materials

Teaching materials is one of the learning tools that play an important role in teaching and learning process. Teaching materials used to provide basic knowledge of learners have a share in the understanding of the material so that the teaching materials used by teachers in the learning process is expected to complement and provide student knowledge. The teaching materials themselves can be text, audio, video, photos, and others that can be used to learn.

Good teaching materials are teaching materials that meet the qualification standards of teaching materials. In order to teach the material has a good quality, it is necessary to know the meaning of the teaching materials themselves. According Purwanto (2013) teaching materials is an arrangement of materials that have been collected and derived from various sources of learning are made systematically.

Understanding of teaching materials with more in-depth presented by Majid (2011) as follows:

1. Teaching materials are all forms of materials used by teachers or instructors in carrying out teaching and learning activities in the classroom. The teaching materials in question can be either written teaching materials or unwritten teaching materials.
2. Teaching materials are information tools and or text needed by teachers for planning and reviewing the implementation of learning.
3. Teaching materials are a set of materials that are arranged systematically written or not so as to create an environment or atmosphere that allows students to learn.

Based on the description of the teaching materials above, it is seen that the important role of teaching materials in the learning process as supported by Purwanto (2013: 24) of teaching materials is very important according to those who use teaching materials and learning strategies used.

2.2.2 Content of Teaching Material

Teaching materials contain content whose substance includes three kinds, namely knowledge, skill, and attitude.

1. Knowledge

   Knowledge includes facts, concepts, principles, and procedures. However, sometimes we are difficult to give understanding of the four learning materials.

2. Skills

   Skills are materials or learning materials that relate to, among other things,

the ability to develop ideas, select, use materials, use equipment, and work techniques.

3. Attitude

   The teaching materials of attitude or values are materials for learning related to scientific attitudes, among others: the values of togetherness, the value of honesty, the value of love saying, the value of help-helping, the value of spirit and interest in learning, the value of the spirit of work, and willing to accept opinions other people.

2.2.3 Benefits of Teaching Material

According Purwanto (2013: 24) based on the parties who use, the benefits of teaching materials can be divided into two kinds, namely the function for teachers and students.

1. Benefits of teaching materials for teachers is :
   a. Saves teachers time in teaching.
   b. Change the teacher's role from a teacher to a facilitator.
   c. Improving the learning process becomes more effective and interactive.
   d. Guidelines for teachers who will direct all their activities in the learning process and are a substance of competence that should be taught to students.
   e. Evaluation tool achievement or mastery of learning outcomes.
2. Benefits of teaching materials for students is :
   a. Students can learn without having to have another teacher or student friend
   b. Students can learn whenever and wherever they want
   c. Students can learn at their own pace
   d. Students can learn according to their own chosen sequence
   e. Helps potential students to become independent students

f. Guidelines for students who will direct all their activities in the learning process and is a substance of competence that should be studied or mastered.

2.2.4 Principle of Teaching Materials

Required learning tools in accordance with the principles of learning-based Curriculum 2013 for the process of preparation of teaching materials more focused. Learning tools include: syllabus, lesson plan, learning materials, evaluation of process and learning outcomes, and student activity sheets (LKS). Depdiknas (2008) states "the development of teaching materials should pay attention to the following learning principles: (1) from easy to understand difficult, from concrete to understanding the abstract; (2) repetition strengthens understanding; (3) positive feedback provides reinforcement to students' understanding; (4) high motivation is one of the determinants of learning success; (5) achieving the objectives; and (6) knowing the results achieved". A teacher in developing teaching materials should understand the principle by realizing that:

1. Development of teaching materials should be oriented that students will more easily understand a concept if the explanation starts from the easy or concrete, which is real in the environment.
2. Repetition is needed so that students better understand a concept. But the repetition in the writing of learning materials should be appropriate and varied so as not boring.
3. Respond given by teachers to students will be a reinforcement in students so do not forget to give positive feedback on the work of students.
4. Learning is a process that is gradual and sustainable, it needs to be made intermediate goals. The intermediate objectives in the teaching materials are formulated in the form of competency indicators.
5. Student who has a high learning motivation will be more successful in learning. For that, one of the tasks of teachers in implementing learning is to provide encouragement (motivation) so that students want to learn.

6. In the learning process, the teacher is like a travel guide, will tell the city of the final destination to be achieved, how to reach it, what cities will be skipped, and also tell where and how far more journey. Thus, all participants can reach the destination city safely at their own pace, but they will all reach the goal albeit at different times.

2.3 Development of Teaching Materials

2.3.1 Development Stages of Teaching Materials

According to Teaching Material Development Guide that published by Depdiknas, there are three basic stages that need to be passed to develop teaching materials, namely: analysis of teaching materials needs, selecting learning resources, and compile a map of teaching materials based on the structure of each teaching materials.

2.3.2 Analysis of Teaching Material Needs

Is the initial process that must be taken in preparing the teaching materials. This analysis aims to make the teaching materials that are made in accordance with the demands of competence that must be mastered by the students. The analysis of teaching material needs include three stages, namely: analysis of curriculum, learning resources, and determining the type and title of teaching materials.

2.3.3 Selecting Learning Resources

As has been mentioned earlier that considering the source of learning is very diverse. Each also has advantages and disadvantages. For that required screening or screening. This selection is based on consideration of conformity with predetermined learning objectives. To simplify the selection process of the learning resources, the following Sudjana and Rivai show two criteria that can be used in the selection of learning resources, namely general criteria and specific criteria.

a. General Criteria

In general, when choosing a learning resource we should consider the following four criteria:

1. In terms of economic

   Learning resources should be cheap or inexpensive. With affordable prices, then all the layers of society will be able to hold it.

2. In practical terms and simple

   Learning resources used should not require service or procurement difficult and rare.

3. In terms of easily obtaining

   Learning resources should be selected close and easy to find.

4. Flexible

   Learning resources can be utilized for various learning purposes.

b. Specific Criteria

There are a number of specific criteria for selection of learning resources. Specific criteria include:

1. Learning resources can motivate learners in learning.
2. Learning resources for teaching purposes.
3. Learning resources for research.
4. Learning resources to solve problems.
5. Learning resources can be for presentation.

2.3.4 Prepare the Map of Teaching Materials Based on the Structure of Each Teaching Material

After the process of analyzing the needs of teaching materials, then we will find out how much teaching materials that even though applied in a certain period of learning, both of type and quantity. The next step is to compile a map of the need for teaching materials. The map of teaching materials needs has many uses, including:

1. To know the amount of teaching materials that must be written.

2. To know the sequence or sequence of teaching materials such as what (this sequence of instructional materials is needed in determining the priority of writing).
3. To determine the nature of teaching materials.

2.4 Science Literacy

2.4.1 Definition of Science Literacy

The literacy of science is derived from a combination of two Latin words: literatus means marked with letters, literacy, or educated and scientia, which means having knowledge. according to Beers (2009), the first person to use the term science literacy is Paul de Hurt of Stanford University. According to Hurt, science literacy means the act of understanding science and applying it to the needs of society.

Meanwhile, the Notional Science Teacher Association (1971) suggests that a person who has science literacy is a person who uses the concept of science, has the science-process skills to be able to judge in making everyday decisions when he relates to others, the environment, and understand the interaction between science, technology and society, including social and economic development. Scientific literature is also defined as the capacity to use scientific knowledge, identify questions and draw fact-based conclusions and data to understand the universe and make decisions about changes occurring due to human activities (OECD, 2004).

Pudjiadi (1987) says that: "science is a group of knowledge about objects and natural phenomena derived from the thinking and research of scientists conducted with the skill of experimenting using the scientific method".

PISA defines science literacy as the capacity to use scientific knowledge and ability, identify questions and draw conclusions based on existing evidence and data in order to understand and assist researchers to make decisions about the natural world and human interaction with nature (Rustaman, et.al, 2003: 2).

Literacy of science according to National Science Education Standards (1995) is Scientific literacy is knowledge and understanding of scientific concepts

and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity. It also includes specific types of abilities.

Literacy of science is a science and understanding of the concepts and processes of science that will enable a person to make a decision with the knowledge it possesses, and is involved in statehood, culture and economic growth, including the specific capabilities it has. Literacy of science can be interpreted as an understanding of science and its application to the needs of society (Zuriyanti, 2009). Literacy means the ability to read and write or literate. In the present context, literacy has a broad meaning, ie technology literacy, politics, critical thinking and sensitive to the surrounding environment, while the word science is the absorption of the English language, the science is derived from sciencia Latin and means knowledge. Science can mean science in general, but it also means natural science (Poedjiadi, 2005).

Literacy Science is defined as the ability to use science knowledge, identify questions, and draw conclusions based on evidence in order to understand and make decisions regarding nature and changes made to nature through human activities. Scientific literacy is defined as the capacity to use scientific knowledge, identify questions and draw fact-based conclusions to understand the universe and make sense of the changes that occur due to human activities. According to Suhendra Yusuf (2003), science literacy is important to be mastered by students in relation to how students can understand the environment, health, economics, and other problems faced by modern society who rely heavily on technology and the advancement and development of science.

2.4.2 Component of Science Literacy

Chiappetta et al (1991) in A Qualitative Analysis of High School Chemistry Textbooks for Scientific Themes and Expository Learning Aids, there are :

1. Science as a body of knowledge

   This category is used when the purpose of the text in the book analyzed is to present facts, concepts, principles and laws, present hypotheses, theories, and models, asking students to remember knowledge or information.

2. Science as a way to investigate

   This category is used if the purpose of the text in the book analyzed is to require students to answer questions through the use of materials, requiring students to answer questions through the use of graphs, tables, etc., requiring students to make calculations, requiring students to explain answers, engage students in experimenting or thinking activities.

3. Science as a way of thinking

   Science is a human activity characterized by the thought process that occurs in the mind of anyone involved in it. The work of scientists with regard to reason, illustrates human curiosity and their desire to understand natural phenomena. Each scientist has the attitudes, beliefs, and values that motivate them to solve the problems they encounter in nature.

   This category is used when the purpose of the text in the book analyzed is to illustrate how a scientist performs an experiment, shows the historical development of an idea, emphasizes the empirical nature and objectivity of science, illustrates the use of assumptions, shows how science runs with inductive and deductive considerations , providing cause and effect relationships, discussing facts and evidence, presenting scientific methods and problem solving.

4. Interaction of science, technology with society

   This category is used when the purpose of the text in the book analyzed is to illustrate the usefulness of science and technology for society, to demonstrate the negative effects of science and technology for

society, to discuss social issues related to science or technology, careers and jobs in science and technology.

2.4.3 Factors Affecting of Science Literacy

Ekohariadi (2014) in his research reported the factors that affect the level of students 'science literacy, namely: (1) the high literacy of students' science literacy is positively influenced by students to the dains and educational background of parents; (2) science literacy is negatively correlated with problem-based learning strategies, the use of this phenomenon to illustrate topics, and laboratory investigations. But science literacy is positively correlated with cooperative strategies, and modeling; (3) the high level of students' attitudes toward science is positively influenced by the work students want, classroom teaching, parental education, and the amount of time spent in learning science; and (4) self-confidence and learning motivation are positively correlated with science literacy. The greater the confidence and motivation to learn science, the greater the science literature students achieve.

2.5 Learning Outcomes

2.5.1 Definition of Learning Outcomes

The ability of the students varies after he / she receives the learning experience. According to Bloom (in Suprijono 2013: 6) learning outcomes include cognitive, affective and psychomotor abilities. Cognitive ability consists of knowledge (memory), comprehension (understanding, explaining, summarizing, examples), application (apply), analysis (outlines, determines relationships), synthesis (organizing, planning), and evaluating. Affective ability consists of receiving, responding (responding), valuing (value), organization, characterization Psychomotor skills include initiatory, pre-rountie, and rountinized.

According to Suprijono (2013: 7) learning outcome is a change in overall behavior is not just one aspect of human potential alone. According to Jihad and Haris (2012: 14) the results of learning is the achievement of behavioral changes

that tend to settle from the cognitive, affective, and psychomotor aspects of the learning process conducted within a certain time.

Learning outcomes are the abilities that a student possesses once he or she receives a learning experience. After a learning process ends, then students get a learning outcome. Learning outcomes have an important role in the learning process. The main goal to be achieved in learning activities is the learning outcomes. Learning outcomes are used to determine the extent to which students can understand and understand the material. Learning outcomes are patterns of action, values, knowledge, attitudes, appreciation, abilities, and skills.

According to Dimyati and Mudjiono (2013: 3) "learning outcomes are the result of an interaction of learning and teaching. From the teacher side, the teaching act ends with the evaluation process of learning outcomes. From the student side, the learning result is the end of the breaking and the peak of the learning process".

Learning outcome is a measurement of the assessment of learning activities or learning process expressed in symbols, letters and sentences that tell the results that have been achieved by each child in a certain period. According to "Susanto (2013: 5) changes that occur in students, both concerning aspects of cognitive, affective, and psychomotor as a result of learning".

Based on the definition of the above learning results, the authors conclude that the results of learning is a result obtained by students after the student is doing learning and learning activities and evidence of success that has been achieved by someone by involving aspects of cognitive, affective and psychomotor, expressed in symbols, letters or sentences.

2.5.2 Factors Affecting Student Learning Outcomes

The learning outcomes achieved by students are influenced by two factors that are derived from within students and factors from outside the student self.

According to Caroll (in Sudjana 2009: 40) there are five factors that influence student learning outcomes, among others: (1) student talent; (2) time

available for students; (3) the time it takes the teacher to explain the material; (4) the quality of teaching; and (5) student ability.

Meanwhile, according to Rusman. T (2013: 124) factors that affect learning outcomes include internal factors and external factors. Internal factors include physiological factors and psychological factors. While external factors include environmental factors and instrumental factors. According to Slameto, the factors that influence learning are:

Internal factors consist of :

a. Physical factors
b. Psychological factors

External factors consist of :

a. Family factors
b. The school actor
c. Community factors

2.5.3 Benefits of Learning Outcomes

Learning outcome is essentially a change in one's behavior that includes cognitive, affective, and psychomotor abilities after attending a particular teaching-learning process. Education and teaching are said to succeed if the changes that appear in the students is a result of the teaching and learning process they experienced is the process through which programs and activities designed and implemented by teachers in the process of teaching. Based on the results of student learning, can be known ability and development as well as the level of success of education.

Learning outcomes must show changes in circumstances for the better, so it is useful to: (a) increase knowledge, (b) better understand something that has not been understood before, (c) develop more skills, (d) have a new view on something, e) appreciate something more than before. It can be concluded that the term learning outcomes is a change of students so that there is a change in terms of knowledge, attitude, and skills.

2.5.4 Types of Learning Outcomes

According to Susanto (2014: 5) learning outcomes are changes that occur in students, both those involving cognitive, affective, and psychomotor aspects as a result of learning activities. Simply put, the learning outcome is defined as the success rate of students in learning the learning materials. Learning outcomes are patterns of actions, values, understandings, attitudes, appreciations and skills. Referring to the thought of Gagne (Suprijono 2013: 5) learning outcomes in the form:

2.5.4.1 Verbal Information

Ability to express knowledge in the form of language, both oral and written. Specific ability to specific angst, the ability does not require symbol manipulation, problem solving or rule implementation.

2.5.4.2 Intellectual Skills

Ability to present concepts and symbols. Intellectual skills consist of categorizing ability, analytical ability-synthesizing fact-concepts and developing scientific principles. Intellectual skills are the ability to perform typical cognitive activities.

2.5.4.3 Cognitive Strategies

The ability to channel and direct its own cognitive activity, this ability includes the use of concepts and rules in solving problems.

2.5.4.4 Motor Skills

Ability to perform a series of physical movements in matters and coordination.

2.5.4.5 Attitude

The ability to accept or reject objects based on an assessment of the object. Attitudes of internalization and externalization of values. Attitude is the ability to make values as standards of behavior.

2.6 Salt Hydrolysis

Salt hydrolysis can effort in daily life for example in process conversion of starch to glucose. In there, we will explain about the definition of salt hydrolysis, pH of salt solution, and Salt hydrolysis in daily life.

2.6.1 Definition of Salt Hydrolysis

In short, hydrolysis can be defined as the reaction of a chemical substance with water. However, furthermore it is defined as a chemical reaction in which compound react with water, causing decomposition and the production of two or more other compounds. The common example of hydrolysis is conversion of starch to glucose, but it is not a **salt hydrolysis.** Hence, what is the salt hydrolysis? According to the definition of hydrolysis , we can easily define the salt hydrolysis as the reaction of a salt with water causing the decomposition or dissociation of the salt.

Basically, ions produced in a salt hydrolysis can influence pH of the solution. It is because some of the ions can react to water to produce H^+ ion, so the solution produced is acidic. Meanwhile, there are also salt ions which react with water to produce OH^- ion, so the solution produced is basic. However, there are salt ions which cannot react to water to produce whether H^+ or OH^- ion . Solution of the such salts are neutral in properly.

2.6.1.1 Salt from a Strong Acid and a Strong Base.

Salt which come from a strong acid and a strong base do not undergo hydrolysis. It is because the ions of the salt which come from a strong acid and a strong base do not react to water. For example, sodium chloride (NaCl) which come from HCl (a strong acid) and NaOH (a strong base) is not hydrolyzed.

Example:

$$NaCl_{(aq)} \rightarrow Na^+_{(aq)} + Cl^-_{(aq)}$$

The salts derived from strong acids and strong bases do not undergo hydrolysis. Take from example NaCl. The cation component, Na^+, is a weak conjugate acid that comes from NaOH, a strong base. Meanwhile the anion

component, Cl^-, is a weak conjugate base that comes from HCl, a strong acid. Such as a salt solution is neutral (pH=7).

2.6.1.2 Salt from a Weak Acid and Strong Base.

Salt which come from a weak acid and a strong base will be hydrolyzed partially when they are dissolved into water, so the hydrolysis for these salt is called the **partial hydrolysis .** Some of ions of salt from a weak acid and a strong base can react to water to produce OH^- ions, so the solution produced is basic. The example of salts that comes from a weak acid and a strong base is sodium acetate (CH_3COONa). In water, CH_3COONa is completely ionized to from CH_3COO^- ion and Na^+ ion.

Example:

$CH_3COONa_{(aq)} \longrightarrow Na^+_{(aq)} + CH3COO^-_{(aq)}.$

$CH_3COO^-_{(aq)} + H_2O_{(l)} \rightleftharpoons CH_3COOH_{(aq)} + OH^-_{(aq)}.$

This is because the anion (CH_3COO^-) is relatively strong thus allowing it to react with water releasing the OH^- ion. As a result, the salt solution is basic (pH>7).

2.6.1.3 Salt from a Strong Acid and a Weak Base.

Salt which come from a strong acid and weak base will also be hydrolyzed partially when they are dissolve into water , so the hydrolysis for these salt is called the **partial hydrolysis**. Some of ions of salt from a strong acid and a weak base can react to water to produce H+ ions, so the solution produced is acidic.

Example :

$NH_4Cl_{(aq)} \longrightarrow NH_4^+_{(aq)} + Cl^-_{(aq)}$

$NH_4^+_{(aq)} + H_2O_{(l)} \rightleftharpoons NH_4OH_{(aq)} + H^+_{(aq)}$

In the solution, NH_4Cl is completely ionized to form NH_4^+ and Cl^- ion is conjugate acid form weak base of NH_4OH so that it can give the proton to water, while Cl^- ion is conjugate base from strong acid of HCl so that it can not attract the proton from water.

$$BHA_{(aq)} \rightarrow BH^{+}_{(aq)} + A^{-}_{(aq)}$$

SALT	CATION	ANION
Of a strong acid and weak base	(Strong conjugate acid from weak base)	(Weak conjugate base from strong base)

This is because the cation BH^+ is relatively strong thus allowing it to react with water releasing the H_3O^+ (H^+) ion. As a result, the salt solution is acidic (pH<7).

2.6.1.4 Salt from a Weak Acid and a Weak Base.

Salt which come from a weak acid and a weak base will be hydrolyzed completely when they are dissolve into water, so the hydrolysis for these salt is called the complete hydrolysis. All ions of salt from a weak acid and a weak base can react with water to produce both H^+ and OH^- ions, so the property of the solution is determined by the equilibrium constant of the weak acid and weak base produced.

Example:

$$NH_4CN_{(aq)} \longrightarrow NH_4^+(aq) + CN^-(aq).$$

$$NH_4^+{}_{(aq)} + H_2O_{(l)} \rightleftharpoons NH_4OH_{(aq)} + H^+_{(aq)}$$

$$CN^-{}_{(aq)} + H_2O_{(l)} \rightleftharpoons HCN_{(aq)} + OH^-_{(aq)}$$

In general, the nature of salts that undergo hydrolysis in aqueous solution can be classified based on the types of the acids and bases that form the salts:

- Strong acid + Weak base → Acidic Salt (pH<7)
- Weak acid + Strong base → Basic salt (pH>7)
- Weak acid + Weak base → Acidic salt (pH<7), Basic salt (pH>7), or Neutral (pH=7).

2.7 Conceptual Framework

Chemistry is a compulsory subject for high school students. But the learning outcomes of learners on chemistry lessons are still low. One is the lack of

interest in reading textbooks. To support the learning process required teaching materials, because teaching materials is the most important part in the learning process. Many different approaches used in preparing ajr materials, but in this study the teaching materials by researchers developed following the aspect of science literation.

It aims to make this teaching material an alternative choice to improve the lithography of students in Indonesia, where students have the ability to identify scientific issues, explain the phenomenon scientifically and use scientific evidence. By using teaching materials based on literacy of pediatric science can improve the learning result of chemistry and can increase reading interest of book.

2.8 Research Hypothesis

Based on the formulation of the problem the hypothesis of this research is student achievement in Salt Hydrolysis where taught using the Module Based on Science Literation is higher than students achievement where taught using the Book in the school.

H_a : learning outcomes taught using the Module Based on Science Literation is better than using Book in the school.

H_0 : learning outcomes taught using the Module Based on Science Literation is not better than using Book in the school.

And the static of the hypothesis is :

1. $H_0 = \mu 1 \leq \mu 2$
2. $H_a = \mu 1 > \mu 2$