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Efforts to Increase Creativity and Achievement Learning Science through Empowerment Student Reasoning

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Abstract

One of the main goals of science education is to encourage the intellectual development of students. In this case, what is to be achieved is that most students can develop their potential at the level of formal reasoning. In general, in today's science learning, reasoning has not been managed optimally, planned, and systematically. The low ability of students to solve problems and the level of reasoning affects their low learning achievement. One of the reasons is that so far students are more required to develop low-level thinking patterns. Preparation of a quality generation should be done through empowering students through problem solving by improving reasoning in any approach, strategy, method or technical effort of learning. Scientific reasoning is one of the factors that affect student achievement in science. Scientific reasoning also contributes to academic achievement, cognitive abilities, decision making, and problem solving. Scientific reasoning can be used as a foundation in understanding and doing science as well as an integral part of problem solving.

Keywords
student reasoning; creativity; learning

I. Introduction

Teachers as educators have an important and strategic role in efforts to improve the quality of education. One of the important roles of the teacher is to create conditions or environmental systems that support and allow for an active and interesting learning process for students, which in turn can improve learning outcomes. In order to increase or improve student learning outcomes, teachers are morally required to find innovations to make students active in learning. Student activity can be raised in various ways, one of which is to innovate learning methods and models.

The development of education in the 21st century requires teachers to be able to facilitate students in the classroom to think scientifically by linking problem solving that occurs in the surrounding environment or daily life so that students can explore their knowledge and be able to think at higher levels. (Novitasari et al., 2020). In the teaching and learning process there are three main components involved, namely teachers (teachers), learners (students), and teaching materials. In this process there is a transformation of knowledge (teaching materials) from teachers to students, and from the results of this transformation students gain learning experiences. There are still many educational experts think about how to create an optimal teaching and learning process, in other words, how the material taught by the teacher can be delivered optimally, and can be well received (understood) by students.

At first glance it seems that the teaching and learning process is an easy and simple process, but to create optimal and meaningful learning is not easy, for that it requires serious and in-depth thinking and research. Because to create a meaningful learning process for students, various studies are needed in terms of teaching materials, studies of communication science based on the culture of each group of students, the effectiveness of the use of learning methodologies, teaching techniques, classroom management, learning media and other aspects that support and affect the learning process. This is the work of teaching developers today, in addition to teaching methodologies which are equally important.

One of the factors that are part of the learning methodology that needs to be developed by the teacher in the classroom is the empowerment of reasoning in students. Reasoning is a way of thinking that seeks to understand or find objects that are not yet known(Ardhiyanti et al., 2019). The object in question is a statement whose truth value has been agreed upon. If the object to be known has not been determined, then there is no other way but to find out something about the object, namely by reasoning.

II. Review of Literatures

2.1 The Nature of Reasoning

Reasoning is a process of thinking in drawing a conclusion in the form of knowledge and have characteristicscertainin findingtruth. Scientific reasoning requires the ability to think logically, think practically, think creatively, and think analytically. Thinking logically means thinking according to a certain pattern or logic; and the thought process is analytical. Reasoning is an activity that relies on an analytical, in the framework of thinking (Jailani, 2009). In order for the knowledge generated through reasoning to have a basis of truth, the thought process must be carried out in a certain way so that the drawing of the new conclusion is considered valid (valid). In other words, the reasoning process is a student's logical thinking process according to the flow of a certain frame of mind or rules based on the evidence that exists in drawing a conclusion in the form of knowledge.

Reasoning according to (Irianti, 2020) is to think logically which means to think logically. Such an understanding is still in line with the notion of reasoning by (Oktora & Sudarto, 2018) Reasoning is a thinking activity. If viewed from the point of view of developmental psychology, reasoning is part of cognitive skills. Reasoning (way of thinking or reasoning) can be interpreted as: "The process of thinking that seeks to connect facts or known evidence to a conclusion". Thus, reasoning is an activity, a process or a thinking activity to draw conclusions or make a new statement that is true based on several statements whose truth has been proven or assumed previously.

A child in his growth and development will undergo about four main stages of reasoning development, there are also transitional stages of reasoning development, the four main stages of reasoning development are;

a. sensory-motor reasoning stage (from birth to 2 years of age)
b. preoperational reasoning stage (from 2 to 7 years old)
c. stage of concrete reasoning (from 7 to 11 years old)
d. formal reasoning stage (from age 11 to adulthood).

With regard to this reasoning (Lailiyah & Nusantara, 2014) remind that children do not explicitly move from one stage of reasoning to the next. It is also said that teenagers or adults can show all four kinds of reasoning at any time even though the main mental activity is at the formal reasoning stage. Furthermore, it is added that IQ, other

indicators of ability, and differences in cultural background can result in variations in the age of achievement of each stage of reasoning.

Piaget stated that it should not be expected that a child will be able to exhibit the reasoning behavior that is characteristic of the two subsequent stages of reasoning. A person can exhibit lower-level reasoning behavior, but substantially does not exhibit higher-level reasoning behavior.

2.2 The Role of Formal Reasoning

One of the main goals of science education is to promote intellectual development. In this case what is to be achieved is that most people can function at the level of formal reasoning, at least in the scientific sphere (Lailiyah & Nusantara, 2014). According to Piaget's theory, the development of formal reasoning abilities is very important for the acquisition (mastery of concepts), because conceptual knowledge is the result or result of a constructive process, and the ability to reason is a necessary tool in that process. (Jailani, 2009). Concepts are frameworks of thought and become the basis for higher mental processes to be able to formulate principles and generalizations.

Psychologically, there are two kinds of reasoning, namely inductive reasoning and deductive reasoning. Inductive reasoning is a thought process to draw conclusions or make a new general statement based on several specific statements that are known to be true. In science, statements obtained from the process of induction are not called theories until they are proven deductively. Deductive reasoning is a way of drawing conclusions from statements or facts that are considered true by using logic. Actually, drawing conclusions in science can be started in an inductive way, but then a true generalization to all circumstances must be proven by a deductive way. Mathematical reasoning also highlights the formation of generalizations, with important abstractions of ideas and relationships. Mathematical reasoning is basically about developing, rationalizing, and using scientific generalizations, leading to an interconnected network of scientific knowledge. In other words, mathematical reasoning is a logical thinking process to obtain solutions to scientific problems that include various activities such as collecting facts, analyzing data, providing arguments, compiling and solving problems (Jailani, 2009). Given the importance of mathematics in the realm of life outlined above, mathematics education must employ the appropriate strategy to ensure that the concepts ingrained in students' minds are not readily forgotten or even survive for life (Junaedi, 2021). Mathematics is one of the main subjects in the field of school education. In addition, mathematics is a science that is also needed is solving problems of everyday life (Sipayung, 2020). Mathematics as a basic science is one of the subjects that play an important role in every level of education as a means of logical, critical, analytical, rational and systematic thinking (Rambe, 2020).

Operationally during learning, the role of reasoning ability on learning success has been reported. Various studies have found a relationship (even influence) between formal reasoning abilities and learning achievement in biology including laboratory work activity skills and critical thinking skills. (Irianti, 2020) stated that reasoning skills proved to be the best predictor of mathematical computational success. Students who have formal reasoning are better able to test scientific hypotheses and identify dependent variables, and are better able to analyze data, compared to students who have concrete reasoning. Next (Ardhiyanti et al., 2019) found that there was a correlation between the level of reasoning and science learning outcomes. Reasoning abilities that can be developed through science learning include:

a. the ability to read and interpret science problems
b. ability to solve routine problems

c. ability to analyze data which includes: reading, interpreting information and making/drawing conclusions
d. ability to solve non-routine problems.

III. Discussion

3.1 Development of Reasoning through Processing of Teaching Materials

There are four stages that must be taken in the process of processing teaching materials, before teaching materials are feasible to be delivered to students. These stages are the process of selection, structuring, characterization, and reduction. In the selection process, teachers are required to select and sort the various information needed so that the information taken is information that is really needed and is directly related to the teaching materials. The selected teaching materials are then structured according to the structure of their respective scientific fields. In the development of teaching materials from the titles of materials that have been structured, each teaching material will have distinctive characteristics. Each concept or segment of the explanation of teaching materials has an easy and difficult character. Difficult concepts can have an abstract, complex, (Ulum et al., 2019). The reduction stage (didactic reduction) is needed if the concept is difficult.

a. The Selection Process for Teaching Materials

Every teacher needs to realize that the development of science takes place continuously and runsvery fast. Without us realizing that our knowledge in a short time is no longer up to date, and there is so much information that we are not able to know as a whole. This vast amount of knowledge, of course, will not be able to be learned by every human being, in addition to the limited capacity of the human brain, also because the time that humans have is very limited. Therefore, people who study science need to sort and select which knowledge and information is more urgent and relevant to their needs. We cannot provide all teaching materials related to the science to students. We need to select (select) essential teaching materials, which are really needed by students. This means that a material is considered important if it is in accordance with his needs to learn further, to live, to meet the needs and demands of community development both locally, nationally and globally as well as the need for economic, social and cultural development. To obtain teaching materials that suit the needs of learners, materials or materials that have been collected from various sources, need to be selected so that they fit the criteria (Ulum et al., 2019). Some of the criteria that must be used as a reference in this selection process are:

1. Scientifically Correct

In determining and selecting teaching materials that have been collected from various sources, it is necessary to consider aspects of the truth of these teaching materials from the scientific side. Although the teaching materials are interesting and very easy for students to understand, but they violate the actual concept according to scientists in that field, then the teaching materials should not be taken (selected).

2. Scope

The standard used in determining the scope of teaching materials is based on the applicable curriculum (breadth and depth). Choosing teaching materials need to consider the depth and breadth of the material, adjusted to the learning objectives and the consequences of learning carried out within a certain period of time, this scope is limited by competency standards and basic competencies that must be achieved.

3. Psychological Development and Benefits for Students

Psychological development and thinking of students in general is something that must be considered, even though in reality there are differences in the development of each individual student. All teaching materials that have been collected are teaching materials that are directly or indirectly related to the subject to be taught. The selection of teaching materials to be given to students must be in accordance with the background knowledge and benefits for them, so that the teaching materials provided are more meaningful for their knowledge and life.

4. Available Time and Material Essence

Of the many materials collected from various sources, of course we will be limited by the availability of time provided by the curriculum to deliver these teaching materials to students. When we have to select many sources of information related to teaching materials that must be delivered, the essential aspect of the concept needs to be a criterion in selecting these concepts.

b. Structuring Process

The selected natural science material must then be structured in a didactic manner, according to the characteristics of the structure of the teaching material. Perhaps the structure of the teaching materials is somewhat different from the body of knowledge, but it may also be appropriate. This depends on the learning needs. The purpose of this structuring is to prevent partial learning from one concept to another. Students must really know how one concept relates to another, and know the position of the concept in the structure of the teaching material. In addition, the structure of this teaching material will be useful to provide a match between the needs of a certain level of learner and the content of the teaching material. This process is very important

c. Characterization Process

In terms of the level of difficulty, each teaching material can have easy and difficult characteristics. Characteristics of teaching materials that are easy to show are concrete, simple, and simple. Meanwhile, difficult teaching materials are characterized by abstract, complex, and complicated nature. Didactic principles that must be followed by every teacher in delivering material, namely from the simple to the complex, from the close to the far, from the easy to the difficult, from the concrete to the abstract, and so on. This characterization of teaching materials is needed so that difficult teaching materials can be processed (packaged) later, so that the teaching materials according to students' views are easier to understand.

d. Reduction Process

The word reduction here can be interpreted as a reduction in the level of difficulty of teaching materials, because in this process the teaching materials are reduced in a didactic manner, taking into account the psychological and scientific aspects, so that the teaching materials that have undergone this reduction can be easily understood by the learners (students). In other words, reducing didactic teaching materials means increasing students' understanding of teaching materials, this process is known as "didactic reduction".

If you want to encourage the development of reasoning, the implementation of learning must be considered or managed intentionally to support that interest. In this case, of course, the implementation aspects that really must be considered are approaches, strategies, methods, and other technical matters of learning implementation (Binti, 2020). Implementation of aspects of the implementation of learning must always be sought so that

it does not merely refer to the interests of information transfer, but refers to the interests of higher order thinking skills, including critical thinking skills.

Actually, through a strategic approach, method, or technical implementation of learning, the development of reasoning can be encouraged. For example, it can be assumed that in the process skills approach, reasoning is more likely to develop, than in the concept skills approach. In the experimental method, it can be assumed that reasoning is easier to develop, compared to the lecture method. The most important thing is that in every approach, strategy, method or technical matter of learning, consciously, deliberately and maximally high-level thinking, including critical thinking, is encouraged.(Bakoban & Yunisah, 2018) states that one of the meanings of critical thinking is an active and skilled intellectually organized process of conceptualizing, applying, analyzing, synthesizing, evaluating information, obtained from or generated by observation, experience, reflection, reasoning, or through communication as a guide. for belief and action.

Learning that empowers reasoning programmatically is believed to result in rapid development of reasoning and high learning achievement among students. Implementation of science learning by empowering reasoning, in line with the idea of science learning from (Nahdi, 2015) which is still related to teaching science the way student learns. Brunce says help them think, help them formulate questions, help them find answers to questions, because students must be participants in learning, and not just recipients of the teacher's wishes. Solving a problem is a basic human activity. Problem solving is sometimes referred to as rule learning and has a close relationship with learning principles (Son, 2021). To be able to solve problems requires a combination of several simple or lower-level principles into higher principles.

Every teacher must be aware of the importance of reasoning in the learning process. However, efforts to develop students' reasoning have not received special attention. So far, most students are only required to develop a low-level mindset. On the other hand, to master concepts that are abstract, complex, and growing very rapidly, high-order thinking skills and good reasoning are required. (Rohaeti et al., 2019). Improved reasoning can be pursued by encouraging questions that can spur the thinking process. According to (Muslim & Sunardi, 2019), that the teacher's questions that are managed well, with the correct questioning technique, can improve students' reasoning. However, in reality, not many teachers ask questions that stimulate their students' reasoning.

3.2 Constructivism Theory View about Empowering Reasoning

The essence of constructivism theory is the idea that students must individually discover and transform complex information if they want it to be theirs. (Murniarti, 2020). According to this theory, in learning, students must actively find and apply complex information, check new information, compare it with old rules, and correct the rules when they are no longer appropriate. Cognitive change occurs when previous concepts are disequilibrated when associated with new information.

This theory advocates a more active role for students in their own learning, compared to what is currently practiced in the majority of classes. Because of its emphasis on the active role of students, constructivism strategies are often called student-centered instruction. In a student-centered classroom, the teacher's role is to help students discover facts, concepts, or principles for themselves, not to give lectures or control all class activities. (Murniarti, 2020).

Constructivism was born from the ideas of Piaget and Vygotsky, both of whom emphasized that cognitive change only occurs if previously understood conceptions are processed into an imbalance process.in an attempt to understand new information. Emphasizes the social nature of learning, to use study groups with different abilities of

group members. Modern constructivism based on Vygotsky's theory emphasizes cooperative, activity-based and discovery-based learning (Cayati et al., 2022). The four key principles derived from his theory include:

1. Students learn through interaction with adults and peers who are more capable, known as the principle of the social nature of learning
2. Students learn best when the concept is within their zone of closest development (one of proximal development), namely the level of actual development and the level of potential development.
3. The principle of cognitive apprenticeship (cognitive apperenticeship), refers to the process of a person gradually gaining expertise in his interactions with experts.
4. Scaffolding principle, or mediated learning, is a step-by-step support for learning and problem solving.

3.3 Constructivist View in Learning

The implications of constructivism theory in learning are as follows:

a. Focusing on the Child's Thinking or Mental Processes, not just the Results

In addition to the correctness of the answer, students must understand the process used to arrive at the answer.

b. Top-Down Process

The constructivist approach to learning emphasizes top-down teaching rather than bottom-up. Top-down means that students start learning with complex problems to solve and then find the basic skills needed, this process requires a high level of reasoning. In contrast to traditional learning that emphasizes bottom-up, which starts from basic skills, gradually higher skills and so on to complex skills. Problem-based learning is a learning model that follows the t patternop-down. Such learning is an implementation of constructivism learning theory. In addition, with problem-based learning, teachers can train students to become independent learners, imitate the role of adults and get used to seeing a problem from various angles. different scientific disciplines.

Problem-based learning is known by various names such as project-based learning, experienced based education, authentic learning, and anchored instruction. Broadly speaking, problem-based learning consists of presenting students with authentic and meaningful problem situations that can make it easier for them to conduct investigations and inquiries.

c. Discovery Learning

Discovery learning is an important component in the constructivism approach. In discovery learning, students are encouraged to learn largely through their own active engagement with concepts, principles. The teacher encourages students to have experiences and conduct experiments that allow them to discover the principle. Learning by discovery has several advantages, including: arouse curiosity, motivate them to continue with research so that they find answers, learn to solve problems independently and practice critical thinking. Discovery learning is a teaching model that emphasizes the importance of helping students understand the structure/key ideas of a discipline.(Cayati et al., 2022).

This learning is applied in the sciences and social sciences, known as inductive reasoning and the processes of inquiry that characterize the scientific method. Another concept of Bruner is scaffoding which is defined as a student who is helped to solve

certain problems beyond their developmental capacity through assistance from a teacher or other person who has more abilities.

d. Cooperative Learning

A review of modern learning theory that students find and understand difficult concepts more easily if they discuss the problem with their friends, the constructivism approach in teaching is carried out through cooperative learning. In cooperative learning, students routinely work in groups of 4-5 people with different abilities, to help each other solve complex problems.

e. Generative Learning

Generative learning strategies teach students specific methods of doing mental work dealing with new information. Generative learning is based on a theory that emphasizes the active integration of new material with existing schemas in the minds of students.

f. Self-Regulated Learning

Constructivism has the insight of ideal students, namely students as learners who have the ability to regulate themselves (Self regulated learners). A self-regulating student is someone who has knowledge of effective learning strategies and knows how and when to use that knowledge.

g. Scaffolding

Scaffolding is based on Vygotsky's concept of assisted learning. Higher mental functions, including the ability to direct memory and attention to specific goals and the ability to think with symbols, are behaviors that require media assistance. Scaffolding is in the form of providing assistance to students in the form of more structured assistance at the beginning of the lesson and gradually shifting learning responsibility to students to work on their own direction.

h. Teaches Problem Solving and Thinking Skills

Whether a teacher realizes it or not, according to Gagne, that the essence of the highest learning outcomes that must be achieved is the ability to solve problems. The most widely known thinking skills program is instrumental enrichment. It is a thinking skills program in which students take written test exercises designed to develop various intellectual abilities (Prasad, 2021).

Theoretical support for learning strategies is put forward through Vygotsky, who emphasizes three main ideas. The three main ideas include that intellectuals develop when individuals face new and difficult ideas and relate these ideas to what they know. The second idea relates to interactions with other people, which can enrich intellectual development, and the third idea about the teacher's role as an assistant and mediator of student learning. The contribution of cognitive psychology is rooted in information processing theories that explain how the brain works and how individuals acquire and process information.

The views offered by Vygotsky and more recent cognitive psychologists are important in understanding the use of learning strategies for three reasons. First, they underline the important role that prior knowledge plays in the learning process. Second, they help us understand what knowledge is and the differences between different types of knowledge, and third, they help explain how knowledge is acquired by humans and processed in the brain's memory system. The learning model can be used as a teaching strategy which essentially tries to explain the components of a set of teaching materials

and procedures that will be used to present, describe, give examples, and provide training to students in order to achieve certain goals. The learning model used by the teacher greatly affects the achievement of learning objectives so that the teacher needs to choose the right learning model from the many models. The selection of learning models is not only based on habits, but on how to make students active and have a high interest in learning.

3.4 Reasoning and Creativity

Every human being basically has one side of the ability to think creatively. Steven Coffey in his book "First Think First", says that the four potential sides possessed by humans are:

1. introspective attitude;
2. able to sharpen the conscience to become a human being of good will, while creating uniqueness and having a mission in life;
3. independent view for provision of action and power to transcend (extraordinary power);
4. creative imagination, which is able to think transcendentally and lead forward to solve various problems with imagination and fantasy.

Teachers should play a major role in developing students' creativity. To the teacher, students carry out a process of self-identification, so that the emergence of creative students is from creative teachers as well. In the future educational paradigm, we need to foster students to be creative. From creative students, the next generation will be able to compete in the era of globalization. That is why nowadays creative teachers have become a necessity to build the nation. The creative generation that has high initiative will win in seizing every opportunity. People become successful because they are responsive to every change, quick, agile, mentally determined and like to work hard to face every challenge. Creative teachers are teachers who are able to use various strategies in learning, happy to find new alternatives to achieve learning effectiveness. He does not think of himself as the only resource person or does not think that students are empty containers that must be filled by teachers. Indeed, students have multiple potentials and creativity, so it is hoped that teachers will act as effectively as possible as motivators, facilitators and communicators.

As a motivator, the teacher must strive to generate interest and enthusiasm so that students continuously want to learn and deepen their knowledge, without feeling pressured, students enjoy learning. As a facilitator, teachers are required to facilitate the learning process so that students enjoy learning. As a communicator, the teacher is able to transfer knowledge, attitudes and skills from various sources. Students are able to absorb, assess and develop their knowledge independently. With these three roles, there are many opportunities for teachers to be creative with various approaches and teaching strategies. The teacher invites students to role play, reason, discuss, make observations and a series of other learning strategies that are liked by students. Teachers are also expected to be able to find new media as innovations in learning.

Teaching in a professional approach must be interpreted in a broader sense which can include aspects of professionalism related to the work environment, for example formulating a learning process that relates it to the learning process teaching is the guidance of learning activities (You, 2017). Teacherteaching means relating to the ability to provide services to student learning activities, student success in learning must be the responsibility of teaching teachers, thus teaching will contain elements of more intense service, so teaching is not only defined as a process of delivering material contained in in every subject, but must experience a change in a positive direction (change of behavior).

Therefore, these two terms contain an element of interdependence, so they are often referred to as learning.

In accordance with the criteria above, if we look closely, the competence of teaching teachers towards professionalism is quite complex and must have various skills, these skills can be grouped into three categories. (Kemendikbud, 2021) which essentially are: First, skills related to the profession (Profession skills), skills related to humanity (Humanity skills) and skills related to society (Society skills).

Skills related to the profession include: 1) Educational skills, namely the ability to guide the process of forming students' personalities towards maturity (training for adults status) so that students are able to take responsibility for all their actions and have cultural values that apply in their society. 2) Teaching skills, namely the ability to continue and develop science and technology.

3.5 The Benefits of Reasoning for Students

One of the main goals of science education is to encourage students' intellectual development, to form logical, critical, careful, creative and disciplined attitudes. To achieve this goal, each presentation of study material is expected to lead to the formation of these attitudes. Therefore, in the presentation of study materials, in addition to emphasizing understanding, it is also indicated what they are studying for. In the end, students are expected to feel that science is an important lesson for their life and fun. To be able to understand and apply science in everyday life, reasoning is needed. The reasoning process is an important component that needs to be honed because it is useful in solving problems that are not only mathematical but also related to everyday life.

Reasoning (the way of thinking or reasoning) can be interpreted as: "The process of thinking"which attempts to relate known facts or evidence to a conclusion. Furthermore, reasoning is an activity, a process or a thinking activity to draw conclusions or make a new statement that is true based on several statements whose truth has been proven or assumed previously.

Students cannot understand science study materials well, if their reasoning abilities are still weak. Students can develop inductive reasoning and deductive reasoning. These include the ability to apply scientific skills to solve problems presented in new situations, for example; the collapse of the dam/reservoir, to provide an understanding of the concept of “water has pressure”. Reasoning can be done by relating it to great pressure, then where does the pressure come from. Thus, students can explain why the embankment can collapse. This form of reasoning is classified as the ability to understand a problem whose solution requires the application of scientific concepts/principles that have been studied.

IV. Conclusion

The conclusion that can be drawn from the description above is the importance of developing students' reasoning by using various strategies and approaches. Reasoning is a thought process in drawing a conclusion in the form of knowledge, and has certain characteristics in finding the truth. In order for the knowledge generated by reasoning to have a basis of truth, the thinking process must be carried out in a certain way so that the drawing of new conclusions is considered valid, among others, students' reasoning can be developed through questions.

Provision of teacher creativity needs to be continuously developed because the result is to make learning easier, both for teachers and students. Media and approaches to learning are sources of creativity that never run out. The reasoning process is an important component that needs to be honed because it is useful in solving problems that are not only

mathematical but also related to everyday life. Teachers are expected to start being brave by passing on new ideas related to learning strategies without feeling afraid of failure. As a teacher, it is necessary to cultivate creativity and develop students' reasoning to prepare a generation that is ready to compete in the era of globalization.

Scientific reasoning includes the thinking skills involved in investigation, experimentation, evaluation of evidence, inference, and argumentation. Among the factors that can influence the development of scientific reasoning are approaches, models, media, and teaching methods used by teachers. Scientific reasoning is the most important part of thinking that involves forming generalizations and drawing valid conclusions about ideas and how these ideas are related.

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