**Scientific Inquiry**

**Science** is all about learning and understanding something new. **Inquiry** means to ask for information or to investigate something to find out more. **Scientific inquiry** is using evidence from observations and investigations to create logical explanations and answer questions. Scientific inquiry is for people who want to be challenged and use creative and critical thinking to answer questions related to science (Leblebiciogly, 2017).

**Importance**

We are living in a time when science and technology play an increasingly important role in our everyday lives. By almost any measure, the pace of change is staggering. Recent inventions and new technologies are having profound effects on our economic, political, and social systems.

These advances have helped improve the lives of many, but they also raise ethical, legal, and social questions. If society is to reap, harvest the benefits of science while minimizing potential negative effects, then it is important for the public to have the ability to make informed, objective decisions regarding the applications of science and technology (Franestian, & Wiyono, 2020).

Learning through inquiry empowers students with the skills and knowledge to become independent, lifelong learners. Finding solutions to their own questions also allows to gain an appreciation for scientific knowledge and the discovery process.

**Need**

Some major aspects of scientific inquiry can be achieved by the students well, of course in learning should be chosen media, models, strategies, methods and approaches right, so that the process occurs debriefing and training of science process skills. The students' skills in science learning processes need to be developed. So, students can find their concepts to understand the material and improve learning outcomes. Science process skills are important for students as a provision in studying phenomena that occur in nature with specific ways to gain this knowledge and be useful in the development of the next (ibid).

One of the components that can be measured to access students' science process skills is the ability to access the inquiry. The inquiry learning has focused on the activities and the provision of learning experiences directly to the students.

**Purpose**:

(a) to help students understand the basic aspects of scientific inquiry, (b) to provide students with an opportunity to practice and refine their critical-thinking skills for making decisions in everyday life, and (c) to convey them ongoing research affects, how we understand the world around us.

**Definitions**

* **Scientific research** is a systematic way of gathering data and harnessing curiosity. This research provides scientific information and theories for the explanation of the nature and the properties of the world. It makes practical applications possible. Scientific research can be subdivided into different classifications according to their academic and application disciplines. Scientific research is a widely used criterion for judging the standing of an academic institution (Roffee, and Andrea, 2016).
* **Scientific inquiry** helps you think outside the box to understand the natural world. Scientific inquiry can be done by: Engaging in science-oriented questions that challenge thinking, giving priority to evidence when responding to questions. Inquiry means to ask for information or investigate something to find out more (McGwan, 2020). So, scientific inquiry is using evidence from observations and investigations to create logical explanations and answer questions. Scientific research is an organized, objective and controlled empirical analysis of one or more variables.
* **Scientific inquiry** proceeds by a continuous, incremental process that involves generating hypotheses, collecting evidence, testing hypotheses, and reaching evidence- based conclusions (Bailey, 1998).

Scientists generally begin by making an observation. They explore and collect information with their senses (smell, sight, sound, touch, and taste) and ask a question that they would like to answer.

If you are a curious person and always want to know, then do you think about why something happened, ask questions, and make observations? Do you investigate things that interest you; do you share what you learned with others and explain how you were able to answer your own questions? If so, you use a type of scientific thinking known as scientific inquiry. So, that exactly is this.

**Basic steps**

Generally, research is understood to follow a certain structural process. Though step order may vary depending on the subject matter and researcher, the following steps are usually part of most formal research, both basic and applied:

* Hypothesis: A testable prediction which designates the relationship between two or more variables.
* Conceptual definition: Description of a concept by relating it to other concepts.
* Operational definition: Details in regards to defining the variables and how they will be measured/assessed in the study.
* Gathering of data: Consists of identifying a population and selecting samples, gathering information from or about these samples by using specific research instruments. The instruments used for data collection must be valid and reliable.
* Analysis of data: Involves breaking down the individual pieces of data to draw conclusions about it.
* Data Interpretation: This can be represented through tables, figures, and pictures, and then described in words.
* Test, revising of hypothesis
* Conclusion, reiteration if necessary (*OECD*, 2015).

**Key points**.

* **Science** is concerned with verified facts and procedural criteria, which maximizes objectives that are critical to scientific inquiry. Science is cumulative and continual replication of findings to correction and ultimately the growth of a fund of verified information. Science is knowledge and scientific knowledge is gathered in scientific way. Or scientific activities need common sense and the approach that you have to base on **logic** (ibid)**.**
* **Logic** means to do with theoretical view. For example, if an inference is not transformed into an “argument“ then it remains a conclusion without evidence, and we can’t say it a logical inference. Logic concerns with relationship between conclusion and evidence give to support. Or it concerns with the strength of evidence linking the premises and conclusions of argument.
* Science proceeds by a continuous, incremental process that involves generating hypotheses, collecting evidence, testing hypotheses, and reaching evidence based conclusions. Rather than involving one particular method, scientific inquiry is flexible.
* Different types of questions require different types of investigations. Moreover, there is more than one way to answer a question. Although students may associate science with experimentation, science also uses observations, surveys, and other non experimental approaches.
* Our fast changing world requires today’s youth to be life-long learners. They must be able to evaluate information from a variety of sources and assess its usefulness.
* They need to discriminate between objective science and pseudoscience--theory or method doubtfully held to be scientific. Students must be able to establish causal relationships and distinguish them from mere associations.
* Keep the discussion relevant and moving forward by questioning or posing appropriate problems or hypothetical situations.