RESEARCH METHODOLOGY SCIENTIFIC/NON-SCIENTIFICTHINKING: OBJECTIVES AND ITS FUNCTIONS

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Abstract: A scientific approach is an approach carried out by conducting research and research to obtain correct data and information. The factors that influence it are human curiosity, curiosity, all-around asking, all-thinking, and likes to seek the truth. Information in preparing a theoretical basis can be obtained from books, reports on other people's research results—interviews with experts, or through direct observation in the field. The theoretical base is useful as a base for drawing hypotheses. And a hypothesis is a provisional or presumptive answer to the problem or question raised based on the framework/ theoretical basis's conclusions. It is said to be a quick answer because this hypothesis only contains logical and theoretical. After all, it has not been proven through experiments. Research is essentially an activity or a systematic process to solve problems done by applying scientific methods. The purpose of all scientific endeavors is to explain, predict, and control phenomena. The purpose is based on the assumption that all behavior and events are impacts and that all results have probable causes.

Keywords: Scientific, Thinking Patterns, Research

Pendekatan ilmiah adalah pendekatan yang dilakukan dengan Abstrak: melakukan penelitian untuk memperoleh data dan informasi yang benar. Faktorfaktor yang mempengaruhinya adalah keingintahuan manusia, keingintahuan yang serba bisa, serba berpikir, dan suka mencari kebenaran. Informasi dalam menyusun landasan teori dapat diperoleh dari buku, laporan hasil penelitian orang lain, wawancara dengan pakar, atau melalui observasi langsung di lapangan. Landasan teori berguna sebagai dasar untuk menggambar hipotesis, dan hipotesis adalah jawaban sementara atau dugaan atas masalah atau pertanyaan yang diajukan berdasarkan kesimpulan kerangka/landasan teori. Dikatakan sebagai jawaban yang cepat karena hipotesis ini hanya mengandung logika dan teoritis. Namun itu belum dibuktikan lewat eksperimen. Penelitian pada hakikatnya merupakan kegiatan atau proses sistematis untuk menyelesaikan masalah yang dilakukan dengan menerapkan metode ilmiah. Tujuan dari semua upaya ilmiah adalah untuk menjelaskan, memprediksi, dan mengendalikan fenomena. Tujuannya didasarkan pada asumsi bahwa semua perilaku dan peristiwa adalah sebuah dampak dan semua hasil memiliki kemungkinan penyebab.

Kata Kunci: Ilmiah, Pola Berpikir, Penelitian

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INTRODUCTION

In our daily lives, we face various problems or problems, both public and problems that demand systemically solving. These problems are often immediate and straightforward and do not require supporting data. In addition to public problems, there are complex or complex issues whose solutions are demanding and require collecting a certain amount of supporting data to make decisions and draw conclusions. It is this kind of problem that concerns us, especially in the world of education. Such problems demand scientific methods for solving them, namely through specific measures to solve the problems encountered. The position of the problem in the flow of the research procedure is critical. More important than the solution or answer to be obtained/searched because the selected problem can determine the formulation of the problem, the purpose, hypothesis, and study of the library to be used to determine the right methodology to solve it. In education, there are many phenomena of a complex problem and hook-hooks that need to be solved in a study, but not all of those problems have to be solved scientifically.

And one of Tri Dharma Perguruan Tinggi is research; therefore, many lecturers or students research education. The research is both independent and project-based. Many of us see the research of lecturers and students conducted in laboratory, class, even plunge directly into the field. But during the pandemic, research activities do not have to be the collection of primary data in the field or laboratory. The methods and times can be varied and flexible according to the guidance of the guidance lecturer. Many unconventional methods can be used as an option, such as assignments, essavs. literature studies, data analysis, independent projects, etc. Research is seen as a methodically conducted activity to test quick answers (hypotheses) about problems researched through careful measurement of empirical facts. The research concept can gradually be accepted as social science applied in social sciences and measurement in the sciences. To test the hypothesis can be done by conducting observations and experiments or experiments. From the experiment will be obtained data. This data will be analyzed to facilitate the of conclusions(Pruzan withdrawal 2016, 55).

And methodology research is fundamental to be a reference for lecturers or students-especially students in researching the last semester, namely creating the thesis. Methodology research became a foothold for prospective undergraduates to develop their research, so this course greatly determines the thesis model as the undergraduate bachelor's final assignment. One of the things that need to be learned by students is the discussion about the methodology of this research. Our focus language is the scientific/non-scientific mindset, objectives, and functions of research, as well as a little discussing research and science. That's why we're trying to do this writing as much as we can.

SCIENTIFIC AND NON-SCIENTIFIC THINKING PAT-TERNS

Scientific Mindset

Scientific Thinking is a human thought or action that uses absolute basics and sciences. So that the idea is acceptable to others, scientific Thinking must also go through a long and correct process because it will concern the truth. In scientific Thinking, one should pay attention to the basics (Kumar 2014, 55). What it's about, who, where, when, and how. Usually, it is used to search for the formulation of a problem and find a solution or conclusion. Scientific Thinking is critical in doing something, not only in the community environment but also in the school environment. If in a job to show the results of our work. We will certainly be required to show what is the result of our work, and all of that will surely be tested so that others will believe in our work. Scientific Thinking is also critical in researching something about plants, animals, humans, and so on. Indeed, in creating and collecting, the data itself must conform to the truth because to explain our research results, it takes a scientific thought. Besides, scientific Thinking is also emotionless and thinks according to the truth that exists. As human beings who always want to be the best, we must always use scientific thought in every reasonable opinion of people-those around us will always assume we do not argue that it is nonsense (Kothari and Garg 2019, 76). Every human being, in addition to scientific Thinking, should be supported by positive Thinking as well as good thoughts. To make every opinion, we can always entrust accepted by everyone.

Scientific Thinking has its characteristics: Opinions or actions through research can be accurate to the truth, can get data or evidence in showing the results, and not based on estimates or just opinions (Kumar 2014).

Scientific Thinking is a pattern of settlement rationally and objectively. Eliminating the subjection element and looking at things neutrally by relying on experts' opinions who are believed to have done analysis research and passed some criticism that the content of the truth has been tested and believed. And why should we think scientifically, because scientific thinking patterns are not only needed for research but can also be used in daily life, especially in response to the issues that are developing today (COVID 19)?

For example, scientific Thinking, the government observes the lack of social effectiveness of dispensing the community. The government then searches for these causes and phenomena by surveying the public directly and managing the results based on standard scientific methods.

Man strives for the scientific truth, which is the truth that can be answered rationally and empirically. This kind of truth can be obtained by me to scientifically (Margono, 2007). Simply put, it can be said that the scientific approach is an attempt to seek science by using scientific ways of Thinking supported by specific systematic measures. There are at least three mindsets developed in the scientific approach, namely the inductive mindset, the deductive mindset, and the mindset that is a deductiveinductive combination (Kothari 2004, 21).

Adherents of the tradition of rationalism often use the deductive mindset.

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The tradition of rationalism says that the idea of truth exists. The mind of man can know the idea of knowledge and truth without seeing the real world. At the same time, the inductive mindset was developed by adherents of *empiricism*. The tradition of empiricism assumes that truth and science can only be obtained through experience. In this relationship, Nan Lin (1997) came up with the term objective approach.

An objective approach is a scientific approach applied in systemic, controlled, empirical, and critical to hypotheses regarding assumed relationships between natural phenomena. The objective approach is carried out on the assumption that the human senses can observe objects, behaviors, and events present in the real world. Both mindsets, namely the inductive mindset and the deductive mindset, have their advantages and weaknesses. One of the fundamental drawbacks of rationalism is the difficulty of finding a word of agreement that can be used as a basis for universal shared Thinking (Nazir, 2005). This phenomenon occurs because, in addition to being a social being, humans are also individuals who have their uniqueness compared to other individuals. At the same time, this fact confirms the various conceptions of truth that exist in human thought (Pruzan 2016, 55).

Meanwhile, adherents of empiricism also fail to find the truth because the symptoms in natural phenomena will mean nothing before being interpreted using reason (Soekadijo, 1993). It's useful to overcome all of the above weaknesses; it is necessary to develop a mindset that combines a deductive mindset and an inductive mindset that then gives birth to a convergent flow. The flow of convergency suggests that truth will be found through follow-up thinking efforts with real-life evidencefinding efforts. Thus, rationalism provides a framework for logical Thinking, whereas the flow of empiricism provides a framework for proving or ensuring the existence of truth (Sali, Saharuddin, and Rosdialena 2020). The mindset developed by the above convergency flow has encouraged the development of scientific methods. In scientific methods, the truth can be obtained through research activities conducted in a planned, systematic, and controlled manner based on empirical data. The truth obtained through the scientific approach is usually consistent because it corresponds to its objective nature. An indispensable scientific method for the research process is a brilliant discovery in human thought(Sabri, Meirison, and Warmansyah, 2020).

Non-Scientific

gain Non-Scientific efforts to knowledge or understand certain phenomena exist traditionally or nonscientifically. These efforts appear in society naturally as various phenomena or problems arise that require explanation. Several non-scientific approaches are widely used to obtain knowledge or truth through the process, common sense, prejudice, intuition, incidental discovery, trial and error, authority, critical mind, and experience (Suryabrata, 2008).

Human activities in the search for science and seeking the truth. Especially before the discovery of scientific methods, are carried out in various ways, among them the discovery of science by chance, the discovery of science using *common sense*, the discovery of science using intuition, the discovery of science through revelation, the discovery of truth through trial and *error*, and soon. In the history of human life, there have been several significant discoveries that occurred by chance, namely, without using the steps as desired in scientific research. One example of scientific discovery that happened by chance was Kina's discovery as a malaria drug (Schoonenboom and Johnson 2017).

For example, a malaria sufferer accidentally finds a trench filled with bitter water caused by a Quinine tree's bark toppled by the wind. Because of thirst, the malaria sufferer drank bitter water found in the trenches. It has been his luck because the bitter water has contained quinine and kaolin (a type of alkaloid), which is the antidote to malaria.

Common sense is a common-sense concept or view used by humans practically in daily life. On the one hand, common sense is indeed a truth, but on the other hand, common sense can lead people astray in making a decision. Such a common-sense view that says that water will always flow towards a lower place. The view is not precise because, in the water capillary event, that can be absorbed by fabrics, sponges, suction paper, and similar objects. Revelation is a knowledge that comes directly from God, in no way an active human in business through reasoning activities. Therefore knowledge obtained by revelation is an absolute truth. However, not all men can obtain revelation from God; only people close to God and clean souls and hearts are likely to get revelation. Intuition can also be used as a way to discover knowledge. Intuition is the ability to understand something through the promptings of the heart.

Another non-scientific effort that can be taken to find knowledge is a trial and error, a series of experiments conducted repeatedly using different means and materials. Trial *and error are carried out* without the use of systematic methods. Thus, trial and error efforts are less efficient and less effective in finding knowledge. Although trial and error often result in absolute knowledge, the discovery cannot be a scientific discovery.

Understanding Research

Research is a process of activities seeking truth or error to symptoms and facts that occur neatly and systematically. This process is usually done by researchers consisting of students, lecturers, and independent researchers who are experts in their field related to what will be sought the truth and its mistakes. The study will find the law's facts and the meaning of an interpretation in the Koran and hadith verse.

The word method comes from the Greek *methods*, which are sun from the words *meta* and *hodos*. Meta means to go, though, follow, or after. At the same time, hodos means road, way, or direction. The word is then absorbed in English into a method word, which means a particular form of procedure to achieve or approach a goal, especially a systematic way. A method is used as a reference for activities because there is an orderly sequence of measures to become more efficient. Concerning scientific efforts. the method is a way of understanding the object that targets the science in question. Apurpose is an object, an object, both abstract and concord observed in truth and its existence.

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The Nature of Research

The nature of research can be understood by studying various aspects that encourage researchers to conduct research. Little about the understanding of research and the attitude and way of Thinking of a researcher.

Etymologically, the term research comes from two words, namely re and search. Re means back or over and over, and search means searching, exploring, or finding meaning. Thus research or research means searching for exploring or rediscovering meaning over and over again. Our research is an organized investigation or a careful and critical investigation in the search for facts to determine something.

A researcher should have a distinctive and substantial attitude in the mastery of procedures and principles in research. An attitude that should be developed by a researcher is as follows (Pruzan 2016);

- 1. Objectively, a researcher should be able to separate between personal opinions and existing facts. To produce a good study, a researcher must work according to the data obtained in the field and not include personal opinions that can detract from the validity of his research (should not be subjective).
- **2.** *Competent*, A good researcher can conduct research using specific research methods and techniques
- 3. *Factually*, a researcher must work based on the facts obtained, not based on observations, expectations, or abstract assumptions.

Besides, a researcher is also expected to have a mindset that supports

their tasks. The expected way of Thinking of a researcher is as follows;

- **1.** *SkepticalThinking*, *A* researcher should always question evidence or facts that can support a statement (not easy to believe)
- 2. *Think analytics, and* Researchers should always analyze every statement or problem faced
- **3.** *Critical Thinking, From* the beginning to the end of the activity, research is conducted based on the prescribed ways, namely the principle of acquiring science.

Below the authors will present some experts who present the nature of the research, namely(Sukmadinata 2005):

- 1. Yoseph and Yoseph said research is nothing but art and science to find the answer to a problem.
- 2. Kerlinger said that the research is a process of discovery that has systematic characteristics.
- 3. Hillway said that research is a study method that a person conducts through careful and perfect investigation of a problem to obtain a proper solution to the problem.
- 4. Priyono defines research as an activity to search, record, formulate and analyze until compiling his report.
- Sangadji interprets it more thoroughly. Penelitian is a careful, regular, and constant investigation to solve a problem dan discover something new.

The conclusion is that research is an activity to find answers to a problem

with systematic, controlled, empirical characteristics, and based on theories hypotheses and to gain proper knowledge of a problem. The big question is, "why does one do research?" the answer is first: because human knowledge, understanding, and ability are so limited, compared to its vast environment, secondly: humans have the urge to know or curiosity. Man always asks, what is it, how is it, why so, third: the man in his life is always faced with problems, challenges, threats, difficulties, both in him, his family, his whole community, and in his work environment, fourth: man is dissatisfied with what he has achieved, mastered, and possessed, he always wants a better, more perfect, more ease, always wants to add and increase the "wealth" and facilities of his life. All of this is achieved through research, both simple research, with narrow environments, designed and selfimplemented in a relatively short period, as well as complex research covering many aspects."

The Importance of Research

Research as a scientific activity is an essential aspect of

the life of a human being. This is due to the following reasons:

- 1. The demands of human needs as a social being continue to evolve in line with life development. To meet these needs, people always strive to find, produce, and apply various knowledge, including technological discoveries and innovations.
- Technological discoveries and innovations have encouraged scientists to continue researching, developing their discoveries.

3. In addition to being driven by curiosity, the researchers were also encouraged by the field's practical demands. Escalation of the development of practical demands is not separated from invention and innovation and continuous research activities. The development of science and technology has encouraged inventions. These inventions are what drive the development of innovation and have made a nation more developed and developed. New inventions arise because of the urge to conduct scientific research. Scientific research is driven by curiosity and practical demands.

Research Objectives

In some studies where the problem is straightforward, it appears that the goal seems to be a repetition of the problem's formulation, only the formulation of the problem is expressed with the question. Simultaneously, the purpose is poured in the form of a statement that usually begins with the word want to know. But if the problem is relatively complex, this problem becomes more clearly missed when a more assertive research objective is laid out that provides direction for research implementation. For example, if the formulation of the problem questions about how to apply contextual learning models to fractional subjects, then it is clear that there are many interpretations of this question's desired answer. The formulation of the purpose should be more assertive. I wanted to know the steps in applying contextual learning models to solving or wanting to know how to apply contextual learning models on the subject of

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solving to learning outcomes(Nasir 1998, 77).

The purpose research is closely related to the formulation of the established problem, and the answer lies in the study conclusion. Some of the traits that must be fulfilled so that the purpose of the research is said to be fair, namely: specific, limited, measurable, and can be examined by looking at the results of the study.

The ultimate goal of a study is to formulate questions and find answers to the research questions. The goal can be branches that encourage further research. Not one person can ask all the questions, and neither can anyone find all the answers even for one question. Therefore, we need to limit our efforts by limiting research objectives. There are various research objectives, viewed from efforts to limit this, namely(Nasir 1998, 79):

1. Exploration

Generally, researchers choose the purpose of exploration because of two kinds of intentions: satisfying the initial curiosity and later understanding better. Testing of feasibility in conducting more in-depth research /studies later, we need to realize that exploration does mean "road opening" so that after "the door is wide open." More indepth research is needed and focused on some of the "spaces behind the doors that have been opened" earlier.

2. Description

Descriptive research relates to the study of phenomena in more detail or distinguishing them from other phenomena.

3. Predictive

Prediction research seeks to identify relationships that allow us to speculate (calculate) something (X) by knowing (based on) something else (Y). Predictions are often used daily, for example. In accepting new students, we use sure minimum scores—which means that with those scores, students are most likely to succeed in their studies (predicting the relationship between entrance exam scores and later study success rates).

4. Explanation

Extensive research examines the causal relationship between two or more phenomena. Research like this is used to determine whether a causeand-effect relationship is valid or not or determine which is more valid between two (or more) competing planets. Extensive research may also aim to explain, for example, "why" a particular type of city has a higher crime rate than other types of cities. Note: in descriptive research, it is only explained that the crime rate in such a city is different from in other types of cities, but it is not explained: "why" (causal relationship) occurs (Meirison 2019).

5. Action

Aksi (action) can pass on any of the above objectives by setting a requirement to find a solution by acting something. This research is generally done with action experiments and observing the results; they are prepared solution requirements. For example, it is known that although the temperature of the outside air is colder than the room temperature, people still use air conditioning (not turn it off). In research experiments, the action created various tools reminding people that the outside air is already colder than the deep air. It turns out that from some tools, there is the most acceptable one. From the findings were compiled the requirements of solutions to the above phenomenon.

Research Functions

The research function is to find explanations and answers to problems and provide alternatives to possibilities that can be used for problem-solving. Solving and answering the problem can be abstract and familiar as only in basic research and can be specified as is usually found in applied research (Nasir 1998, 79).

1. Describe, provide, data, or information.

Research with decrypting the symptoms and events that occur and the symptoms that occur around us need attention and countermeasures. The symptoms and events that occur are broad, and some are small but, when viewed in terms of development for the future, need to get immediate attention.

2. Describe the data or condition or background of an event

Research with the task of explaining. In contrast to research that emphasizes the disclosure of events as they are, research describing events is much more complex and broad. Can be seen from one relationship with another

3. Compiling theories

The preparation of the new Theory takes quite a long time because it will involve bookkeeping in various instruments, procedures, and populations and samples.

4. Foresee, estimate, and project

An event that may occur based on known and collected data, the information obtained will be significant in estimating the likelihood that it will happen to go through the future. Through research collected data to predict future events or situations. 5. Control events and symptoms that occur

Through research can also be controlled events as well as symptoms. They are designing such a form of research to control the event. The treatment is structured in the design is to create control measures on other variables that might affect the event. Gain a new understanding and raise the level of science and technology, so when a person conducts research, it requires a particular form or type of research that corresponds to the field of research that he or she is doing.

RESEARCH AND SCIENCE

To be able to do research properly, researchers need to know the various elements of research. The elements that are the basis of this scientific research are concepts, propositions, theories, variables, hypotheses, and operational definitions. Concepts are the most crucial research element and are definitions used by researchers to describe a social phenomenon or natural phenomenon abstractly. A proposition is a statement of the nature of reality that can be tested for truth. The Theory is scientific information obtained by increasing the abstraction of understanding and relationships in the proposition. This variable is a concept that has a variation in value. The hypothesis is a temporary conclusion or tentative proposition about the relationship between two or more variables. OperationalDefinition, one element that helps communication between research is the operational definition, which is a clue about how a variable is measured (Pruzan 2016, 45).

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Pengetahuan has a close relationship with research or study. Science can advance and develop due to research development, while analysis can develop due to science development. They have the same final task: to show the truth, and the truth is obtained based on empirical data and done based on or according to scientific means or procedures.

Science is a group of knowledge that is systematically organized and negotiated through scientific methods. Scientific methods or so-called research methods are systematic procemeasures or in gaining dures knowledge. These systematic measures include: Identifying and formulating problems, drawing up a framework for Thinking, formulating hypotheses, testing hypotheses, and drawing conclusions.

In other words, scientific methods are a way of acquiring and compiling knowledge. The difference between Science Science and lies in: "Knowledge" is the material of science, and can only answer what, whereas "Science" answers about why a reality or event." Thus, science is a set of knowledge in a particular field that is systematically organized, uses scientific methods, can be learned and taught, and has an absolute value of use. Science requires to have scientific objects and methods, or have the following dimensions/aspects:

1. Ontological aspects,

Deals with what science learns or deals with the object of study, the ontological aspect deals with what you want to know, what to think, or what to think. Example: The ontological aspect in economics is human behavior faced with limited human resource problems, with unlimited needs.

2. Epistemological Aspects

It was related to how science learns its study object using specific methods, namely scientific methods or scientific methods supported by scientific means of Thinking(Kothari and Garg 2019). *3. Axiological aspects*

The research aspect of acology is described in the suggestions or recommendations of the study results.

Broadly, science is formed through the following processes and stages: The science of studying phenomena, phenomena are abstracted into concepts and variables, concepts and variables are studied in the form of proportions that are hypothesized, the hypothesis is empirically tested into facts, the link of facts in the full framework of forming theories and theories of the here are theories that are science.

The above has been explained that the subject matter of science is to include the aspect of ontology, the epistemological aspect, and the aspect of physiology. Scientific activities begin with the formulation of problems and prepare a frame of thought that includes logic and mathematics, which then produces the Khasanah of scientific knowledge (in it includes Theory and empirical research). From that frame of Thinking, a hypothesis arises to be tested using data, analysis, testing techniques (statistics), and static conclusions. If the hypothesis is accepted, it will become the Khasanah of scientific knowledge. If rejected, it will return to the drafting of the frame of thought to be repeated to the hypothesis until the conclusion is finally accepted. For more details, please note the Scientific Activity Chart as a Process and Method.

The function of science is to describe, explain, predict, and control. Science performs its functions through the Theory it contains. The Theory is a set of definitions, concepts, and hypotheses about the relationship between variables. The main feature of the Theory is that it means "if..., then...". The purpose of the Theory is to explain and make predictions, making it possible to exercise control. The scientific attitude of a must-have is as follows:

- 1. *Curiosity*, i.e., having an attitude of asking or always curious about something dark, unnatural, and gaps.
- 2. *Skeptics are* who are skeptical of statements that have not been strong based on proof.
- 3. *Critical*,i.e. capable of showing the boundaries of the question, showing *differences (divergences) and equations (convergence),* and capable of placing the right understandings.
- 4. *Objective*, i.e., to prioritize objectivity (impartiality).

Science has the following components:

- 1. The General Theory that has been scientifically tested.
- 2. *The* fact, the actual state (empirical) manifested in the interceding of two or more concepts.
- 3. Phenomena, namely symptoms and events captured with the senses (vision, hearing, smell, feelings, feelings), then used as a concept (term or symbol) that contains a brief sense of the phenomenon,
- 4. *The* concept, i.e., a term or symbol that contains a brief sense of the phenomenon.

5. When one fact affects the other is called a factor. Relationships between factors are called proportions. This proportion is commonly called embryo theory. If the relationship's nature has a known proportion, then that proportion becomes an advanced concept (which is higher than the original concept), i.e., becomes a relationship theory. If the Theory is tested repeatedly and persists, it will escalate into law or evidence.

Science, in addition to having components and structures, also has apparatus(completeness) such as:

- 1. Axioma is the basis of Thinking or the basic concept of science. For example, the basic concept of educational science is that everyone has a potential that can be developed. The basic concept of entrepreneurship is a challenge. The basic concept of economics is a situation where there are scarcity means.
- 2. Data is facts as empirical evidence—the endowment, which is considered sustainable (cannot be changed by a particular discipline). The severy symptom variable can be measured (some symptoms can not be measured, e.g., taste). All variables are measured according to objectivity, scientific reliability, and scientific validity and given factor, which is a factor that is considered relatively fixed (usually used as a basic assumption for the law's enactment in science).

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- 3. The method of Thinking consists of Deductions, which is to discuss everyday things analyzed to extraordinary things. Induction, i.e., analysis data to make generalizations and Sistesis, i.e., the combination of both good for the verification of Theory
- 4. *Reasoning techniques (method or reasoning)*, e.g., in economics, can be presented in verbal, diagrammatic, mathematics, static, and graphics.
- 5. *The object of* **science**, every science has an object that is an object that is studied by science. E.g., human ways/actions in acquiring and using limited goods and services, how to allocate resources, how to learn behavior, how to overcome, how to control.
- 6. *The function* of science is to explain, predict, describe, and control.

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