# The third lecture

## Basics of scientific research

### The goal to be achieved:

For the student to become familiar with the methodology of scientific research as a field of knowledge and the basic basis for completing research within its correct and systematic framework.

-Preface

- - Obstacles to scientific research
- - Knowledge
- - Elements of knowledge
- - Classification of knowledge
- - Characteristics of knowledge
- - The importance of knowledge
- - Scientific spirit
- - Characteristics of the scientific spirit

-Conclusion

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# The third lecture

## Introduction:

Man has gone through several stages, over a long period of time, where he has reached what he is today in terms of development in methods of thinking and obtaining knowledge. Man, since his inception, has been surrounded by problems of all kinds, and it has required him to confront them and find appropriate solutions to them with his limited capabilities. He began with a stage He contemplated what was around him, and wondered about the causes of facts and events. It was rare for a day to pass without him wondering about the cause of what was happening to him, and what was happening around him in the environment in which he lived.

In this lecture, we will try to shed light on the obstacles that hinder the progress of research to achieve the desired results.

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## Obstacles to scientific research

Scientific research has many obstacles, the most prominent of which are:

**1- The nature of the field of education as an obstacle to educational research:**

Education is a broad, sprawling field, and many of its concepts, principles, and theories are still not precisely defined, neither in the descriptive sense nor in the procedural sense. In addition, most of the educational knowledge has been developed mainly by relying on other sciences, such as psychology, for example, which makes it difficult to consider education as a solid scientific system. Building.

**2- The absence of scientific communities in the field of education:**

The mutual relationships between scientific models (the scientific model is a theoretical framework or way of understanding and perceiving the world adopted by a group of scientists, in other words the lens through which the community of scientists views the world they study) are the key to scientific progress throughout history. Shulman points out that there is a fundamental difference between the natural sciences and the educational sciences, which requires the development of a unique cognitive model that meets the needs of the unique characteristics of the educational sciences.

**3- Weak funding for educational research:**

Educational research in various parts of the world suffers from weak funding, as weak funding constitutes one of the most important external obstacles to scientific research. Efficient educational research increases in cost day after day.

**4- Poor qualification of researchers in the educational field:**

There are usually three categories of people who conduct educational research: university professors in colleges of education, researchers in research centers attached to universities or ministries of education, and teachers or field educators, and there is a belief that the general qualification level of the three categories in the field of conducting research is weak. This weakness increases as we move from the first category to the third category, because scientific research requires knowledge and a high degree in the field of methodology, methods, and statistics.

**5- The gap between the researcher and the practitioner:**

There is a large degree of doubt between those who conduct educational research, who are researchers from different categories, and between the teacher who implements the findings of their research, and researchers from some categories may not be aware of the educational problems that teachers face during classroom learning.

**6- The absence of educational research policies and clear research plans:**

Policy is a legal text for binding action that is represented in a number of texts, legislation, and regulations. Policy is an essential factor in organizing human effort. The absence of policy is embodied in the fragmentation of research efforts, their lack of seriousness, and the creation of a feeling of their unnecessaryness, which constitutes a factor hindering the growth of the educational research movement.

**7- Weakness of scientific management of educational research:**

This necessarily means the absence of directing educational research policies towards the goals of scientific research in society, and the weakness of their legal, technical and financial oversight, which ultimately leads to the dispersion of effort, energy and funds and the weakness of the internal and external efficiency and productivity of scientific research institutions.

**Knowledge**

Knowledge is of great importance to humans, as it represents the means that helps them overcome obstacles, avoid mistakes, and predict the future.

Language: It is the perception of something as it is, and it is the result of learning over a long period of time that has been formed over the ages. The Cambridge Dictionary defines it as understanding or possessing information related to a subject that comes through experience or study that exists in the mind of one person or that people possess in general, or it is the state of knowing or being aware of something or being familiar.

Technically: a set of meanings, beliefs, judgments, concepts, and intellectual representations that a person forms as a result of his repeated attempts to understand the phenomena and things surrounding him.

Knowledge includes scientific and non-scientific knowledge. All knowledge is knowledge, but not all knowledge is science.

Behind all knowledge lies a natural tendency in man to explore, to understand what is around him, to understand himself, and the nature of humanity...and this allows him to anticipate what will happen in the future.

K. LHRER analyzes the word KNOW in the English language, explaining the meanings of this word as follows:

- Having a certain form of ability to do something.
- Knowledge of meeting, viewing, or direct contact.

It appears from the similarity of meanings of the word “knowledge” between the Arabic language and the English language that it revolves entirely around perception and understanding.

- Recently, Foucault proposed the concept of epistemology as also a conceptual network that includes all cognitive patterns in a specific time period.

Procedurally: meaning to be aware of something, and it is a description of a situation or process for some aspects of life for people or groups that are prepared for it. For example, if I "know" that it will rain, then I will take my umbrella with me when I go out.

## Knowledge elements

The knowledge elements were agreed upon as follows:

- The knowing self: represented by the person who seeks to obtain knowledge.
- The subject of knowledge: it may be a thing, event, or natural, social, or psychological phenomenon.
- Cause and relationship: which is the connection between the knowing subject and the object of knowledge.

## Knowledge classification:

Knowledge is classified according to several criteria, which we summarize as follows:

A - According to its source: It is classified into three (03) types:

### 1- Sensory knowledge:

It is what a person acquires by watching, listening, and touching, relying on his senses and experience, and in this way it does not reach the level of scientific verification. Man has acquired this knowledge as a result of experience and its accumulation over the ages. If he encounters a certain phenomenon that is difficult for him to analyze, he attributes it to unseen forces that he tries to extrapolate through various means. This type of knowledge does not help a person reach knowledge of the relationships that exist between different variables, and the reasons for the occurrence of some phenomena such as eclipses, eclipses, and floods... Such knowledge is widespread among ordinary individuals.

- So, it can be said that sensory knowledge is what a person reaches through his senses and is through simple and spontaneous observation, examples of which include a person's awareness of the alternation of day and night and the fluctuations of the weather...

### 2- Contemplative philosophical knowledge:

This type of knowledge constitutes a more advanced step than sensory knowledge towards scientific thinking and human intellectual maturity, and is not within the reach of the average person who may not comprehend it and therefore not appreciate it. The reason lies in the fact that this knowledge

examines theoretical issues and requires more mental effort than what is required to understand and interpret the daily matters facing the average person.

Therefore, it can be said that philosophical knowledge is built on contemplation and thinking about problems that trouble humans, such as the causes of creation, death, and the end of the universe..., and these are things related to the metaphysical world.

3- Scientific knowledge:

It interprets various phenomena scientifically on the basis of systematic observation of phenomena, setting hypotheses and verifying them experimentally, and collecting and analyzing data to reach results. They are of two types:

3-1- Intellectual scientific knowledge in which rational tools such as reasoning are used.

3-2- Experimental scientific knowledge is a set of solutions to natural or social phenomena and developing explanations for them through observation, hypotheses, and experimentation.

- Scientific knowledge, with its approach based on experience, aims to reach generalizations and theories...that enable predicting the occurrence of the phenomenon in question, and controlling it within certain conditions. That is, it is the result of continuous efforts achieved throughout different eras and all peoples contributed to its construction. One of the most prominent characteristics of this knowledge is correction...that is, scientific knowledge is not final or absolute, but rather is subject to modification and change. It is always considered the best explanation for the set of observations and facts that have been collected. The previous knowledge represents the integrated framework of knowledge and is built on the following foundations:

• Intentional systematic observation of phenomena.
• Establishing appropriate hypotheses.
• Verifying hypotheses experimentally.
• Data collection and analysis.
• Generalization of results.
• Predicting what happens to different phenomena.

## Characteristics of scientific knowledge

### 1- Objectivity:

Its opposite is subjectivity, which means the complete and absolute absence of the researcher's self (temperament, culture, ideology, prejudices, and conclusions) in his scientific work, that is, in all stages and steps of scientific research, whether related to building the topic and formulating the problem or when building scientific hypotheses. Or when conducting scientific experiments until the researcher reaches an accurate scientific judgment that can be generalized. In this regard, Gaston Bachelard says, "Science brings people closer together while whims and interests drive them apart, because science uses rational evidence and logical proofs that are independent of personal and subjective factors."

### 2- Position:

It is the opposite of metaphysics and metaphysics, and positivism means working with topics, issues, and issues that we can reach directly and that exist either as an objective reality or as a mental reality.

### 3- Reasoning:

It means researching the causes and causes, meaning that the researcher must be guided to the real causes and effective causes of the phenomenon that he is studying. He is not required to describe the phenomenon as much as he is required to reveal the causal relationships that exist between the phenomena. The correct scientific knowledge is that which is through the causes.

### 4- Realism:

It is based on extrapolating phenomena and experiences that we actually live, and not that fall within the scope of imagination and perceptions.

### 5- Accuracy:

It is considered one of the most important pillars on which scientific thought is based, as scientific knowledge is characterized by accuracy, whether in concepts or questions, or the accuracy of hypotheses, experiments, conclusions, and generalizations.

### 6- Circular:

The accuracy of scientific results and theories is what enables scientific research to carry out the process of generalization, which in its logical meaning means making the whole carry the ruling of a part or some parts. This is what is known as the process of incomplete induction on which scientific research is based, where the researcher suffices with studying some cases, then He generalizes the facts he has arrived at to the cases being studied, while in complete induction

the researcher observes all the items of the phenomenon he is researching, and his judgment is merely a summary of the judgments he issues on each item of the research.

7- Relativity:

The accuracy of scientific results and theories, on the other hand, does not mean treating them as absolute truths that cannot be investigated again. Rather, what the scientific mind believes is that scientific theory is true and accurate only in some of its aspects, and therefore it always needs to be added and Amendment: The relative nature of scientific knowledge does not mean a sign of deficiency or shortcomings in explaining phenomena. Rather, what is meant is that science is in constant movement and its vitality continues.

8- Quantitative expression:

Scientific knowledge did not acquire its scientific character until it relied on quantification. It is said that the progress of science is the progress of measurement, as what is established in the history of scientific thought and scientific theories is that they do not deal with facts as qualities, but rather they are transformed into quantities so that we can study them and succeed in expressing them. .

In this regard, Aristotle said, "Sounds and colors were not transformed into scientific facts until they were interpreted quantitatively."

B - According to the method of acquisition: According to this criterion, there are two (02) types:

1- General knowledge: It is what a person acquires through daily interaction and observation of what is happening around him, and thus he forms a general impression about a specific topic.

2- Special knowledge or precise scientific knowledge: It is knowledge that is not based on intuition and contact with others, but rather is acquired through learning and systematic and comprehensive analysis of the subject, and the final decision is based on scientific evidence and evidence.

• From this it becomes clear to us that science is part of knowledge and is the most important element in it because it is characterized by certainty.

• Knowledge represents everything that the human mind has achieved in its attempt to control the phenomena surrounding it, as it includes scientific and non-scientific knowledge, which forms part of the culture in society consisting of interacting groups of institutions (family - religion - organization...), Scientific knowledge attempts to reach general laws and theories that link specific

vocabulary to each other under certain circumstances without stopping at partial vocabulary.

• Methods of obtaining knowledge can be simplified into the following points:

1- Coincidence: Coincidence often played an important role in obtaining knowledge, and the most prominent issue was Newton's discovery of gravity through his vision of the apple falling from the tree.

2- Experience: By it we mean the knowledge a person obtains as a result of an event occurring more than once. A person used to remember the times of sunrise and sunset, for example.

3- Trial and error: Humans used it in the past, and it is still used in the present era to obtain knowledge and discover new things. Any new type of medicine must undergo animal experiments, then clinical and field experiments, and after that it can be approved. . Also, many scientific theories were discovered and arrived at through these experiments and continued for several years.

4- Thinking: Man used the deductive and inductive thinking method to verify the veracity of new knowledge by comparing it to other previous knowledge, as well as verifying partial knowledge by relying on observation and sensory experience. Studying vocabulary as parts and knowing the characteristics of these vocabulary leads us to a general rule that applies to all vocabulary in the case.

5- Scientific thinking in research: The scientific method in research is a method used by the researcher in order to reach results whose validity and accuracy can be verified, because it proceeds within an organized plan, whether in defining the research problem or in developing appropriate hypotheses for it, and collecting relevant information. Analyze them, draw conclusions from them, and then find appropriate solutions. Accordingly, the researcher, by using the scientific method in research, can find the relationship that links phenomena to each other, and then reach a generalization and prediction of its results in an attempt to control and control them.

Importance of knowledge:

None of us denies the importance of knowledge for humans, as it lies in the following:

- It helps to understand the issues that a person faces in his life.
- It helps in overcoming the obstacles that prevent a person from achieving his goals
- It helps to correct mistakes and take appropriate measures to achieve goals in life.

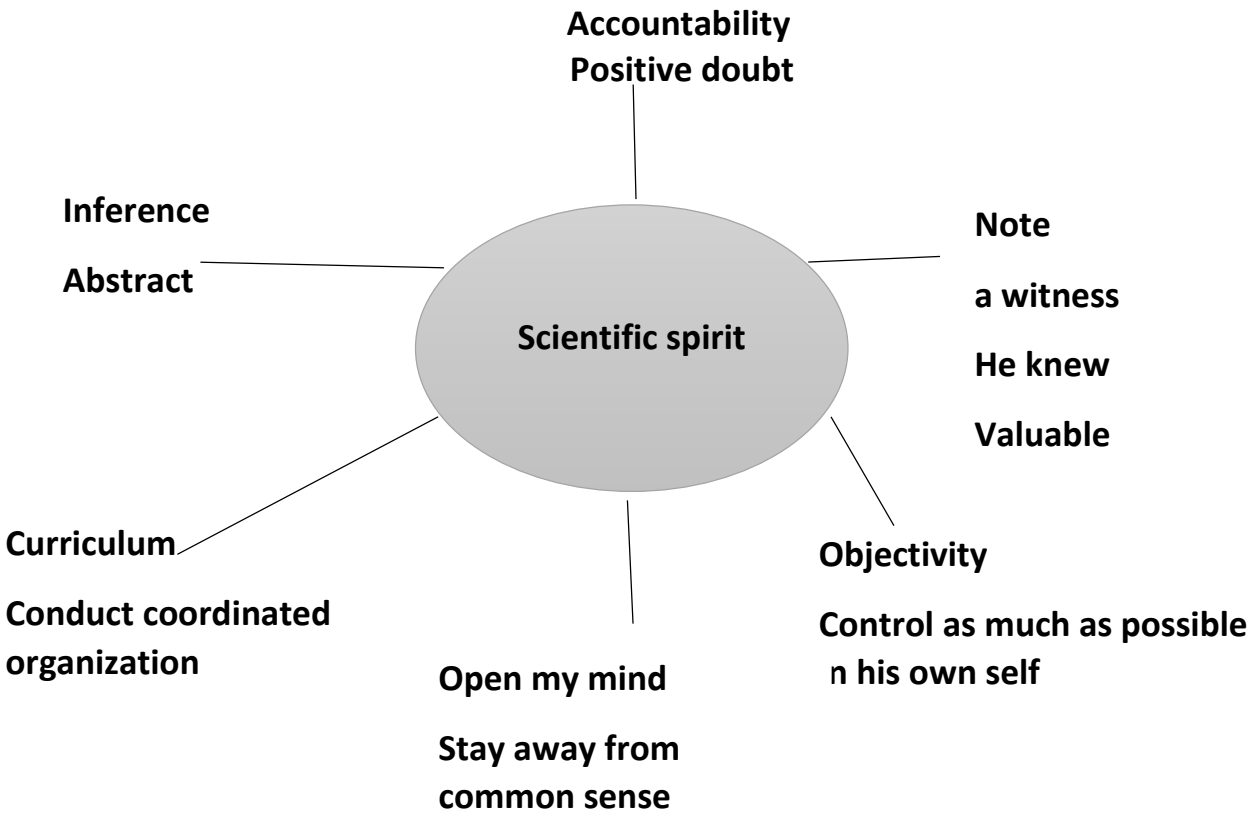
## Scientific spirit

It is known that before a person engages in any activity or work, he prepares for it by creating conditions and conditions that achieve and guarantee success in it later. The same applies to scientific research. The scientific spirit is a behavior characterized by some basic mental preparations in relation to the scientific method, and is acquired through practice and experience, meaning immersion in the process of scientific research is the way to develop the capabilities of the scientific spirit, and training in it is not an easy matter, as it requires a great effort to reach reliable results. It is accurate because it was built on sound scientific foundations.

**Features of the scientific spirit**

Observation, accountability, reasoning, methodology, open-mindedness, objectivity, and other characteristics that characterize the scientific spirit are, in their entirety, those gains that allow for the successful practice of scientific research.

**Figure No. (01): represents the characteristics of the scientific spirit**



## 1- Observation

It is the discovery and understanding of some aspects of phenomena that are still important, and by that we mean curiosity, which in science does not mean a lack of secrecy, but rather is synonymous with the positive desire to know, which every person feels, but to varying degrees. Then comes the care and concern that a person has towards the beings and things that surround him, and in this sense, the observing spirit is a curious spirit.

1-1- The tendency to watch: The mental readiness for the scientific spirit appears through the tendency towards paying attention to everything that surrounds us. It is the most common tendency among those who have never sat in one of the corners of a street crowded with vendors and customers, or in the lobby of a café, or in a A secluded observatory in a forest busy observing something? This position is in fact evidence of a desire to reveal what external appearances hide, and thus examine this world of which we are in reality only a part of the truth. This attention directed towards people and things is only the first step in an effort that attempts to understand our surroundings in order to reach understanding. Scientific observation allows for the discovery and understanding of some aspects of phenomena that until now remain obscure and which were initially devoid of any benefit.

1-2- Stages of observation: The scientific spirit develops the tendency towards observation that does not stop at merely testing the simple vision of beings and things. Selye (1973) divided this tendency into three different stages, which are: That I observe means that I watch or observe, i.e. I see something or someone present in front of my sight, then observing means that I recognize and determine whether the person or thing is known or unknown, or whether I have never seen it before, and finally, observing means that I measure, or in a broader sense, I evaluate the person or thing. . The fact that a person or thing is "measured as such" or "has such and such nationality" are in fact only living examples of the evaluation process. Thus, I have established and determined the standards that allow me to control this person's stature, as well as his nationality. For example, we assume that you arrived at the café located in your workplace or study and saw at first glance four people sitting around a table. In this case, you have completed the first step, which is watching. Then it becomes clear to you that two of them you have seen before, and that the other two people you have never seen before. In this case, which is the second step, you have gotten to know two of them. As for the third and final step, you will try to find out whether you should go towards them or refrain from doing so. Then you will

have carried out the evaluation process. This evaluation is based on many considerations and standards, such as the desire to talk to them, the degree of discomfort that may arise. Caused by them, the potential importance of the topic of conversation between them...etc.

- All of these processes take place in your mind in a relatively short time, and you cannot always perceive all of these various stages. Perception, recognition, and evaluation are all processes that make scientific observation far from being just a simple observation, as in ordinary life we can stop at the stage. The first is to be satisfied with it, but if we adhere to the scientific spirit, we are forced to pass through the three stages mentioned previously.

## 2- Accountability

Even if we apply focused and careful observation, it is actually impossible to observe everything at the same time or to give equal attention to all the phenomena being observed. The questions that are asked before or during observation are what guide one way or another in our observation. In short, questions are what allow us to select and define the phenomena around which thinking will be based or stopped. Thus, if we take the previous example, which is your entry into a café, then if you have decided in advance that you will sit alone or with other people, then your observation of everything that is happening in the café lobby will not It is done in the same manner as before.

2-1- Love of questioning: Observation in science does not take place without preparation. It is preceded by a question or several questions, which also prompts us to focus on some facts and exclude other facts while we are observing. The scientific spirit seeks to go beyond simple observation. It observes beings and things and senses new and unfamiliar facts by looking at them closely and contemplating them for as long as possible. However, the scientific spirit does not stop there because the question that will remain open is: Why did this or that thing take this direction or that? Or why this social group adopts this or that behavior...etc. For the scientific spirit, accountability is the indispensable key to opening the doors of knowledge. According to G. Bachelard, “For the scientific spirit, every knowledge is an answer to a question. If there is no question, there cannot be scientific knowledge.”

## 3- Inference

The accountability referred to previously is neither arbitrary nor spontaneous, but rather is the result of sober, rational action and based on inference, and therefore reason imposes itself as a preferred tool.

Reasoning is the act of perception through the mind, and there is no need to say that the human being is gifted with the mind and that the latter is what gives him the necessary intellectual tools that allow him to investigate and question the nature of beings and things.

## 4- Curriculum

If we ask questions in science with the help of scientific reasoning, and for the sake of better observation, this does not mean that we are doing so according to an unclear endeavor, but rather this is done according to a method, and this method is defined here by a set of precise procedures and methods adopted in order to reach a result, that Method in science is a fundamental issue, and the procedures used during the preparation and implementation of research determine the results.

Thus, whoever is doing the research, he is required to respect the endeavor, which is in fact a precise, correct, and organized method according to an inflexible logic. In other words, it is a rigorous endeavor, and in order for it to be acceptable and produce appropriate results, this endeavor requires rigor. In science, then, as is the case in other fields, there is a method, which is a series of successive stages that must be followed in a coordinated and organized manner.

## 5- Open-mindedness

The behaviors, actions, and beliefs that characterize daily life are determined by what we often call “common sense.” Thus, the belief that the poor can escape poverty if they make an effort, or that immigrants from countries of the South represent a heavy burden on the economies of countries of the North, can emerge. For many, it is taken from common sense, and others may be taught that the Europeans who immigrated to America in the 16th and 17th centuries did so for one goal and to reside in vacant land. While others, precisely those who live in families in which the parents harmoniously share family tasks, may tend to imagine that the matter is the same in all families. These assertions have not been analyzed (proved or denied). On the contrary, their opposite has been proven. In some cases, reality deviates from what is generally recognized by everyone, while open-mindedness includes the idea of the possibility that reality does not fit with indoctrinated ideas. acquired.

The scientific spirit must accept transcending agreed-upon judgments and common sense and move away as much as possible from spontaneity in thinking. It is required to accept that there are other ways of perceiving things than those to which you are accustomed.

## 6- Objectivity

There has been a lot of talk about objectivity. If for some people it means neutrality, then for others it means staying away from self-interests. But if objectivity is usually synonymous with not being biased towards an opinion or a position, then it is, more specifically, the characteristic of everything that describes a thing or phenomenon. Truthfully, that is, everything that gives a representation that matches reality. Objectivity is an ideal that is impossible to achieve. Indeed, although we aspire to an honest description of what we see or hear, what we see or hear is done according to our being, which includes feelings, sensations, judgments, experiences, and knowledge, including the mind.

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## Conclusion

The researcher faces many obstacles that hinder his research path and his investigation and processing of information, in various fields and levels of research, in his effort to achieve certain facts and acquire scientific knowledge, and this requires him to possess many qualities that help him and facilitate his work in finding solutions to the problems studied.

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