



Pre-scientific knowledge: the starting point of the research processes

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ABSTRACT

This essay addresses some topics that are rarely a subject matter of conversation between researchers and teachers of higher education related to the little scientific rigor with which some research topics are addressed, which are often pondered without reaching important conclusions.

It is highlighted in this paper the previous knowledge that every scientific researcher must possess as an indispensable premise for an objective approach to the object of research, and finally, some deficiencies that we present in our academic work are pointed out when we conduct research or when we assign some responsibility to our students.

The writing refers to some topics or philosophical approaches that have been made over the last decades about scientific knowledge and the proposals made by some theorists to reach it. Also, some of the multiple deficiencies that many members of the educational community, teachers, and students encounter when we face the task of investigating with scientific character some topic that we consider relevant in our academic performance.

DEVELOPING

About scientific research

Scientific research is based on rigorous procedures and is carefully carried out. It is the way that science uses to enrich itself with knowledge, Bayarre, and Hosford (2000). In other words, it is systematic, controlled and critical. Systematic and controlled means that there is a constant discipline to do scientific research and that the facts are not left to chance. Criticism implies that it is constantly judged objectively and personal preferences and value judgments are eliminated.

In the light of this conceptualization of what is a scientific investigation, questions arise about what we do in our teaching work related to research processes that we carry out in different areas of our academic performance. Doubts float in the air about whether what we do is actually “scientific research” or simply investigative processes that allow us to have a limited and biased version of our reality.

On many occasions, we develop research processes, individually or collectively, without considering the need for the systematic process undertaken. We want knowledge to come to us as something given, something like that suddenly we do not know something and suddenly we already know everything about that “something”.

It is to criticize the low levels of planning that we undergo when we undertake the task of investigating which limits the rigor required in a process of inquiry that will allow obtaining new knowledge, the approach of a new theory or the contribution to the solution of a problem. Investigating, therefore, requires something like what Popper called, a “basic logical scheme”, although it is labeled as methodological monism that leads to the explanation of the phenomenon studied and the consequent obtaining of new knowledge.

Research as a process

Some philosophy theorists point out that the scientific research process begins with prior knowledge of the object of the investigation. The hermeneutics establishes, in its so-called hermeneutic circle, “we always start from a pre-scientific knowledge about the object we investigate” and adds “what I want to know I have to know before starting to reflect and investigate.” These approaches lead us to more questions: where does scientific research begin? Is pre-scientific knowledge the starting point of the process?

It is possible to take into consideration the pre-scientific knowledge of an object of study as the starting point and often it is necessary to have it to give rise to an investigative process but we must also consider what the Erlangen school thinks and its constructive thinking when he criticizes the point of view of hermeneutics and affirms “we cannot put any absolute principle...”

“... since there is no clear beginning, at the beginning there is darkness” (Mardones and Ursúa 1999)

In this regard Area Sacristán (2012) states:

“All research originates from an idea, problem or problematic situation, but since the problematic situations are diverse and diverse, there is no single scheme to formulate the projects on which the researcher intends to conduct an empirical investigation on them”.

Notwithstanding these statements, we must consider what Borsotti (2008) raises regarding the need to “get acquainted with the problem situation” as a fundamental premise before starting to approach a research topic. Borsotti (2008) adds that basically, familiarization with the problematic situation consists of understanding the characteristics of said situation, its context, and its background.

Despite the different approaches to the starting point of an investigation, what cannot be doubted is that the acquisition of new knowledge through research must obey a process that gives meaning (to the process) dynamic, changing and continuous. To the question, should we always formulate a research project before starting the research process? Borsotti (2008) points out: “the objective is to demonstrate the importance, relevance, usefulness, and feasibility of its execution”, therefore the answer to the question is affirmative. This research project and for this, there is a great consensus, it must start with the “problem statement”, one of the researcher’s most important tasks, a problem with which we must be previously familiar.

This then leads us to the imperative need to take that first step firmly to start the investigative process. Let us not forget that the problem situation that we define is the north that will guide us in the search for new knowledge. Then a new question arises: what should we do, know or be aware of to properly raise a research problem? At least as Borsotti points out, its context and its background.

The role of observation in the problem statement

We have highlighted the importance of the good approach to the problem as an initial step in the investigation process and it is the observation that can offer the opportunity to identify and know the problem situation or the disturbing facts that hinder the usual occurrences. The role of observation in science has long been debated. Olivé and Pérez citing Hanson affirm that “in no philosophical approach of science it has been questioned that science depends fundamentally on properly controlled experience and systematic observation both for the problem statement and for the formulation and hypothesis testing”.

The controversy arises when some theorists of science wonder if there really are “pure” observations that are not prejudiced in any way by theories. The debate then opens up that if

a process of scientific research should be initiated from a previous knowledge based on a belief or under the influence of some conception about the world. I consider that in our environment when we develop research processes we have made exclusive uses of methodological monisms since the research projects are planned and executed making exclusive use of what is known as the scientific method discussed by many schools of thought regarding their great utility in the natural sciences but questioned about its use in the social sciences.

Generally, we start the processes following the rigor of the scientific method or the steps that it defines in its logical scheme, we have accepted observation as something universal as the first step of any research process. Many times this first step has led us to ambiguous and sometimes wrong interpretations of the social processes or events that we observe, we discovered then and until then the need to have that pre-scientific knowledge of the observable object.

Hanson (1977) clearly explains the difficulties that observation processes can pose and illustrates with clear examples the diverse interpretations that can be given to the same observable phenomenon, thus referring us to the experiences that Tycho Brahe (geocentric) and Johannes Kepler could live (heliocentric) observing the rising sun from the same place. The two astronomers would perceive, understand and act according to their theories and the expectations and beliefs derived from them by observing both the sunrise and each of them making a judgment of what was observed based on the prior knowledge that each of them has about the phenomenon in question.

Hanson (1977) also highlights the importance of the perception and interpretation that each person gives of the object observed. When you look at a flat drawing, you ask, do I really see something different every time or just interpret what I see differently? This leads us to consider that every time we observe the occurrence of a natural phenomenon or a social event we can have different interpretations every time we observe it, even when what happens in that event is always the same, the criterion of having at least one theoretical notion, but a pre-scientific knowledge of the phenomenon to be observed, regains strength.

We realize then that many times we start investigative processes without first exploring what has been said, what has been written regarding the object of study, many times we do not have a conceptual framework that defines the variables involved in the study. What is also inferred from what is observed will depend on the level of academic preparation of the observer in this regard Hanson suggests "... Although the layman sees the same as the physical, he cannot interpret it in the same way because he has not learned so much."

In our teaching work we often organize research processes that our students must develop as academic requirements, not very rarely do we realize the previous levels they must possess, before starting the research processes about the object of study and many times they play the

role of the “child or the layman” who can see because they are not blind, but cannot see what the physicist sees. A previous level of knowledge organization is required to effectively develop the research process. When Kepler observes the dawn interprets it in a different way from what Tycho would do because “Kepler’s visual field has a different conceptual organization”...

Hanson concludes in this regard: “In a sense, then, vision is an action that carries a theoretical burden. The observation of X is shaped by previous knowledge of x ...”

The paradigms of scientific research

“What a man sees depends both on what he sees and on what his visual and conceptual experience has taught him” (Kuhn, 1962). The author of this phrase is one of those who adds to the criterion that there is an urgent need to have prior knowledge of the object of study when you want to do science through research and adds ... “we came to suspect that something is needed similar to a paradigm as a prerequisite for perception itself” and then affirms “in the absence of such training there can only be a flourishing and buzzing confusion”.

We discover then the reasons for many failures of investigative processes that we have driven and that has resulted in vain annotations, the main one: the lack of a significant previous knowledge that leads us to develop the investigative processes objectively and with the scientific rigor required that demands our academic performance. An important observation that Kuhn makes is that a student to become an inhabitant of the world of scientists must go through a process of vision transformation so that he can see and respond as scientists do. In other words, you must live a revolution of vision (or way of seeing things), a change in the paradigms in which you have been educated to see as Kuhn says “the world of research with which you are committed differently.”

In our academic world, we define research as a transversal axis of the teaching-learning process. Our educational model defines it as follows:

“Research is a transversal axis of the professional training process. In this sense, it will be treated as a systemic, reflective and critical process in the study plans, considering: interdisciplinarity, ensuring that an attitude and research practice is formed during the career” (UNAN, 2011).

However, new questions arise in this regard: are we educating for a new research culture? Do we want to change the tradition of normal science in which we have educated our students? We think the new educational model of our alma mater is important because of the importance that is given to research as a fundamental axis of the teaching-learning process, however, there seems to be a long way to go, many paradigms to break and new paradigms to create.

Paradigms that lead the way to treat or address the explanation of an identified research problem, whether it be natural or social, that allow us to identify the parts of that whole we want

to investigate, ask the questions we must ask and find the answers to those questions and finally guide the way of interpreting, analyzing and presenting the results of the investigation.

We have a great task ahead; define those paradigms, provoke a revolution in the vision and in the way of thinking of all the actors of our educational sub-system and then perhaps, we will begin to see different things where we had already seen before, perhaps we also do, through investigative processes conducted scientifically, important discoveries that allow us to make significant contributions to science, but also that allow us to contribute from our university to the solution of the great social, economic and technical problems that our society is going through.

Empiricism: predominance of experience as a source of knowledge

Empiricism maintains the main thesis that experience is the only source of knowledge, that all knowledge arises from experience and that our mind is like a blank paper that obtains all its materials from the experience itself. Then I wonder, what meaningful knowledge can come out of the classrooms if we fail to articulate theoretical education with real experiences that allow students to interact with the environment in which it develops or will develop in their professional activity?

Another question arises more important than the previous one if research is a fundamental axis of our educational model, how can we educate for research if we do not have the experience of having developed research processes? It is eminent then the need not only to train researchers but rather to develop an educational model that allows linking theoretical knowledge with experiences of everyday reality so that we can develop in our students the skills required for highly competitive environments, skills that allow them to access not only by knowing but by knowing how to do and knowing how to be.

The generation of new knowledge, scientific method, and research.

“... There is no logical method to have new ideas, nor the logical reconstruction of this mental process... each discovery contains an irrational element or a creative intuition ...” Such a statement by Popper is flattering and becomes inspiring when it refers to what Einstein says:

“The search for those universal laws ... from which a worldview can be obtained through mere deduction ... there is no logical path that leads us to those laws, it can only be reached through intuition, based on something similar to intellectual love to the objects of experience ”

It is important to consider that these two approaches should become the paradigms of research processes and what we now call “innovation” as ways to reach new knowledge. These approaches discover the need to develop those innate creative abilities that we possess and have been constrained by the methodological typecasting to which we have submitted them. Perhaps it has been that typecasting that has limited use in the creation of new knowledge.

Our educational model should contemplate the didactic forms that allow us, firstly to us as teachers and then to our educators, to develop by putting into practice, those skills, which can sometimes lead us to make mistakes, but which can become the open door to access new and significant knowledge.

The approaches of Popper and Einstein call us to consider abandoning the methodological rigidity that has characterized us and betting on strategies that allow us to take advantage of the potential of our students and our own in our capacity as teacher and researcher, and explore those areas of knowledge that allows us to improve our scientific quality in personal terms and therefore that of our educational entity.

This does not mean abandoning the scientific rigor that the proposals of the new ways of seeking knowledge must contain; rather, it is a proposal that allows liberality in the ways of seeking this new knowledge, something like giving wings to the imagination and intuition to discover much of what has possibly been in our sight but that due to the academic and methodological rigors we have not managed to observe and discover.

CONCLUSIONS

Many are the paths that lead us to obtain new knowledge or new learning; scientific or not. This theme has been discussed since memorable times: what is the right path or at least how we started that journey that will lead us to the interpretation and explanation of the world around us. In natural sciences the scientific method is constituted in that logical process that guides us in the systematic becoming to obtain new knowledge, however, in the social sciences, the discussion still persists if this method, considered by some as methodological monism, is the way correct to address new discoveries in the field of research.

What we consider important to highlight is the prior knowledge that must be possessed as a fundamental premise to address an investigative process. This pre-scientific knowledge will contribute to an adequate approach to the research problem and will allow us to familiarize ourselves with the context and background of the research problem itself. It also highlights the importance of the investigative paradigms that govern our thoughts and how to approach the reality that surrounds us, which will inevitably affect the final perception we have of the phenomena studied.

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