RIDU Revista Digital de Investigación en Docencia Universitaria
e-ISSN: 2223-2516

V. 13, nº 1, ene-jul | PERÚ | 2019
https://doi.org/10.19083/ridu.2019.644

REVIEW ARTICLE

Epistemic Fundamentals of Qualitative and Quantitative Research: Consensus and Dissensus

Fabio Anselmo Sánchez Flores*
https://orcid.org/0000-0002-0144-9892
Departamento de Psicología de la Facultad de Ciencias de la Salud de la Universidad Andina del Cusco. Cusco, Perú.

Citar como:
Sánchez Flores, F. A. (2019). Fundamentos epistémicos de la investigación cualitativa y cuantitativa: consensos y disensos. *Revista Digital de Investigación en Docencia Universitaria*, *13*(1), 77-91. doi: https://doi.org/10.19083/ridu.2019.644

Recibido: 11-02-18; Revisado: 15-08-18; Aceptado: 25-01-18; Publicado:

Abstract

This article analyzes the main characteristics of research with a quantitative and qualitative approach, contrasting its differences and pointing out their historical and epistemic similarities, as well as the methodological and procedural ones. Likewise, its pertinence is defined depending on the subject of study and the discipline—scientific, proto-scientific or human—in which it is framed, providing guidelines for the selection of one approach or the other, or of both—*mixed* research—through the estimation of its advantages and disadvantages for scientific research. On the other hand, it highlights the importance of establishing communication and integration channels between the corresponding cognitive approaches, far from the conceptions that seek to find dissensus rather than consensus, thus contravening the value of studies with a mixed or complementary approach, which would be an alternative to the previous ones, but not for that reason superior or always necessary.

Keywords:
scientific research, scientific method, epistemology, quantitative research, qualitative research.

Fundamentos Epistémicos de la Investigación Cualitativa y Cuantitativa: Consensos y Disensos

Resumen

En el presente artículo se analizan las principales características de la investigación con enfoque cuantitativo y cualitativo, contrastando sus diferencias y señalando sus semejanzas tanto históricas y epistémicas como metodológicas y procedimentales. Asimismo, se define su pertinencia dependiendo de la temática de estudio y de la disciplina –científica, protocientífica o humana– en la que se enmarque, brindando pautas para la elección de uno u otro enfoque, o de ambos –investigación *mixta*–, a través de la ponderación de sus ventajas y desventajas para la investigación científica. Por otro lado, se destaca la importancia de establecer canales de comunicación e integración entre sendos enfoques cognoscitivos, lejos de las concepciones que pretenden encontrar disensos más que consensos, contraviniendo así el valor de los estudios con enfoque mixto o complementario, que sería uno alternativo a los anteriores, mas no por ello superior ni siempre necesario.

Palabras clave:
Investigación científica, método científico, epistemología, investigación cuantitativa, investigación cualitativa.

*email: fsanchez@uandina.edu.pe

Fundamentos epistémicos da pesquisa qualitativa e quantitativa: consensos e dissensos

Resumo

No presente artigo, analisam-se as principais características da pesquisa com enfoque quantitativo e qualitativo, contrastando suas diferenças e apontando para suas semelhanças, tanto históricas e epistêmicas como metodológicas e procedimentais. Da mesma forma, define-se sua pertinência dependendo da temática de estudo e da disciplina –científica, protocientífica ou humana– na qual se situa, brindando pautas para a escolha de um ou outro enfoque, ou de ambos –pesquisa mista–, a través da ponderação de suas vantagens e desvantagens para a pesquisa científica. Por outro lado, destaca-se a importância de estabelecer canais de comunicação e integração entre seus respectivos enfoques cognoscitivos, muito além das concepções que pretendem encontrar dissensos mais do que consensos, contrariando, desta maneira, o valor dos estudos com enfoque misto ou complementário, que seria um alternativo aos anteriores, mas não por isso superior nem sempre necessário.

Palavras-chaves:

Investigação científica, método científico, epistemologia, pesquisa quantitativa, pesquisa qualitativa.

"Our knowledge can only be finite, while our ignorance must necessarily be infinite."
Karl Popper.
(1902 - 1994)

Introduction

In the academic setting, especially at the undergraduate level, there is a problem between faculty and students, especially among those who are about to conduct the "final" research or undergraduate thesis—and at the postgraduate level in recent years,— about the pertinence of conducting a research study under a quantitative or qualitative approach, thus generating a dilemma that could either be avoided or reduced with a little more knowledge and information.

On the other hand, *specialized* research texts show notable gaps and contradictions in defining, contrasting, and elucidating both approaches, which aggravates the problem described above: if faculty and students lack information on the relevance of choosing either approach, and if the scientific research methodology books—many of them 'best sellers'—are merely mechanical application manuals of the scientific method in either approach without defining or justifying them, their readers will probably become more uncertain and will postpone promising projects, or choose inadequate methodologies for their research studies, thus generating great damage that could well be avoided.

Faced with this problem, it is pertinent and necessary to address this unnecessary problem about the supposed opposition between the quantitative and qualitative approaches, in order to know their historical background, elucidate their epistemic foundations, clarify their methodologies, and define their relevance and opportunity in the various study areas within the different scientific disciplines. These are the main objectives of this article.

Qualitative and Quantitative Approach, Definitions and Clarifications

Definition of the Qualitative Approach.

The qualitative research is the "methodological procedure that uses words, texts, speeches, drawings, figures and pictures [...], and it studies different objects in order to understand the social life of the subject through the meanings developed by the subject" (Mejía, as quoted in Katayama, 2014, p. 43).

From the above definition, it can be inferred

that research under the qualitative approach is based on evidence that is more oriented towards the deep description of the phenomenon with the purpose of understanding and explaining it through the application of methods and techniques derived from its conceptions and epistemic foundations, such as hermeneutics, phenomenology, and the inductive method.

Definition of the Quantitative Approach.

Under the quantitative approach, research is so called because it deals with phenomena that can be measured (that is, that can be assigned a number; for example: number of children, age, weight, height, acceleration, mass, hemoglobin level, IQ, among others) through the use of statistical techniques for the analysis of the data collected. Its most important purpose lies in the description, explanation, prediction, and objective control of its causes and the prediction of its occurrence from their disclosure, basing its conclusions on the rigorous use of metrics or quantification, both of the collection of its results and of its processing, analysis and interpretation, through the hypothetical-deductive method. In this sense, it has a wider field of application within the natural sciences, such as biology, chemistry, physics, neurology, physiology, psychology, etc. (Kerlinger, 2002).

Historical Origin of the Qualitative and Quantitative Approach

While the origins of both research approaches have longstanding philosophical and strictly scientific foundations, their naming and differentiation is inexplicably recent. The following is a brief outline of the historical origins of both approaches:

Origin of the Qualitative Approach.

Research on representations of the world, their conceptual and semantic meanings, on culture and the collective imaginary, on history, customs, the collective unconscious, ethnic prejudices and struggles, the search for immortality, among others, could be said to be innate to the human being. Since the origins of our species, the study of climate through the systematic observation of the stars with the purpose of predicting rain or its absence, as well as the development of our own existence in an experiential frame of reference, as defined by Husserl (2008), in the *world of life*, has been an ongoing activity even before the appearance of culture and history itself (Kolakowski, 1994).

Thus, if one wants to trace the historical origins of the qualitative approach, one would have to go back to the very appearance and development of the cognitive apparatus. Since we have consciousness and representation of the world, it can be affirmed that there is a desire to qualitatively investigate the phenomena with the intention of understanding them in their immediate essence, without theoretical or scientific assumptions that explain their consistency and structure, which are facts that are subsequent and inherent to the phenomenal description of the facts with the aim of giving them a meaning or purpose. Therefore, in the simplified meaning of the term, it could be stated that the qualitative approach is as remote as human cognition, and the most innate aspect to our species.

Using rigorous epistemic parameters, its origin dates back to the application of systematic observation and interpretation of facts. Philosophical speculation may well be catalogued as the first forms of qualitative research of phenomena, since its purpose was to understand the facts that occur in the world, from the investigation of the perennial change in nature to contemporary studies to understand the linguistic differences between two nearby ethnic groups.

Although philosophy can be catalogued as a form of qualitative investigation of reality, qualitative research is not limited to it, just as philosophy is not limited to hermeneutics (Mosterín, 2011), phenomenology or humanism, as they are methodological trends among many others which philosophers use to understand and apprehend the world. Therefore, at this point it is necessary to differentiate the origin of the qualitative approach, already in the strict sense, on the basis of the trends mentioned above, originated mainly in the Frankfurt School in the 20th century, besides other German philosophers such as Husserl (2004, 2008), Heidegger, Gadamer (1993), and Adorno (1972), as a reaction against "dehumanization", "mechanicism" and "scientism"—in addition to its inadequacy for the study of social phenomena—of the positivist paradigm, which

would become the epistemic foundation of the quantitative approach, whose epistemic basis will be analyzed later.

Origin of the Quantitative Approach.

Unlike the qualitative approach, the quantitative approach is less remote in simple terms, because its origin could be traced back to Pythagoras (who quantified the duration of the sound to explain and understand its nature, and concluded that everything is composed of numbers) or the Hellenic scientists, such as Archimedes de Agrigento (who was already carrying out practical and empirical experiments with military and technological purposes), and others of Alexandrian origin, such as Ptolemy, Euclid, Eratosthenes, Heron, and Galen. Its more genuine identification appeared in the 15th and 16th centuries, and resulted in the emergence of modern science; for example, unlike Ptolemy, Copernicus, Galileo, Kepler, and other Renaissance scientists, they are not only based on the measurement of the phenomena they try to explain—such as the movement of the Earth and gravity,—but also consider the objectivity of observation as their basic premise (Russell, 1970). In other words, they aim to avoid their personal convictions, without yielding to social syncretisms, a fact that (as well as measurement) characterizes the quantitative approach: such is the need to distance oneself from the phenomenon of study, leaving aside one's own subjectivity and sectarian or mystical pressures, to focus on facts that can be observed and quantified in concrete experience.

Later, the metric and objectivist trend of the quantitative approach will gain strength under the influence of egregious philosophers such as Descartes (2011), Bacon and Hume (1992); as well as scientists such as Newton in the eighteenth century; and recently, with all this cognitive baggage, to establish its epistemic foundation with the positivism of Comte (2009) in the 19th century and the neo-positivist current of the twentieth century, including the deductivist falsificationism of Popper, which at most continues the empirical line of neo-positivism (Alvarado, 2005; Echevarría, 1999; Villena, 2014), yet with a more rigorous and logical aspect in the light of the hypothetical-deductive method (which would be a correction of neopositivist inductivism), which practically delimited what today, in the twenty-first century, is called science or scientific knowledge in the strict sense, to differentiate it from the proto-scientific or pseudoscientific (Bunge, 1972, 1980, 2009; Jaffé, 2007).

Consequently, the power of what is today called scientific knowledge, or of what acquires the status of "science", is related to the strictly quantitative approach under the influence of the above-mentioned characters and the epistemic currents of thought originated in the United Kingdom, France and Germany, whose influence and supremacy in the scientific and academic world remains to this day.

Epistemic Bases of the Quantitative and Qualitative Approach

Epistemology of the Quantitative Approach.

The epistemic bases of the quantitative approach are related to its history, because in a strict sense they would go back to the experimental procedure applied by Galileo in his studies of gravity, whose epistemic foundation would rescue the best or the most valuable substance of the Greek empirical method (Cornford, 1974), which is used in the study of nature through empirical and formal procedures, which were already found in Heraclitus, Parmenides, Alcmeon, Hippocrates, and Aristotle (whose syllogistic method and theory of correspondence has influenced the logical structure of modern science until today) two thousand years before him (Sambursky, 1990). Thus, the quantitative approach, based on the measurement of phenomena studied through rigorous procedures that guarantee precision and objectivity, has characteristics that made the birth of modern science possible, detaching itself from the philosophy of that time, which encapsulated what was called science and delimited it procedurally under Aristotelian canons with mainly Christian mystical and religious nuances (Kuhn, 1978; Russell, 1970).

It was only because of the breaking down of the misused Aristotelian metaphysics that the science which used quantification made its own path and thus acquired a particular and differentiated body, establishing with Descartes, Bacon, and Hume—who already differentiated the ideas

of reason or logic and the ideas of facts, of syncretic and metaphysical ideas—the need to approach the study of reality through mathematical procedures, especially geometry and arithmetic, whose applications exponentially promoted the development of knowledge in scientific disciplines such as physics, chemistry, and biology. Later, this was strengthened with Comte (Kolakowski, 1988)—whose positivism also generated what is known today as sociology,—Carnap, Schlick, Reichenbach, Hempel, among others (Yesterday, 1993), thus acquiring the identity with which knowledge with the status of science is known today, which acquired a more conventional form through Popper's falsificationism, whose hypothetical-deductive method, applicable to all factual sciences based on experience for the falsehood of hypotheses—inferred from general theories—with the intention of increasing the body of the theories that give rise to them, in order to generate more scientific knowledge and thus broaden the cognitive spectrum of science and, with it, of humanity as a conglomerate of individuals with cognitive capacity, need and will.

Therefore, everything that today carries the adjective "scientific" has its origin in the quantitative approach, rooted in English empiricism, French positivism and German neo-positivism, which under the precept of the scientific method, which consists of the application of the hypothetical-deductive model, has made it possible to develop science and technology from the sixteenth century up to the present day.

> ***The hypothetical-deductive model.*** In short, it consists of the generation of hypothesis based on two premises, a universal one (laws and scientific theories, called nomological enunciation) and an empirical one (called enthymematic enunciation, which would be the observable fact that generates the problem and motivates the inquiry), to take it to the empirical contrast (Popper, 2008). Its purpose is to understand phenomena and explain the origin or causes that generate them. Its other objectives are prediction and control, which would be one of the most important applications based on scientific laws and theories.
>
> In short, in the hypothetical-deductive model general premises are used to reach a particular conclusion, which would be the hypothesis to be falsified in order to contrast its veracity. If this were the case, it would not only allow the increase of the theory from which it started (thus generating a cyclical advance in knowledge), but also the proposal of solutions to both theoretical and practical problems (also called pragmatic, applicative or technological). Besides, it could well promote its reformulation until exhausting the attempts to make it truthful or abandon it and reconsider it on the basis of other theoretical precepts that indicate a different or alternative orientation to the previous one.
>
> Its deductive path is one common to all factual sciences based on facts and with unavoidable support in the measurement or quantification, in the objectivity of the procedures (leaving aside the subjective convictions or beliefs of the researcher), and in the experience for the contrast of their hypotheses, whose main and ultimate goal would be both the expansion of knowledge through the pretension of universality of the results found, as well as the generation of scientific laws that allow both the explanation of the causes of the phenomena as well as the prediction, control, and retrodiction of their occurrence.

The causal-explicative model. It is another model of the quantitative approach that is mostly used within different sciences, especially natural sciences. It is mainly based on the experimentation and testing of causal hypotheses, in controlled laboratory situations (its ideal context for the care of its internal validity through the avoidance of strange variables). It is linked to the hypothetical-deductive model, because the hypotheses that arise from theories to create new knowledge are formulated in the logical mode of "if p, then q"; that is, "if such a cause is manipulated, then such an effect will be obtained," and "if such a reagent is applied to such a substance, then such a consequence will be ob-

tained." The first part of the hypothesis is called *explanans* (possibility condition of the hypothesis), whereas the second part is called *explanandum* (possibility condition of the problem). It was developed by Hempel (Okasha, 2002), who naturally accepted the limitations of such model, since not all the phenomena of reality (especially the social ones) adjust to causal explanations according to the logical scheme proposed by this model (it will be explained later on).

Epistemology of the Qualitative Approach.

Probably, in order to understand the need to resort to the qualitative approach when the quantitative one has reached its limits or exhausted its possibilities of accessing knowledge of the phenomenon through its methods or techniques, it is necessary to understand the reasons why Wundt (Greenwood, 2009), the founder of experimental (1879) and scientific psychology *per se* (within the quantitative approach with positivist roots), left the psychology laboratory at the University of Leipzig (1900) at the end of his years to get involved in the study of the social phenomena that incur in human consciousness and its complex subjectivity that generates imagination, thought, legends, language, and customs, which he summarized in his *Völkerpsychologie*—or psychology of peoples—beyond the experimental study of simpler phenomena such as perception, sensations and attention, among others, in contexts rigorously and irrefutably controlled in terms of objectivity and precision, through comparative studies by using Darwin's historical-comparative-naturalist model (Greenwood, 2009). Though, it is necessary to clarify that many of the phenomena that Wundt considered inaccessible to the experimental study of psychology are now satisfactorily developed through cognitive psychology—with experimental cognitive science as its most promising creation—and neurosciences that include philosophy and various scientific disciplines ranging from cognitive anthropology to linguistics (Bunge, 2002; Gardner, 2000). Therefore, it is necessary to analyze the development and technological advance of one or the other approach in order to define their limits and cognitive possibilities.

Beyond this, as it has already been mentioned, Wundt's example illustrates the need to resort to other study approaches that do not seek to control phenomena so that, based on their exact manipulation and measurement, they have the power to explain (*erklären*), predict (*versprechen*), and control the events they trigger, but rather aim to understand (*verstehen*) them in order to know their subjective dimension by using other procedures for accessing and revealing information (Orbegoso, 2015; Piscoya, 2009b). For instance, it is very difficult to measure or quantify—when not inappropriate—the religious beliefs of a native community in their deities and, much less, the cultural and historical roots behind them. Similarly, a comparative study of the role of women in political, economic and social life within the pre-Hispanic cultures of South America, as opposed to the contemporary cultures of the European continent, would be unfeasible following a strictly quantitative approach. In this sense, it is necessary to explain that, when it comes to focusing on the study of social phenomena that concern the subjectivity and intersubjectivity of the individuals who construct and structure them within their own historical-cultural context, it is necessary to change the focus or approach when conducting the study, and get involved in its research assuming one or more of the study models that the qualitative approach implies:

The humanist model. Following the line of Husserl (1859-1938), the qualitative approach emphasizes the need to be interested in the human being, and its individuality, to know its world of life far from stereotyped theoretical patterns. This reaction is justified in Husserl (2008) due to the mathematization of nature which he proclaimed as one of the causes of the positivist debacle when explaining natural phenomena, which people also sought to apply to social studies, which was like trying to fit a circle in a square space. However, Husserl's claim is not limited to the method, but to the product, because he thought science had become so distanced from its original purpose, because of the mathematization of nature, that it had become delegitimized by abandoning its most important function which was to reveal the reason of our exis-

tence, and had thus become a simple instrument of technology with the dehumanizing sequels that can still be seen today in the light of consumerism, such as the dependence on new technologies—hence the explosion of unidimensional individuals addicted to technology that we see every day as we walk the streets, which Marcuse analyzed thoroughly—and the ecological devastation of the planet (Sánchez, 2013). In short, positive science, according to Husserl, had changed its course and now it is lost around techno-scientific paths without the slightest interest in returning to its place for which it was conceived at the beginning of the sixteenth century, in full boom of the Renaissance movement.

Beyond that, Husserl's claim (2008) becomes legitimate, because quantitative research, which had generated so many results of promising value and still does in the natural sciences (chemistry, biology, physiology, physics, neurology, etc.), showed problems when trying to apply it to social studies, where the "objects" of study are no longer concrete phenomena such as atoms, cells, planets or chemical elements, but feelings, social and individual perceptions and cognitions, mythical and religious thoughts, ethnic and linguistic differences, cultural structures and constructs, and so on. Quantification omitted these more proper and exclusive aspects of the human condition in the social and intersubjective sense, compared to the material and concrete sense, considering subjects as experimental objects at the social and subjective levels. In light of this, the need to humanize scientific research was stressed, and instead of aiming at quantifying phenomena to explain their origins, causes and thus control them and predict their occurrence through generalizable trends (one of the most important purposes of the quantitative approach), people tried to promote their understanding through the understanding of human beings who make them possible within their own spaces or contexts of natural interaction, without trying to control or manipulate them to generate consequences. Facts, as well as subjective social and cultural consequences, are found in human beings themselves. The work of the qualitative researcher—one of his most important challenges—was to reveal them through the interpretation that inevitably implies a certain dose of empathy and, likewise, subjectivity, which are vital to understand the most internal and profound experiences of human beings, as endowed with humanity.

The hermeneutic model. Understanding hermeneutics as the art of interpretation, conceived for the understanding of classical texts of both philosophical and Catholic origin, its transposition and use within qualitative research is owed to the German philosophers of the Frankfurt School: Weber, Dilthey, and Habermas (Adorno, 1972). The purpose of this conception is multiple, but its origin goes back to the intention of understanding (*verstehen*) the nature of the facts in their own context of occurrence, in the world of life that Husserl emphasized so much in his transcendental phenomenology.

It is thus that the intention of the *verstehen*, as comprehension—for its other meaning in German is to *understand,*—is better suited to the study of phenomena in the social sciences, since quantification, as it has been pointed out, is not often possible in some cases, while in others, even if it is, it is not convenient; for example, for the understanding of the origin of Greek myths and their transformation into philosophy in a historical study. Consequently, understanding by transcending and dispensing with quantification seeks to provide sufficiently detailed and profound information of the phenomenon in a direct—through the phenomenological *epoché*, which will be discussed later on—and immediate way through the interpretation of facts that are circumscribed to human and social experience (Orbegoso, 2015; Piscoya, 2009b), without intervening in it, within its own

space of occurrence, and with a certain dose of empathy, but taking care not to intercede or mediate in it, since any intervention of the researcher could denature it and generate partialized knowledge that lacks objectivity. One does not intercede in social phenomena that one investigates through hermeneutic interpretation in social experience, just as one does not immerse oneself in the writing of a classic book in order to distort it through tendentious and prejudiced interpretations. Such is the consistency of the hermeneutic model that, as it can be inferred, it is intimately linked to the humanist model and the phenomenological model, which is described below:

The phenomenological model. The phenomenology of Husserl (2004), which has already been addressed when dealing with humanism lines above, proposed a peculiar access to the comprehensive study of the phenomenon (that literally means, what is shown, what is apparent to the senses). Reason is suspended, and *epoché* is implemented, by which it is intended to describe things as they are presented to the senses, without prejudices, convictions, or theoretical preconceptions—which is why hypotheses are not allowed in this approach,—thus assuming the natural attitude of who knows a phenomenon for the first time focusing attention, reason and senses on those things.

Perhaps a metaphorical way of understanding the phenomenological model would be to imagine tearing off a tuber, layer by layer, until we reach the most hidden root of it, an action that implies removing what would have been made of it socially or culturally, which, in short, impels us to dismantle it from ourselves. Thus, the qualitative researcher makes use of the phenomenological model to get rid of his or her own prejudices, convictions and preconceptions in order to immerse himself or herself in the study of a human phenomenon, either within anthropological, ethnological, or psychological science, among others, by using intuition and the detailed description of what he or she can observe when totally *unaware* of what he or she wants to know. In this way, when the researcher gets immerse in a native community to know its models of patriarchal or matriarchal authority, he or she must be in consonance with it, participating and mixing with it, but without letting his or her prejudices interfere with the object of study so as not to deform it in the interpretation, nor let the studied phenomenon submerge him or her completely, because that would make him or her leave or quit his or her role as a researcher and merge into the phenomenon, losing, likewise, objectivity and, *per se*, excluding himself or herself and abandoning his or her research.

The inductive model. Although modern science was born with the inductive model, advocated by Galileo, Bacon and Hume (1992), in the sixteenth and seventeenth centuries (Echevarría, 1999; Okasha, 2002); in the twentieth century, under the influence of Popper and his falsehoodism at all costs, science from the neo-positivism of the Circle of Vienna (Echevarría, 1999; Villena, 2014) abandoned the inductivist model to adopt the hypothetical-deductive one. However, the qualitative approach originated in the Frankfurt School recovered it for the study of social phenomena. This could not be otherwise, because how can we do research immersed in the particularities of a phenomenon without proceeding inductively? This is perhaps one of the strengths of the qualitative approach, and its greatest weakness at the same time.

When a psychologist (whose theoretical model is more linked to the qualitative approach) analyzes the personality and psychopathological symptoms of a patient with major depression, for example, from a marginal urban area of the city of Lima,, not to know their correlations between them, but to understand the nosology of the psychopathological phenomenon the patient suffers, through the clinical method and its respective techniques, such as

anamnesis or case study, he or she penetrates into all the factors that could intervene both in the past and in the present of the patient, in a predisposing or triggering way. To achieve this, the psychologist uses the humanist model to approach the patient as a human being rather than as an object of observation, while the hermeneutic model is used to interpret the patient's most deeply rooted experiences from his or her childhood up to the present time. Also, the phenomenological model is used to get rid of his or her own prejudices and observe the essence of the phenomenon in order to understand its nature and give a diagnosis, a treatment and a prognosis. In this case, the psychologist will have qualitatively unraveled the factors that led to such pathology using the inductive method, establishing a sum of particular facts to determine a general diagnosis. However, the fact that he or she has unraveled these symptoms and factors in a particular person does not necessarily lead to the generalization of the results to another patient, or to the same city, community, ethnic group, or family—in case the patient's child or sibling has a similar illness,—and much less to a nosological framework—however similar it may seem—in a depressed person in the United Kingdom.

The generalization of the results obtained by the psychologist is circumscribed to the own particular case that he or she analyzed in a deep and detailed way. The case of the sample by saturation does not give guarantee of it, because even if the same results were obtained by saturation within the familiar context of this person or of his or her social or cultural group, or if three or more psychologists observed the same results in the analyzed patient, this does not mean results can be generalized in any way, since they are circumscribed to their own sociocultural context. To deny this fact in the qualitative approach would be like refusing to continue existing. One of its strengths and reasons for its birth are related to the understanding of the phenomenon within its own context of origin; therefore, if people try to generalize its results, it would be discredited as an alternative to the quantitative model, that is, it would be extracting itself. However, on the deep understanding of a phenomenon, one can establish certain explanations about the nature, the origin of this phenomenon and others specific to the social sciences, such as anthropology when studying the origin of a custom rooted in the tradition of a people, or ethnology when analyzing the dissimilar conceptions about death in two neighboring ethnic communities in a comparative way, which would be little less than viable under the quantitative approach.

Therefore, the explanations triggered by the inductive model, on the basis of the understanding of particular facts, are only legitimate and reliable for the particular group being analyzed, as they are circumscribed within their own context. It cannot be otherwise, because it would completely delegitimize it. This is its greatest value and also its greatest *weakness*—in the light of the quantitative approach.

Relevance of the Quantitative and Qualitative Approach in Scientific Research

Surely the reader of this article will already be able to reach his or her own conclusions on the relevance of one or the other approach; however, it is appropriate to elucidate the following:

Methodology and Applications of the Quantitative Approach.

The methodology and applications of the quantitative approach were conceived for the study of natural—and not necessarily human—phenomena, such as astronomy, physics, chemistry, biology, physiology, neurology, botany, etc. Among these, for example, both medicine and its derived branches of application were effectively used to extend the life of human beings and offer a better quality of life to society, while technology was used because of its applications in various aspects of human life, from mega-constructions to computers and telecommunications.

In such conditions, the applications of the quantitative approach must be defined according to the nature of the phenomenon to be studied, since, following the example of the psychologist, if its purpose were to know succinctly and quickly the chronicity of the symptoms of what is presumed to be a major depressive syndrome, under this hypothesis—following the hypothetical-deductive model—it would be enough to apply a psychological test—which had overcome rigid criteria of validation and statistical reliability for such quantification,—in order to measure the magnitude of the problem and then carry out a structured interview, following relatively strict guidelines of order according to own and adequate manuals for its application in several sessions, and under the external observation of the symptoms, and to classify the nosology inside a manual of psychodiagnosis—whose scientific theoretical support would avoid committing an error in the generalization,—to plan a treatment in the light of the existing therapeutic theory and, finally, to apply it foreseeing the time of the recovery on the base of experimental studies with similar cases. In the same way, a doctor does the same when dealing with a viral or bacterial disease in a patient.

From the example it can be inferred that the choice of approach to be used is based on the nature of the variables that make up the research problem, because if one intends to study natural or behavioral phenomena in an objective manner and without trying to immerse oneself too much in the deep and subjective nature of the problem, one could use the quantitative approach, which consists of succinctly formulating hypotheses on the basis of theoretical knowledge and facts observable in reality, and taking them to their empirical verification through tests and instruments duly accredited for it and issuing a final result of said analysis, which must have a very detailed, rigorous and objective explanation of the casuistry of the phenomenon of study, which must be published to be assessed and analyzed by the scientific community, in such a way that its objectivity and logical casuistry can be measured and pondered (Piscoya, 2009a, 2009b), so that the understanding of the origin or causes of the phenomenon, as well as the planning of possible solutions, is achieved. In the latter case, the experimental method and systematic observation are the most appropriate techniques, as it was patented from its origins in the revolutionary medicine applied by the famous Vesalius in the middle of the sixteenth century, whose legacy survives to the present day.

The choice therefore derives from three factors: first, how much the researcher intends to immerse himself or herself in the subjective elements of the phenomenon; second, to assess whether it is relevant and necessary to do so; and third, how much the phenomenon requires to do so. The researcher can choose the phenomenon or the approach, but the phenomenon's nature defines the best approach that should be used to study it appropriately and adequately. In this context, the task and role of the researcher is to be sufficiently attentive to this demand to decide what is most appropriate and convenient for the study and approach to the problem.

Methodology and Applications of the Qualitative Approach.

The qualitative methodology, which consists of carrying out case studies (other than the *single-case experimental design,* which according to Hernández, Fernández and Baptista, 2014, can also be applied from the quantitative approach), the clinical method, and the ethnographic method, as well as the interview and observation techniques, the discussion groups and the biographical methods, aim to further analyze the data until achieving a close global understanding of the phenomenon studied (Katayama, 2014; Orbegoso, 2015; Sánchez & Reyes, 1998).

In this sense, the applications given to it in the study of a phenomenon have to be justified in the light of what is intended to know about it, that is, acknowledging that the results cannot be further generalized than to the individual, social group or community in which it is carried out, since one of the most important objectives of qualitative research is to know and understand subjectivity, so it is impossible to think that these could be generalized (Alvarez-Gayou, 2009). Therefore, the researcher must be aware that his or her findings will not be able to generate laws or causal theories with the rigor and mathematical precision of the quantitative approach, since they are genera-

ted on the basis of the contrasting of hypotheses by means of the hypothetical-deductive method that, with all its limitations, is based on theories to generate hypotheses, which may acquire the status of laws—weak but still causal laws—if they survive the falsehood, and by their systematic accumulation of scientific theories, more and more general and universal. Unlike the theories that are generated through the design of theory based on the qualitative approach, these scientific theories have a statistical support that gives them precision (although this is always only probabilistic, since the margins of error are inherent to the statistical procedures of data analysis), hence they allow to diagnose with precision, for example, a disease under the chronic, moderate or mild categories.

On this subject, it is necessary to point out that for some authors like Flick (2004), the qualitative approach, through the design of grounded theory, is capable of producing theories by gradually transferring the individual findings of, for example, the case studies, to more general and abstract relations, with a previous critical evaluation of the validity and reliability of the data, the adequacy of the research process, and the "empirical foundation" in which they are sustained. Hence, for example, the individual characteristics of a small group of consumers of a certain product could be generalized, thus providing extremely important information for decision-making in market analysis, consumer psychology, and corporate marketing (a quite common practice in the business world through *focus groups*); in this sense, the generation of theories through induction would be an obvious possibility. However, it is important to highlight that these theories would lack epistemic strength. According to Popper (2008), an individual case that refutes the general theory would be sufficient for it to be refuted and rejected; it is enough to recall his classic example of white swans. Nevertheless, this topic continues to be the subject of epistemic discussion and debate, still rooted in the dispute for hegemony between the positivist and hermeneutic-constructivist paradigms.

On the other hand, with regard to the use of hypotheses, the qualitative approach generally does not propose a formulation because of its inadequacy with its phenomenological basis. However, for other theoreticians of qualitative research, such as Alvarez-Gayou (2009), its use is not only feasible, but necessary, because instead of focusing on testing it first (which is the function they fulfill in the quantitative approach), the purpose and advantage of its use would be, first, to guide or direct the study topic, giving the researcher a clearer horizon of what is intended to understand through the application of the techniques and instruments of this approach; and, secondly, to allow the generation of new ideas and proposals that are formulated and reformulated in a dynamic way as the study progresses (unlike the hypotheses in the quantitative approach, where they remain unalterable from their formulation until their contrast with the facts of reality), thus allowing the making of new decisions, either practical or methodological, for a better understanding of the phenomenon.

Consensus and Dissensus Between the Quantitative and Qualitative approach

Both the quantitative and qualitative approaches are interested in knowing reality. In this sense, their cognitive commitment to obtain the truth is legitimate and common to both. In order to achieve this, each one of the different methods is used from different origins and with different purposes, which are also different, but not mutually exclusive. The application of the scientific method is evident in one, which has been giving promising results to the so-called "hard" sciences with precision in the measurement of the phenomenon and with great generalizable outreach to other individuals and communities all over the planet. Since the laws and theories generated under the hypothetical-deductive model have this purpose, it builds and deconstructs itself—and with it, science—under these precepts. The qualitative approach is also based on methods that combine humanism, hermeneutics and phenomenology, trying to delve into those aspects not quite explained by quantification and where the beams of light from inferential statistics and mathematical metrics, with their implicit rigor and precision, do not reach—and are unlikely to ever do so: for instance, the reason or understanding for which a mother raises her child in such a way

that she immobilizes the whole body by tying it tightly from the trunk to the lower extremities tied tightly to a splint located in the posterior plexus from the back to the feet, as it happens in the Andean communities rooted in the Peruvian Andes, under the pretext of making them stronger and healthier during their physical and psychological maturational development. It would be wrong for the researcher to limit himself or herself to measuring the reasons for this phenomenon through a psychometric instrument, since its nature transcends quantification. In this case, the hermeneutic and phenomenological qualifications, as humanist, have a fundamental role at the time of understanding and trying to explain this fact in the light of the own conception of the mother within the sociocultural context in which she lives and develops.

Now, the disagreements between the two research approaches would be determined by prejudicial rather than real and rational reasons, which prejudge one or the other approach from both positions, by stating that they are contradictory or are opposed in the study of reality, launching criticisms from one or the other perspective. An anodyne fact as it is to criticize an ideology from its opposite, and vice versa, drowning each one in its own conviction without major pretensions of understanding, integration, nor mutual cooperation, forgetting that, historically, knowledge is developed through a dialogical way of confrontation of ideas through consistent arguments in the light of the facts and the logical sense. This was the motto of Socratic dialectics through irony and mayeutics, and of Heraclitean dialectics through the struggle and complementation of opposites. In this sense, the mixed approach represents a plausible sample that integration and complementation between both approaches in dispute is not only viable, but already a reality, yet its application is not always necessary. Also, its methodological procedures, as well as its epistemic foundations, need to be developed and further clarified, and for this purpose it must first transcend the assumption that the simple conjunction of the qualitative and quantitative approaches already generate a mixed approach, thus confusing sum with integration. Hence, the epistemic and methodological focus of this alternative approach, as an integration of the two previous ones, which implies the epistemic deconstruction of its scientific and procedural structure, deserves a more exhaustive study.[1]

Is Research with a Qualitative Approach Scientific?

According to what has been analyzed, and in order to answer this question in a judicious manner, it is necessary to get rid of the positivist and scientistic prejudices that impel any study that disregards quantification to be judged as pseudo-scientific, as if all phenomena could be measured under rigorous criteria of observation and experimentation, and especially the manipulation of certain reagents in strictly controlled contexts, where any immersion of strange variables that alter the results of a study is strongly isolated and its consequences are measured with mathematical rigor. This procedure, which is more typical of natural sciences, unfortunately cannot be applied or transferred to the study of social phenomena for the reasons already explained in the previous pages, so it is enough to imagine the nonsense of trying to manipulate cultural and historical variables (Harari, 2017), and quantify its consequences under rigorously controlled situations, such as in a molecular biology laboratory.

In this sense, qualitative studies are a different and alternative way of generating scientific knowledge, in a space where it is only possible to delve into subjectivity under the phenomenal and hermeneutic qualification, by means of which valuable information can be extracted from its depths that allows understanding its internal and external dynamics to explain—with its unavoidable generalizable and precision limitations—the nature of the facts to be known through its inductive interpretation and under the meticulous application of the diverse methods and techniques available to the qualitative approach. History, ethnology, anthropology, ethology, linguistics, ethnography, among other social sciences, owe their existence and possibility, in large part, to this approach, by which we as humanity have achieved a better understanding of ourselves.

1 On the epistemic and procedural basis of the mixed approach, see *Integration vs. Opposition*

Integration Versus Opposition

Although for many researchers and methodologists both approaches are irreconcilable and contradictory, by stating that they respond to different paradigms and ideologies, even to dissimilar political positions coming from different cultural and historical moments, the exact opposite happens in practical and real-application situations.

Following the example of the psychologist who evaluates the etiology of his or her patient's major depressive syndrome through a case study or clinical anamnesis, delving into the subjective experiences lived by the subject during its development, it is unlikely to obtain an accurate diagnosis by only applying the phenomenal *epoché*, since clinical *praxis*, in addition to systematic observation (characteristic of the quantitative approach), also implies an in-depth interview (typical of the qualitative approach) and the application of psychometric instruments (typical of the quantitative approach), in order to locate or classify the symptoms within an accredited diagnosis under criteria of quantitative rigor, and to finally give a vast and profound interpretation (typical of the qualitative approach) of what is at the origin of the problem; that is, the predisposing and triggering factors of it. In this sense, it is common to apply a *mixed* or combined approach in research that, transcending the prejudices of both positions in dispute, uses methodologies of both approaches to achieve a better understanding and explanation of the problem. However, it must be made clear that the phenomenon does not always require mixed treatment, especially when it involves simple facts that could be studied under one or both approaches, but with a predominance of one of them; for example, the study on the cause of an infection caused by an insect bite could be resolved with a simple interview with the patient, observation of the edema on the skin, and a laboratory test to determine a more reliable and accurate diagnosis. In such cases the qualitative approach would not be very useful, neither a mixed study.

Therefore, both approaches, rather than opposition, have as their common destiny their mutual complementarity, because where it is not possible to quantify the phenomenon or control its occurrence to determine laws of cause and effect, it is necessary to resort to the qualitative approach. On the contrary, where it is better to quantify the phenomenon with precision for reasons of health or other reasons of equal importance, because a qualitative study would be more than unnecessary when inadequate, it is necessary to resort to the quantitative approach. And in case the phenomenon is so complex that it involves both measuring and understanding through the interpretation and detailed description of the phenomenon in order to explain its origin and apply the best methods of solving the problem, it is necessary to resort to the mixed approach, with predominance of one of the two approaches depending on the demand and need of the problem being addressed.

Conclusions

Quantitative research can begin where qualitative research ends when, after its application and development it proposes hypotheses that can be measured in order to know the nature of the phenomenon in a more precise way and thus have an integral knowledge of it. By the same token, qualitative research can begin where quantitative research ends, when the phenomenon cannot be quantified, either due to technological limitations or the inadequacy of this procedure—especially when studying social phenomena with a higher level of complexity due to their subjective nature, their cultural relations, and social or historical implications—. Therefore, there is a relationship of mutual complementarity between the two, where the first is better suited to the studies of the natural sciences—although not limited to them—and the second is suited to the social sciences—not limited to the qualitative approach either—.

The result of their mutual complementation could well give rise to mixed studies, when the nature of the integration requires it depending on the level of complexity of the phenomenon being studied; otherwise, it is unnecessary due to the high effort demanded by the researcher, as well as the resources and time involved in its planning, implementation, development, and execution. In this case, one or another approach should be chosen, depending on the nature of the variable

or phenomenon to be studied. In this sense, it is the researcher who chooses the phenomenon to study—according to his or her preferences, vocation, skills and the observed problematic—. However, the choice of one or another approach is determined by the very nature of the phenomenon or object of study, because it depends on its qualities, properties, and relations with other phenomena (in view of the fact that scientific research does not face an isolated problem, but sets of problems intimately related to each other [Piscoya, 2009a]); by considering this, the most suitable way will be chosen to obtain more viable, reliable and, therefore, truthful knowledge.

With respect to the supposed rivalry between both research approaches, it is necessary to specify that it is rather the result of extreme positions based on prejudices than of real facts that are presented as perennial challenges for the researcher. Hence, in practice both approaches are usually developed jointly for a more complete and integral approach to the phenomenon, and thus provide more objective and adequate solutions to the problem being researched.

Numerous research methodology manuals tend to reinforce this kind of rivalry between the two approaches, establishing forced differences such as the permissibility towards the use of the subjectivity of the qualitative researcher when understanding the phenomenon, thus generating an erroneous vision of the qualitative approach, undermining its credibility and objectivity. This criterion or condition does not exist—nor will ever exist—within the research that is defined as scientific, because it must always be guided by the facts that are manifested in reality, leaving aside the tendentious beliefs of the researcher, as a result of his or her passions, prejudices, syncretisms, and personal conceptions, which must not interfere with the analysis and interpretation of the phenomenon being studied. Although they are subjective tools used by the researcher to elucidate the casuistry of his or her study, as they depend on cognitive processes such as thought, decoding, and information processing, they must be based on consistent, clear, concise, syntactic, semantic, and orthographically correct arguments (Piscoya, 2009a).

It has been concluded that qualitative research is an alternative way of generating scientific knowledge, based on the rigor in the application of its methods and techniques, which are not intended to contrast hypotheses to generate laws and theories with the precision and causality relationship of the quantitative approach, yet are aimed at understanding the nature of those phenomena that cannot be quantified or hypothesized, allowing a better cognitive approximation of diverse phenomena of study through the application of their own procedural resources, which would otherwise be relegated, excluded or limited from scientific knowledge, following the positivist, neo-positivist, and false paradigm of the quantitative approach.

Therefore, although the purpose of the qualitative approach is to generate scientific knowledge, it is necessary to specify the limitations of such knowledge, since it lacks the criterion of generalization of its results—in view of the fact that not to do so would contravene its own essence and main purpose,—because of the inductive and verificationist method it uses. Knowledge obtained from these results has a very important scientific value, but they are limited to the understanding of a phenomenon within the social and historical-cultural context in which it develops, which are aspects that the quantitative approach cannot measure most of the time, as they are not quantifiable.

References

Alvarado, C. (2005). *Epistemología*. Lima: Mantaro.

Adorno, T. (1972). *Epistemología y ciencias sociales*. Madrid: Frónesis.

Álvarez-Gayou, J. L. (2009). *Cómo hacer investigación cualitativa: fundamentos y metodología*. México D.F.: Paidós Mexicana.

Ayer, A. J. (Ed.). (1993). *El positivismo lógico*. Madrid: Fondo de Cultura Económica de España.

Bunge, M. (1972). *La ciencia, su método y su filosofía*. Buenos Aires: Siglo Veinte.

Bunge, M. (1980). *Epistemología*. Buenos Aires: Siglo Veintiuno Editores.

Bunge, M. (2002). *Ser, saber, hacer*. México D.F.: Paidós Mexicana.

Bunge, M. (2009). *Vigencia de la filosofía*. Lima, Perú: Fondo Editorial de la UIGV.

Comte, A. (2009). *Discurso del espíritu positivo*. Retrieved from: https://goo.gl/8e8Kjx

Cornford, F.M. (1974). *La filosofía no escrita*. Barcelona: Ariel.

Descartes, R. (2011). *Discurso del método*. Madrid: Alianza.

Echevarría, J. (1999). *Introducción a la metodología de la ciencia: la filosofía en el siglo XX*. Madrid: Cátedra.

Flick, U. (2004). *Introducción a la investigación cualitativa*. Madrid: Morata.

Gadamer, H. (1993). *Verdad y método*. Salamanca: Ediciones Sígueme.

Gardner, H. (2000). *La nueva ciencia de la mente: historia de la revolución cognitiva*. Barcelona: Paidós.

Greenwood, J. (2009). *Historia de la psicología, un enfoque conceptual*. México, D.F.: Mc Graw Hill.

Harari, Y. N. (2017). *Sapiens, de animales a dioses: una breve historia de la humanidad*. Lima: Debate.

Hernández, R.; Fernández, C. & Baptista, P. (2014). *Metodología de la investigación* (6ª ed.). México: McGraw-Hill Education.

Hume, D. (1992). *Investigación sobre el entendimiento humano*. Bogotá: Grupo Editorial Norma.

Husserl, E. (2004). *Ideas relativas a una fenomenología pura y a una filosofía fenomenológica*. Madrid: Fondo de Cultura Económica de España.

Husserl, E. (2008). *La crisis de las ciencias europeas y la fenomenología trascendental*. Buenos Aires: Prometeo Libros.

Jaffé, K. (2007). *¿Qué es la ciencia?* Caracas: Fundación Empresas Polar.

Katayama, R. J. (2014). *Introducción a la investigación cualitativa*. Lima: Fondo Editorial de la UIGV.

Kerlinger, F. N. (2002). *Investigación del comportamiento*. México D.F.: McGraw-Hill.

Kolakowski, L. (1988). *La filosofía positiva*. Madrid: Cátedra.

Kolakowski, L. (1994). *Husserl y la búsqueda de la certeza*. Madrid: Alianza.

Kuhn, T. (1978). *La revolución copernicana*. Barcelona: Orbis.

Mosterín, J. (2011). *Filosofía y ciencia: un continuo*. Lima: Fondo Editorial de la UIGV.

Okasha, S. (2002). *Una brevísima introducción a la filosofía de la ciencia*. México D.F.: Oceano.

Orbegoso, J. (2015). *Manual de metodología de la investigación cualitativa*. Lima: Autor.

Piscoya, L. (2009a). *El proceso de la investigación científica*. Lima: Fondo Editorial de la UIGV

Piscoya, L. (2009b). *Tópicos de epistemología*. Lima: Fondo Editorial de la UIGV.

Popper, K. (2008). *La lógica de la investigación científica*. Madrid: Tecnos.

Russell, B. (1970). La revolución copernicana. *Revista de la Universidad Nacional*, *5*, 237-254. Retrieved from: https://goo.gl/JW1oBo

Sambursky, S. (1990). *El mundo físico de los griegos*. Madrid: Alianza.

Sánchez, F. (2013). Ciencia moderna y crisis ambiental: alternativas desde la cosmogonía andino-amazónica. *Dialéctica: Revista de Filosofía de la UNMSM*, *2*, 171-192.

Sánchez, H. & Reyes, C. (1998). *Metodología y diseños de la investigación científica*. Lima: Mantaro.

Villena, D. (2014). El círculo de Viena. Una nota histórica. *Analítica*, *8*(8), 123-130. Retrieved from: http://cesfia.org.pe/villena/circulo_de_viena.pdf

RIDU / Revista Digital de Investigación en Docencia Universitaria / e-ISSN: 2223-2516