

Conceptualizing the method and methodological comparison of the quantitative and qualitative approaches in teacher education research

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Abstract

Although the methodology is the foundation of teacher education research, and today the domain of this research has encountered methodological ambiguity, limited studies have been conducted on it in recent years. This shortcoming has led some studies to ignore the theoretical requirements of research and suffer from frequent conceptual fallacies. Therefore, it is necessary to seriously review and rethink the methodological concepts in the teacher education research. In fact, it is necessary to re-conceptualize the method in teacher education research using the fundamentals of this field. In this regard, the present study intends to take a comprehensive look at the developments in the domain of research and the emergence of the third methodological movement, to conceptualize the method versus research method and examine the relationship between the methodology and ontology, epistemology and axiology and then compare the quantitative and qualitative approaches in the teacher education research from a methodological point of view. To achieve these goals, using systematic documentary methods in a regular process, 18 related articles on the educational methodology were retrieved and analyzed, and the selected texts were reviewed and criticized. Findings indicated that the research methodology in the teacher education research has homogeneous philosophical foundations at the ontological, epistemological and axiological levels, which is necessary to be considered to shape the research methods as the operational research techniques. Also, the qualitative and quantitative research at all the mentioned levels were investigated, and their differences and similarities were evaluated. Using these findings, the researchers in the domain of teacher education could avoid many of the methodological fallacies in the results of the contemporary research on the teacher education and achieve a deeper and more conceptual understanding of the research method.

Keywords: Research in Teacher Education, Methodology, Research Presuppositions, Methodological Awareness, Mere Operationalism, Documentary Study

Introduction

University is an exceptionally long-lived institution that dates back to about a thousand years ago in the Middle Ages; however, it will still have new developments in the 21st century (Barnett, 2012). In addition, due to the increasing cultural, social, and political complexities, the University has become an ambiguous phenomenon. These developments have led to new concepts in higher education that need to be specifically addressed. Nevertheless, higher education is still a new and emerging field (Tight, 2018). Recognition of the phenomenon of higher education is done through increasing research (Tight, 2012). One of the most important missions of higher education is teacher training, which provides a kind of infrastructure for higher education institutions in the future, and research to improve the performance of the education system in this area is a necessity of the higher education system (Mayer & Mills, 2020, Mohan, 2019). Despite this importance and the quantitative increase in studies in recent years, studies in this field have not been seriously considered in terms of the methodological approaches. In this regard, Keller mentions the need to break the chains that surround the

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Accepted:

research studies, such as the dominance of the quantitative research methods that underlie the fundamental neglect in its cognition (Keller, ۱۹۹۸, ۱۹۸۶).

Field evidence indicates a lack of attention to explaining the method and its assumptions as of the basis of studies in the teacher training research. However, the research and teaching of the fundamental differences in the methodology and the quantitative and qualitative research methods are conceptually more necessary. In his study, Lotfābādi (۲۰۰۶), while acknowledging the fundamental weakness of methodology in the studies on the fields of psychology and education, raises questions and explains why the Iranian community of psychology and education needs new thoughts in the research methodology. In response to this question, he concludes that studies in the fields of psychology and education are generally based on the theoretical foundations of positivist and post-positivist philosophy and "the Iranian Psychological and Educational Society do not pay serious attention to the fact that knowledge of psychology and educational sciences requires a new attitude to the foundations of the philosophy of science and the acceptable use of qualitative and mixed methods and innovation in the research methodology. In response to this question, he also acknowledges that currently, the teaching of research methods and research in psychology and educational sciences in our Universities, knowingly or unknowingly, is dominated by the positivist and post-positivist epistemological and methodological views as the indisputable foundations of scientific research in psychology and educational sciences. And they do not go beyond the level of sensory and operational knowledge and the concise concepts (p. ۴۷). In another part of his research, he emphasizes that the main problem is that students and scholars in the research method classrooms are unaware of the complexities of the research foundations and philosophy of science. They accept the existing positivist and post-positivist views as evident research principles in psychology and educational sciences, and they often do not know. They are not taught that positivist and post-positivist philosophy, which directs about ۹۶% of research in this field of study in Iran (Lotfābādi and Norouzi, ۲۰۰۶), replaces realism and rationality original cultural values with the personal thinking and sensory empiricism. It considers the universe to be blind, soulless, and without a will; it looks at science only with a materialistic view and does not pay serious attention to the spiritual aspects of science and its foundations and conceptual system and contexts of its native cultural roots (Lotfabadi, ۲۰۰۶).

In the present study, an attempt has been made to analyze the primary concepts of methodology and research method and its roles in conducting the research studies in the domain of teacher training, and it was tried the relationship among these concepts to be criticized in a coherent structure with the ontological, epistemological and axiological assumptions. Finally, the quantitative and qualitative research methods were analyzed from a methodological point of view, and their differences and similarities were investigated.

The dissociation between thought and action is the initial issue that the teacher training research faces with it. A worldview with the immanence into epistemology provides the way for the human being to reach the knowledge, and by neglecting the expression of the nature, possibility, resources, and limitations of access to knowledge, the time comes for the researcher to recall his/her area of cosmological view into the field of scholar practice using his/her self-made lived-world proposition, to lead to the realization of appropriate knowledge through a homogeneous and simultaneous action. Meanwhile, humanities research in general and educational research, in particular, find a dual identity that leads to the dissociation of the researcher's opinion and scholarly practice, in this case, there is a latent dissociation among the knowledge that has been theoretically determined, its acquisition has been assumed, and the scholar practice that the researcher has to do to reach the assumed knowledge as required, that makes the transition from the existing path impossible or difficult.

Through re-reading the teacher training research, these studies are inherently involved between their two faces of identity; The primary face, which depends on the research practice, and the secondary face, which forms it as the grounded theory behind the scholar practice, organize it and provides the capacity to interpret different operations so that a top-down relationship could be drawn among the background theories hidden during the realization of scholar practice. And in this way, he/she changed the research from a regular single approach practice with the unified methodology into a rule escaping, multi-approach, and multi-methods operation. And he/she expressed the need to re-read and re-reflect on the methodological foundations of contemporary teacher training research by moving from the unified methodology towards multiple approaches.

In this way, the educational research needs the theoretical revisions and reconstructions that fertilize them to provide the required knowledge and the courses of action which using an epistemological bridge to the scholar practice, pave the way for the dissociated path. In the current view, the educational research identifies between the two worlds. From the epistemological point of view, the educational research has been trapped between the two worlds in terms of identity, which are influenced by the worldview and research operations that lead to the acquisition of the expected epistemological knowledge, in such a way that it is necessary to find a way to connect them to escape the status quo and solve the current theoretical problems.

The methodology is a bridge to connect the epistemological parallel universes and scholar practice. In this sense, the methodology provides the researcher with the premises of the research operations so that the researcher provides the a priori causes of the research operation, creates the research first, and then organizes its steps. From this perspective, the methodology is an attitude that allows the simultaneous and homogeneous theoretical connection of the research operation with the ontological theories and thus integrates the general approaches to research into a coherent whole. Thus, from a methodological point of view, philosophy is reduced from the status of abstraction to the status of practice and becomes so-called earthly. In this way, the researchers' ignorance of the premises governing the research framework when doing the scholar practice changes into their awareness of the existing literature, and the realization of this important point provides the basis for creating holistic thinking to organize the research process while being operational to provide the technical aspects of research, and to address minor issues in the research process.

The necessity of the existence of methodology of teacher training research is strongly felt due to the presence of different ontological perspectives, the complexity of the domain of the educational research, and the necessity of an intelligent system to organize the research operations, which is known as the research method in the contemporary educational science terms. On the one hand, educational research in the monopoly of mere operational research methods suffers from philosophical blindness from a methodological point of view. On the other hand, philosophical research in the domain of education does not provide approaches related to the methodology governing educational research. In this regard, Andrew Sayer says: "It is unfortunate that many social scientists still think of the method only on the basis of the quantitative techniques, and although today these methods are complemented by the qualitative methods, the practice of conceptualization, which is inevitable, has remained unexamined"(Sayer, ۲۰۱۰). Therefore, the place of method in the teacher training research is not properly discussed and sometimes even its distinction with epistemology is not properly recognized, and sometimes in this way the concepts related to the method of heterogeneity are combined together and lead to the thematic confusion.

Studies have shown that no research on the methodology of the teacher training research has been conducted directly. The research developed in the domain of social science methodology falls into several categories. In the first category, we are faced with studies that have only dealt with qualitative methods and have not examined quantitative methods methodologically (Manadi, ۲۰۰۶; Pākseresht, ۲۰۰۵; Delāvar, ۲۰۱۰).

The second category includes the research with a reductionist view of the methodology and has reduced it to the research method due to the lack of proper conceptualization (Khodāvardi, ۲۰۱۰). The third category is research in the behavioral sciences conducted with a view to the general philosophical approaches. Still, the explanation of the philosophical foundations underlying the mixed studies and the methodological dipoles and the three methodological movements have not been studied (Bāzargān, ۲۰۰۵). The final group of methodological research has introduced a mixed-method based on the pragmatic approach. Often with a pragmatic point of view, they have neglected the basic premise of the fundamental contradictions of integrating quantitative and qualitative views from the perspective of the alternative philosophical approaches (Mohammadpour et al., ۲۰۱۰; Dānāyi Fard & Emāmi, ۲۰۰۷). One reason this article does not deal with the mixed approach and quantitative and qualitative approaches is that integrating the quantitative and qualitative approaches and considering a trans-polarity view is not possible to be presented in one article. If to do so, it would have a reductionist perspective. To study these issues, it is necessary to introduce alternative philosophical approaches such as feminist and critical theory and others in a related methodological range and discuss them methodologically. Similar research on the research methods does not make a methodological claim; however, they have not mentioned its essential backgrounds. In all the research that has been done so far, three common characteristics are seriously neglected, and they are the topic of the present study. In the mentioned studies:

- The method is not particularly conceptualized, and its relationship to the other premises in the research has not been explained.
- The domains of methodology and research method were not separated by determining the criteria, and in most cases, they are confused.
- None of the studies have considered the methodological bipolarity in detail regarding the implications of its conceptualization.

This study explores the methodological discourse missing in the educational research by outlining the contemporary philosophical approaches' methodological positions and providing the necessary context for creating the power, capacity, and morale of indigenous theorizing in educational research. Also, this study tries to explain the role of methodology in teacher training research and eliminate the reductionist ideas present in the work of some researchers in this domain who consider the method as only a mere tool for research. The present study paves the way for a pluralistic view in educational research by expressing contemporary philosophical approaches. It seeks a starting point for designing and paying attention to the philosophical issues and methodological ambiguity that educational research faces today and ignores them. Examining these concepts at the basic level could provide the theoretical implications needed to improve the quality of the current teacher education research and the applied research that is affected by them consequently.

In this regard, the present study tries first through defining the concept of methodology and delineate its place among the other premises governing the research, redefine the basic concepts which usually their explanation and definition are neglected through stating their importance and function. Then, it tries to determine the position of the polarities governing educational research by explaining the extremist tendencies and their salient features through

drawing the general conflict position in different schools. And so, this study could draw the map of the two camps, which are against the educational research. Then, to determine the points of view of different schools in the methodology of educational research, first by stating their main concepts, to determine the effectiveness of each, briefly introduce the historical process of formation of each and their theorists and briefly introduce each approach at three levels. Explain ontology, epistemology, and methodology, then the impact of each approach on the following educational research. In what follows, by examining the effect of the existing premises of each approach on the educational research, its methodological requirements are stated. By analyzing their hidden layers affecting the current research in the domain of education, the necessary conditions for being aware of the premises of these viewpoints in the operational process of research in the teacher training studies are provided. Thus, this study could alleviate the current theoretical turmoil in educational research and breaking the deadlock of a mere operational tendency to research within a given framework without considering its premises. The general procedure of the research process has been shown in Figure 1.

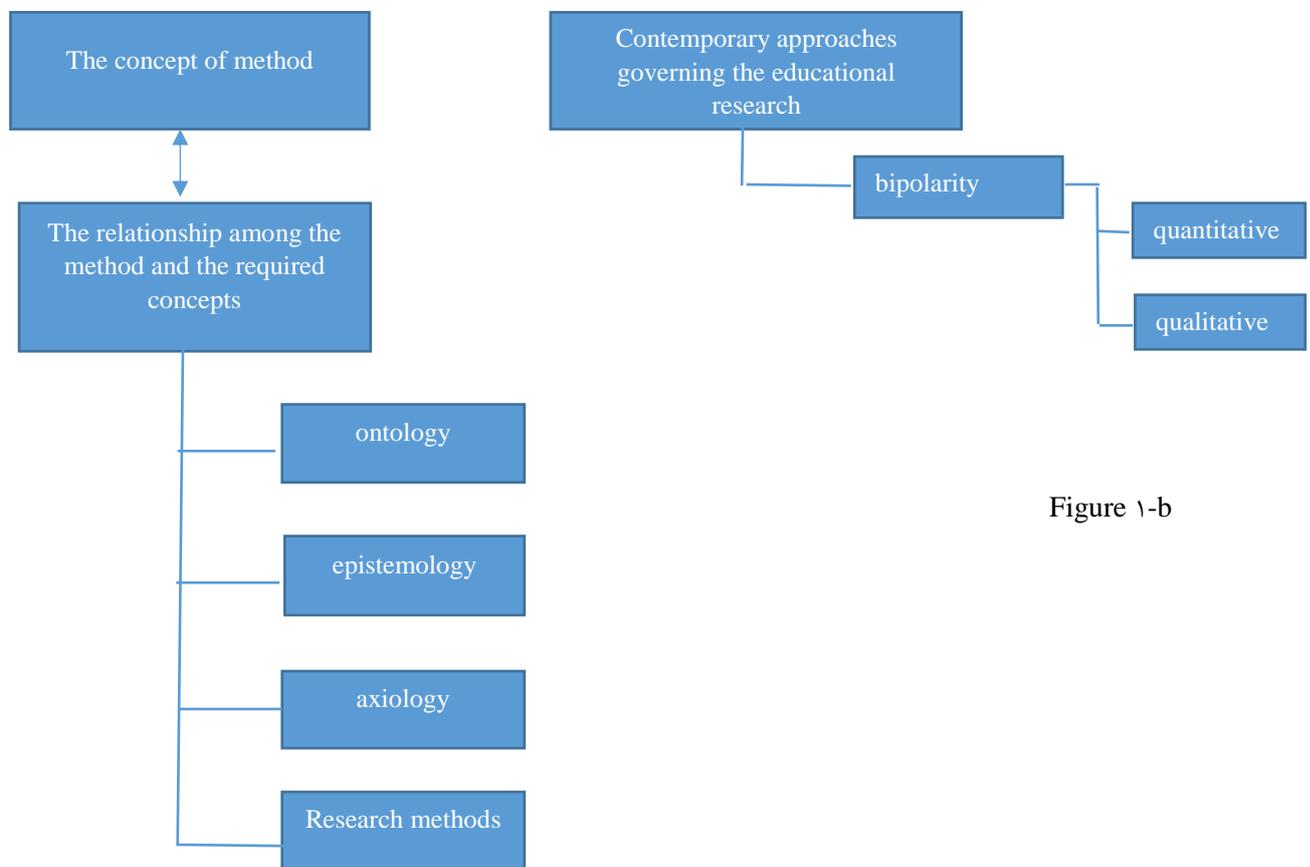


Figure 1 – a

Figure 1-b

Figure 1. The current research Path, a: interpretation of the concept of method; b: Methodological bipolar conceptualization

Given the need for a methodological review of the teacher training studies and to create a fundamental discourse of the method among researchers in this domain, the present study aims to answer the following questions:

- What is the concept of methodology in contemporary teacher training studies?

- What is the relationship between the premises of research and methodology in contemporary teacher training studies?
- What are the distinctions between the concept of methodology and research method in contemporary teacher training studies?
- What are the methodological differences and similarities of the quantitative and qualitative research premises in contemporary teacher training studies?

Research methodology

In this study, based on the nature of the research, the documentary research method has been used. In this section, to identify and extract the relevant sources and references, the keywords such as "methodology," "research method," "qualitative research," "quantitative research," "research on the teacher training was searched in the databases of Sage, ERIC, Web of Science WOS), Taylor and Francis, Springer, Emerald, PubMed and Elsevier, and the Stanford Encyclopedia of Philosophy (SEP) were searched between 1990 and 2020, in terms of the methodology. The search led to the retrieval of 50 documents, out of which 20 documents that were completely relevant and available to the study's researchers were considered as the basis of the study after the initial review, and they were systematically examined. To analyze the articles, Wach & Ward's (2013) text analysis strategy has been used. Among the available methods for document mining, this method is one of the most optimal methods that lead to reliable results. The content is systematically analyzed, and the desired concepts are extracted from the relevant documents. Sometimes the classical sources are selected and used according to the necessity of their presentation. At this stage, the selected sources were examined. The steps of this study were as follows:

1. **Determining the criteria for selecting the texts and documents:** The main criteria in selecting the texts and documents were the applicability of the sources in responding to the research problem, the approved scientific validity of the documents, and the up-to-date sources of the research process related to the research problem;
2. **Collection of the sources and texts:** At this stage, after determining the expected criteria, books, articles, and dissertations were reviewed and finally collected.
3. **Initial review of the sources:** At this stage, the titles and abstracts of the sources were studied, and then the most relevant sources with the research problem were reviewed.
4. The desired features were identified and determined by note taking.
5. **The final step:** consisted of removing the similar data, collecting data, and categorizing them according to the research problem. Also, the accuracy of the research findings was checked and confirmed using the peer review method.

Findings

In what follows, the findings for each of the research questions are presented, respectively:

- **What is the concept of methodology in the contemporary teacher training studies, and what are its distinctions from the research method?**

Educational research needs coherent philosophical approaches to form a unified and systematic identity. It goes through its problems in a cohesive whole to achieve the progressive goals and overcome the practical and theoretical obstacles. Unfortunately, due to the dominance of the

quantitative approaches over the educational research (Mohammadzāde and Sālehi, ۲۰۱۵, ۲۰۱۶) in recent years and the novelty of the qualitative research in terms of methodology, the related premises have been neglected and caused fallacies and thus reducing the quality of research. In this regard, Andrew Sayer calls various forms of pure scientism 'methodological imperialism'. He believes that this view is a ridiculous approach to science and its use to shape research in the social sciences eliminates many fruitful studies in a reductionist way (Sayer, ۲۰۱۰). Re-interpreting this concept of educational research, explaining the basic concepts, and determining their relationship with each other is the first step to reach the correct methodological understanding in its contemporary image. After passing the necessity to methodically re-read the educational research based on the modern philosophical views and explaining the theory-practice gap in the layered areas of research, and expressing the methodological functions in forming the human knowledge derived from it, the fundamental step for a validated understanding of research in its contemporary semantic context is to define and clarify the concept of methodology. This section deals with the essence of the concept of methodology and states its nature. After expressing the concept of methodology, its relationship with the other premises governing the research is presented, and thus the position of methodology is determined primitively.

The primary question we encounter is conceptualization in the context of the method. Conceptualization means dealing with the meaning of concepts through linguistic tools (Nuyts, ۱۹۹۹). In this case, the nature of the method, which appears against the question of the essence of the method, would be the first step in our confrontation with the posterior concepts of methodology. According to the trend existing in social research, the research results depend on our initial definition of the domain of study and the conceptualization of key concepts. These concepts form the flow of research before limiting the concept of tools and techniques of data collection and interpretation. Therefore, the method could not be reduced to the statistical techniques, interview, and conventional survey methods, and our conceptualization of these key concepts could not be neglected (Sayer, ۲۰۱۰). Unfortunately, considering the current educational research, in many cases, methods change into mere techniques for conducting research, which has led to the formation of mere operationalism for manual creating in conducting research and achieving results without attention to its premises. Our first step in better understanding the method is to move away from the reductionist view that sees the method as merely a tool and to believe that research methods are derived from our lived worlds, which are based on the foundations of our worldview.

In other words, the "method" gives us a way of approaching the world to understand it better; it will be very useful to judge the method if we could have an idea of the nature of the relationship between ourselves and what we want to achieve during the research process. Thus, at this fundamental level, many methodological arguments go wrong because of little or no attention to the background knowledge. At this level, the methodological questions that we encounter are questions such as how do the social sciences relate to everyday knowledge on the one hand and the natural sciences on the other hand? Should the social sciences compete with the natural sciences? (Sayer, ۲۰۱۰). In this way, the method finds identity. In this regard, Roy Bhaskar believes that philosophy and methodology are not self-dependent, but they are like the inferior workers who serve these sciences (Bhaskar, ۲۰۱۰). Thus, the method is the researcher's way to reach the destination he is looking for. In other words, the researcher tries to get a kind of assumed reality in the context of his field's knowledge, considering the ontological and epistemological assumptions in the research framework. From this perspective, research is like a perception of the world that determines the level of the researcher's encounter with a kind of default reality in a structured process. In this case, the methodology is defined as the theoretical framework governing the research procedures (Neuman, ۲۰۰۹) that guide

and manages it (Sarantakos, ۲۰۱۲). In fact, methodology introduces the type of cognition and logic governing the research to the researcher (Lather, ۱۹۹۲), and the researcher, with the prevailing methodological premises, chooses the research design and a type of research method from among the research methods. In this sense, the methodology provides the outlines governing the research methods, and the research methods offer us the tools and the data collection procedure (Howell, ۲۰۱۳). The descent of the high epistemological domain in a philosophical position to the domain of action is an approach that methodology brings to us fundamentally. Meanwhile, the methodology plays the role of a mediator, which could be briefly seen in Figure ۲.

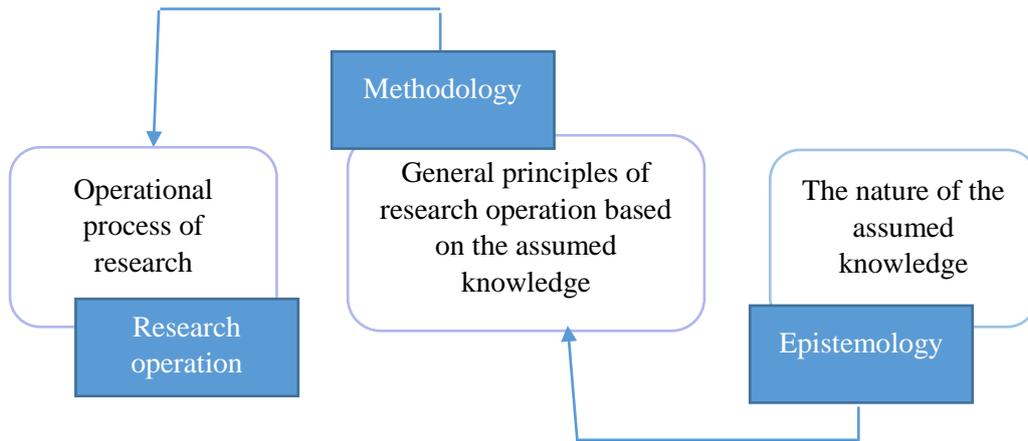


Figure ۲; Explaining the role of method in research

If we look at the method in practice, the methods should be commensurate with the nature of the subjects studied and our research's objectives and expectations (Sālehi & Golafshāni, ۲۰۱۰). As shown in Figure ۳, a triangle of the method, subject, and objective could be drawn, and each of these angles could be examined in a ۲ by ۲ relationship (Sayer, ۲۰۱۰). Given this issue, each of the topics raised in the educational research should thus be homogenous with our goals and assumptions about the research results. For example, could students' anxiety be measured with the interpretive method? Could the organizational culture of colleges be analyzed using statistical methods? Or could the economic developments in teacher education be predicted in a constructivist way? These questions indicate the need to make an effective connection between goals and methods. If they are not in line with each other, not only the results of the study would be invalidated, but they will also lead to the formation and intensification of misconceptions, wrong decisions, and ineffective performance.

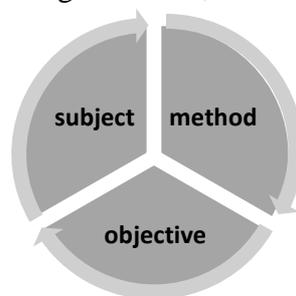


Figure ۳. The triple of subject, objective & method in research

To avoid neglecting the philosophical teachings of research and its dangerous consequences in choosing the wrong method in the domain of theory and operating it in practice,

understanding the correct and accurate methodology from various perspectives is essential for any research and researcher. Therefore, a deep and practical understanding of the research methodology and its multiple perspectives and requirements is a prerequisite for any intelligent thinking and action about any research that we want to do. Given this fundamental principle in conducting any study, we should not understand and research without clarifying its philosophical foundations (Arthur, ۲۰۱۲). Due to this issue, we are required to specify the methodological assumptions governing the research process, which in the first place will provide us a kind of awareness for choosing the different research approaches. Then, it causes the researcher to have theoretical coherence in explaining and creating the capability of organizing the research findings, organize the research findings into a coherent whole according to the existing premises, and clearly state the assumptions governing them. In any case, the methodology focuses on it. It seeks to explore the relevant theoretical requirements and explain the concept of research in general and how the researcher acquires knowledge in the research or chooses research strategies in particular. In this re-reading of the method, the idea (nature) of the research is retrieved by the conceptual reprocessing of how the researcher conducts the research and reconstructs it in the most fundamental layer methodologically.

•In the contemporary teacher training studies, what is the relationship among ontology, epistemology, and axiology with the methodology?

The methodology is somehow derived from the other institutions of knowledge. Ontology and epistemology are another levels of premises that govern the research which play a decisive role in choosing the type of method appropriate to the study. To examine the concept of methodology in more detail and clarify its relationship with the other levels, we briefly define the premises governing the research in each level and then examine its relationship with methodology.

The first and most fundamental level that could be addressed is ontology, a branch of philosophy whose central concept is existences (or, in the words of some philosophers, ontic), commonly known as the theory of existence, and it discusses the nature of reality and beings. And ontological questions including what could we say about existence? what exists to be known? And what is the nature of the physical and social phenomena? (Palaiologou et al., ۲۰۱۵). From this point of view, ontology creates a conceptual wall of the possibility of constructing a concept for thinking and discussion, that there is nothing that we could discuss on its another side. Thus, ontology which is the starting point of the theoretical arguments creates our view of the most fundamental concept which could be addressed. This concept would have the multilateral inclusivity of all the concepts which we use and it could be interpreted as being, existence or reality.

The second level of premises governing the research is epistemology which is related to the theory of epistemology (knowledge). Given the kind of view which it takes on the nature and form of knowledge, there are the epistemological questions such as what is knowledge? How is knowledge acquired? And how should we know what we need to know? (Palaiologou et al., ۲۰۱۵). In fact, the product of the epistemology is that by examining the concept of knowledge, it determines the human view of knowledge, which are usually known as two types, i.e., objective and subjective (Blaikie, ۱۹۹۳). Considering their appropriate ontological view, different philosophical approaches, describe a kind of adaptive epistemology, and thereby build their methodological mechanisms on it. As influenced by the other epistemological institutions, the conceptual structure of methodology affects the research techniques used in proportion to the research.

The third level of premises governing the research is axiology. Axiology is primarily concerned with what is good and how it becomes good. Another question which is arised at this level is whether the object of value is a state of mind or a status in the external world. Axiology provides the basis for discussion on the aesthetics and research ethics. Some even consider it as a part of the philosophy of ethics. Axiology is also known as the theory of value or meta-ethics (Schroeder, 2008).

In the meantime, the concept of the research method should be reviewed according to the previous concepts. Research methods are a set of techniques for collecting and analyzing the research-related data (Crotty, 1998; Sarantakos, 2012). In other words, the researcher uses a tool within the research process to collect the data he/she needs and structurally analyzes and describes the research findings. In this section, the researcher tries to complete the research process and achieve its purpose after determining the methodological premises, considering the compatibility of these concepts with the type of tools in the practical research procedure.

The relationship between epistemological institutions and research techniques is in the form of a continuum, and none of these levels could be considered independently. This type of relationship is like a structure that puts the consistent propositions together in a coherent whole. In this continuum, the epistemological concepts are not necessarily derived from the ontological concepts through the semantic inference, because it is possible to achieve some understanding about the knowledge, independent of probing into the ontological concepts. However, this does not mean independence and disconnection of the epistemic levels from each other. Hence, choosing a type of ontology requires choosing a type of epistemology that are put together as a consistent whole and define the conceptual structure that leads to the choice of the way we deal with the reality.

There are different methods for categorizing the concepts and levels. Some believe in creating three levels of knowledge. The initial level is the philosophical level in which the theoretical framework is placed. The next level is the strategy in which the methodology is placed, and the routine level is the tactics in which the research techniques are placed (Taber, 2007). However, these classifications do not provide a criterion for distinguishing the levels from each other. Therefore, these levels are in a state of ambiguity, and another classification could also be presented in general. That is how ontology, epistemology, and methodology are at the level of expressing the theoretical requirements and the research techniques at the level of expressing the practical requirements. It means that the issues proposed at the theoretical level as opposed to the practical level are not used directly in the decision making. From this point of view, the basic levels of research reconstruct the generality of the research by expressing its theoretical and conceptual requirements. Also, the practical levels express the procedural requirements and strategies for conducting the research. A summary of the scheme could be seen in Figure 4.

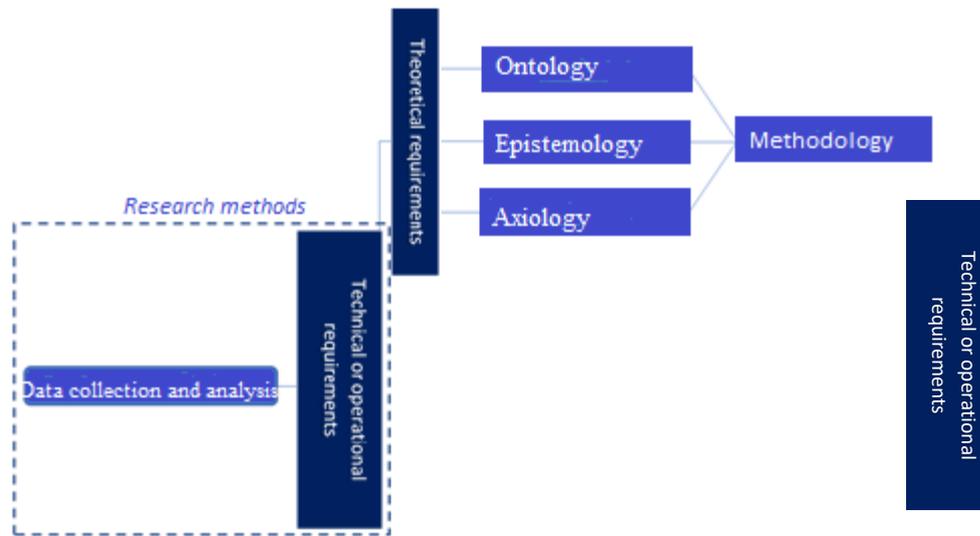


Figure 4: The relationship among the method and the other appropriate levels

- **What are the methodological differences and similarities between quantitative and qualitative research premises in the contemporary teacher training studies?**

Qualitative-quantitative bipolar

Over the decades, the positivism and interpretive-phenomenology approaches have overshadowed the vast domain of the educational research. These approaches have always been in conflict due to serious confrontations at the levels of their cognitive premises. They are located on both sides of the continuum of theoretical geographical coordinates, like the positive and negative poles. Thus, they can be called the dipoles that govern the teacher training research. According to their epistemological foundations. Each of these approaches has proposed different methods, according to their epistemological foundations, to achieve the justified results in the research process. Bipolar approaches methodologically constitute the quantitative and qualitative research designs that today are considered as the two major approaches in the methodology and they include all the research methods, so recognizing them would be necessary to clarify the previous contradictory premises that exist in the teacher training research. Also, knowledge of these premises would generally be effective in understanding the position of the other approaches to the prevailing dipoles and will help to understand the fundamentals of the other methods. It should be noted that efforts have been made in the educational research to connect these two perspectives. Howe (2003) draws a roadmap for this issue in his book on ‘closing the methodological divides’. However, given the fundamental contradictions of the present approaches, the two approaches could never be integrated into a single literature and merely met the biased pragmatic criteria. Symonds and Gorard have formulated these contradictions under the heading of the death of the mixed methods (Symonds & Gorard, 2008). Therefore, the dual quantitative-qualitative dilemma cannot be easily solved by adopting a pragmatic approach, and this problem is more serious than being easy to deal with.

The initial question we face is what is qualitative research versus quantitative one. Bryman says: Qualitative research is a research strategy that usually emphasizes on words instead of quantification in data collection and analysis (Bryman, 2008, p. 366). According to Sandelowski, the qualitative research is an umbrella term for a set of attitudes and strategies in conducting research that aims to explore how to understand, experience, interpret, and construct the social world (Sandelowski, 2004, p. 893). Several definitions can be given of the

concept of qualitative research (Alasturi, ۲۰۰۴). However, the definition that can be commonly chosen among all the definitions is their emphasis on the attributes rather than the amounts, as Erickson puts it etymologically: taken from Latin, quality fundamentally focuses on the qualities, or the characteristics of ontics to make a difference, whereas the term quantity focuses fundamentally on the differences in amounts (Erickson, ۲۰۱۱, p. ۴۳). However, some believe that the label of qualitative research covers heterogeneous fields (Hammersley, ۲۰۱۳). So, the interpreters of qualitative research are divided into two groups, those who propose qualitative research in an integrated way for various fields (Grahame, ۱۹۹۹, p. ۴; Silverman, ۲۰۰۶, p. ۳۳) and the others who do not see the need to do so (Holliday, ۲۰۰۲, p. ۱).

To clarify the definition of qualitative research and giving it an integrated identity, one can rely on the conceptual contradiction of the qualitative versus quantitative research. So, if we reveal the features of quantitative research, then qualitative research can be distinguished from it. To achieve this goal, two semantic and historical approaches can be used. In the historical dimension, it is necessary to deal with the temporal evolution of contemporary qualitative methods versus quantitative methods in the educational research. These approaches have emerged during the development of various researches. Therefore, to identify them accurately, one must pay attention to how they originated in the disciplines that have been developed specifically in the humanities. Historically, the qualitative research was first widely used in the ۱۹۶۰s to distinguish it from the quantitative research used in laboratories such as social psychology and applied disciplines such as survey research in sociology, political science, and the other domains. Along with that, the formal use of statistics was significantly discussed in demography, economics, and health research. Then, the thematic analysis of media content and the structured observation were used significantly in the educational and criminological research. In fact, the development of qualitative research in particular has often taken place to replace the types of rudimentary research that have been done non-quantitatively to form a satisfactory and scientific framework (Hammersley, ۲۰۰۷). At this time, quantitative research, often labeled scientific, had features such as hypothesis testing, use of numerical data, procedural objectivity, generalization, identifying systematic patterns of association among the phenomena, and controlling the variables (Grix, ۲۰۰۴).

The procedure of challenging the assumptions of the dominance of the quantitative research identified under a dominant approach using arguments such as a) the need to study the phenomena in the real world instead of experimental environments, b) the need to observe the phenomena instead of emphasizing only the use of interviews or questionnaires, the need for people (participants) to speak in interviews in their language to understand the different perspectives; c) The risk of losing the basic concept in quantifying the results of the research and concerns about the lack of correct understanding of the analysis of the variables of conditions, complexity, and contextural sensitivities began. To address these shortcomings, they paved the way for the other approaches, all of which fall under the umbrella of qualitative research. These approaches developed with the common basic concepts such as the inductive-centered flexibility, reproductive (abduction), data-driven, using the unstructured types of data, considering the subjectivity, the study of the phenomena in the natural setting, the case study of a small number, and the use of verbal analysis instead of statistics. These differences can be summarized in Table ۱ (Hammersley, ۲۰۱۳).

Table ١: Major features of quantitative and qualitative research

Qualitative research	Quantitative research	Qualitative research	Quantitative research
Aspects, concept, and category	Changeable	flexible	structured
Multiple interpretations	Cause and Effect	Introverted	Exteroverved
reproductive - abduction	Inductive-inferential	human-centered	Environmentalist
Semantic system	Regular system	Probable	Repeatable
Bottom-up	Top-down	Situated	Universal
Research among people	Research on people	Analytical generalization	Statistical generalization
Procedural	Cross-sectional	Descriptive	Mediator
intellecion	Explanation	Fluid	Controlled
Value-based	Indifferent to value	Conceptual data	Numerical data

(Denzin & Lincoln, ٢٠١٨, Arthur, ٢٠١٢; Salehi & Golafshani, ٢٠١٠; Crotty, ١٩٩٨; Blaikie, ١٩٩٣)

Thus, according to the nature of teacher training research in the present approaches, the researcher's position in research, values that govern it, and the researcher's agency in research results and achieving its goals can be determined. The point that is not considered in most studies is that the term paradigm is used to identify and classify these approaches. Generally, the differences between the premises in the two quantitative and qualitative camps can be briefly observed in Table ٢.

Table ٢: Differences in premises governing quantitative and qualitative research

Qualitative research	Quantitative research
It assumes that social reality depends on the human perception and is constructed by its participants	It assumes an objective social reality independent of human perception.
It assumes that social reality is constantly constructed in local situations and that generalization is impossible.	It assumes that social reality is relatively stable over time and space and it is the basis of discovering laws and generalizations. -
It gives a major role to human intentions and purposes in explaining the causal relationships among the social phenomena	Considers the causal relationships among the social phenomena from the perspective of the mechanical approach
They communicate personally with the research participants	It has a detached and objective position towards the research participants
They study individual and case studies that are examples appropriate to the purpose of the research.	They study communities or examples that represent the wider communities

They study human actions in the natural settings	They study human behavior in the constructed environments
They study the inner meaning and phenomena	They study behavior and the other observable phenomena.
By their premises, they interpret the research community and deal with conceptualization, conceptual regulation, and theorizing.	They test their premise theories empirically
They use verbal and observational data to interpret the social setting.	They use numerical data to access the external representation.
Instead of generalizability, they focus on the transferability of the findings and, in practice, they represent the case findings to look for the other similar cases.	They use statistical inference tools to generalize the sample findings.
They provide the interpretive reports that are constructed out of the researchers' values.	They seek to provide impersonal reports of the research findings.
Power, and especially inequality or imbalance in power, are central to understanding the social phenomena.	Power relations do not affect the research
The social phenomenon is more than a connection among the components and it can only be understood holistically.	The phenomena can only be understood by analyzing its components (reductionism).

Based on Gall et al., (۲۰۰۶) with modification

The differences between qualitative and quantitative research show the essential differences between teacher training research in the two quantitative-qualitative poles. Due to the different conditions of quantitative-qualitative research, the effectiveness of knowledge of their methodological premises by the researcher is different. Quantitative research is more integrated in terms of a priori philosophical premises. It thus can be used more easily, and in some cases, the researcher's lack of knowledge about these premises may not harm the research conduction and obtaining the accurate results. However, in qualitative research, another situation prevails. In qualitative research, philosophy and method are combined, and it is not possible to draw a clear line between the philosophical hypotheses and research practice. In other words, generally, the philosophical premises of the research directly interfere in the operational process of the research. Thus, the researcher's lack of knowledge about these premises can be considered as grounds for getting the distorted research results. In such a case, the results will be simplistic. So, they will lose their effectiveness and efficiency. At this scale, the qualitative research has more methodological diversity than the quantitative research. Therefore, the accuracy of their premises becomes more important, but this does not create the illusion that it the researcher could eliminate the philosophical premises in the quantitative research for the researcher.

During the stages of formation of each of the approaches discussed, the meaning of the research and the general principles governing it have been formed by their distinguishing premises. In this regard, each of these approaches directly have proposed their main assumptions to shape the research process and create a coherent whole, governing the research in different domains. So, to understand the research on the current approaches; it is necessary to examine them at three levels of ontology, epistemology, and methodology and clearly state

their premises. The main premises governing the quantitative and qualitative approaches have been briefly represented in Table ۳.

Table ۳: the general differences between quantitative and qualitative approaches, taken from Cropley, ۲۰۱۵

Dominant schools	positivism	Interpretivism - Phenomenologism
Ontology	Extroverted / realist	Introverted / idealist
Epistemology	Dualistic/objectivist	Subjective / transcendental
Methodology	Nomothetic (legal) / experimental	Ideographic (individual) / dialectic
Research purposes	Description / Explanation / Prediction / Control	Understanding / Interpreting / Constructivism

For example, if a researcher intends to study on e-learning in teacher training, he should keep in mind that different research methods follow different premises, so the formulation of research on a single topic will be different. A quantitative formulation on this topic, in particular, can include explaining the effects of variables on e-learning. Hence, the researcher's premise on the ontology is an objective premise, on the epistemology, a dualistic premise and on the methodology, it is the image of a regular network, consisting of cause-effect relationships. This happens when the same researcher wants to use a qualitative approach on a similar topic; he/she must change the formulation completely. In a qualitative formulation, the researcher organizes the study according to the mental elements of the participants of the study. In this case, the meaning of these elements could be mined in the perception of the teacher training students from virtual education. So, in terms of ontology, the premise of the researcher is mental (individual), in terms of epistemology, it is subjective and in terms of methodology, it is ideographic (individual). As already indicated, a single problem can be formulated differently in the two methodological poles. The researcher needs to be aware of the premises for formulation in accordance with his/her problem and worldview.

Field evidence and research documents show that paying attention to the philosophical foundations of quantitative, qualitative, and mixed approaches to research and explaining its premises and requirements has been neglected not only in practice, but also at the theoretical and educational level with severe and thought-provoking neglect; in such a way that a few classes or courses of research methods can be found that in practice emphasize the need to pay attention to these basic concepts as an important part of the research methods. It is clear that the lack of attention to these basic concepts has provided the basis for the emergence and intensification of methodological ambiguities and functional contradictions in research and it has led to severe challenges in the theoretical and practical development of the method and its elements.

Discussion and Conclusion

The higher education phenomenon is becoming more and more complex and expands its multiple existences in its historical development. Therefore, the research is needed as a distinct phenomenon (Barnett, ۲۰۱۳). Also, as an important part of higher education, the teacher training system needs to expand the research required to reform its structure and improve its performance (Biesta et al., ۲۰۲۰, Darling-Hammond, ۲۰۰۰, Johnson & Golombek, ۲۰۲۰).

Research plays a key role as a factor in the human knowledge of this phenomenon. In this regard, the method is the foundation of the research, and the fundamental issues of the method have been raised to advance the logic governing the teacher training researches, and by the development of this discourse, the theoretical gaps that have a fundamental view towards the research must be eliminated. Therefore, the present study has dealt with the specific conceptualization of method in teacher training studies and, by distinguishing between research method and methodology, it has tried to conceptualize the methodological polarity. In particular, the methodological polarization in the classical period has led to a dual classification which the present study has expanded its fundamental considerations.

Lack of attention to the methodological dualism and raising the unilateral pragmatic judgments has provided the ground for developing contexts in which the method has been reduced to a technique, and its philosophical requirements have been neglected. In this case, research without basic justifications has only sought to provide practical results and, in many cases, it has been subjected to Mere operationalism. Mere operationalism does not reflect any methodological consideration. Due to the development of methodological considerations in the context of research in the world, it is still seen in some research and it may cover a massive volume of research. This perspective causes the nationwide research remain the subordinate research and having the methodological ignorance just imitate the existing methods without paying attention to its foundations; This has led some researches to be mixed with the methodological fallacies. This is why the methodological knowledge can provide the grounds for advancing and developing the research and fertilize the research tree.

This research can be the beginning of the rise of the discourse of methodological research from the philosophical perspective in teacher training studies. Findings of this study showed that each of the domains of the quantitative and qualitative research requires more in-depth methodological studies, and the lack of these studies can have adverse consequences for the contemporary man who uses the research as the basis of the world understanding. It is obvious that just as research can be a reliable tool for gaining knowledge about the phenomenon of teacher training, neglecting its fundamental issues can lead to the illusion of cognition which is far more harmful than lack of knowledge. According to the proposed frameworks, quantitative methods are based on the measurement. Studies on their methodological foundations are required to ask fundamental questions about the philosophy of science, language, probability, measurement, and the other related domains. To review the methodology of qualitative research and as a basis for future research, we can study the foundations of each of the approaches of these researches, for example, phenomenology, phenomenography, narrative, and grounded theory to understand the phenomenon of teacher training.

This research introduces a deep quantitative-qualitative dichotomy as a serious dissociation in the methodology of teacher training research. Due to these findings, the research in this field should be consistent with each of the previous premises and meet them. In this case, the research on the teacher training has methodological awareness. It provides the grounds for developing the native theories in methodology and methodological critique and development known as the research logic. Also, we can witness the emergence of the fundamental innovative researches.

Due to the lack of methodological research in the contemporary teacher training research, each of these approaches has a detailed discussion in its field, therefore, research on the philosophical foundations of the quantitative and qualitative approaches can be presented separately with historical-analytical methods, and the incoherence and incompatibility of these approaches can be examined in particular. The relationship between ontology as the

metaphysics and methodology, the necessity of considering the ontological realm in the research, the possibility of forming the research foundations posteriori and without philosophical foundations, the lack of methodological coherence of the existing studies, the semantic contradiction of multiple methodologies, the consequences of neglecting the methodology, method as a historical concept, criticizing the method over time, introductions to indigenous methodological development, methodology from a comparative perspective, contemporary methodological ambiguity, methodological repetition in the context of research, methodology and lack of innovation, the relationship between educational research methodology and natural sciences could be issues that need to be considered in the context of the current research studies. Educational research, especially the modern research on teacher training has a severe need for fundamental analysis, and the context for the formation of new research in these areas has remained barren.

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