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RESEARCH METHODOLOGY IN EDUCATION: BASIC PRINCIPLES AND PROCEDURES

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ABSTRACT

The purpose of educational research is to develop the state of learning and teaching by gathering data about the causes of the problematic issues and the way of coping with them. To achieve this goal, educational researchers should follow a specific methodology that enables them to obtain valid and reliable research results. The present article attempts to supply information about the principles of research methodology in education. First, it portrays the historical background of educational research. Then, it explains the basic philosophy of research adopted within the domain of social sciences in general and education in particular. After that, it lists the research methods applied in educational research and describes the principal steps and procedures embodied in the design of a research work. Thus, it gives an overview of the types of variables, information sources and the sampling methods involved in educational research. Furthermore, it enumerates the different research instruments employed for data collection. Also, it elicits the various types and forms of data analysis. Finally, the article presents an account of some limitations of the methodology of educational research and provides a set of suggestions that may help the researchers to decrease bias and get reliable findings.

Keywords: *Educational research, methodology, research instruments.*

EĞİTİM ALANINDA ARAŞTIRMA METODOLOJİSİ: TEMEL İLKELERİ VE PROSEDÜRLERİ

Eğitim alanında yapılan araştırmaların amacı, sorunlu konuların nedenleri ve olası çözümleri hakkında bilgi vererek eğitim ve öğretim kalitesini geliştirmesidir. Bu hedefe ulaşmak için eğitim araştırmacısı geçerli ve güvenilir araştırmanın sonuçları sağlayan bir yöntemi takip etmelidir. Bu makale, eğitimde araştırma metodolojisinin ilkeleri hakkında bilgi vermektedir. Öncelikle, eğitim alanında araştırmanın tarihsel arka planı verilmektedir. Ayrıca, genel olarak sosyal bilimlerde ve özel olarak eğitim alanında temel benimsenen araştırma felsefesi anlatılmıştır. Eğitimsel incelemede uygulanan araştırma yöntemleri listelenmiştirler. Daha sonra,

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araştırma çalışmayı tasarımında somutlaşan önemli adımları ve prosedürleri takdim edilmiştir. Bu aşamada değişken türleri, veri kaynaklarının tipleri ve örnekleme yöntemleri açıklanmaktadır. Eğitimsel araştırmalarla ilgili gözlem, görüşme, anket, test ve belge taraması de dâhil olmak üzere veri toplama araçları açıklanmıştır. Eğitim alanında incelemenin veri analizi çok önemli bir adımdır. Bundan dolayı, veri analizi türleri ifade edilmiştir. Nitel tipinde kullanan yöntemleri belirttikten sonra, nicel tipinde temel formları ve araçları izlemektedir. En sonunda, eğitimsel araştırmada uygulanan metodolojik ilkelerin sınırlılıkları tartışılmaktadır. Bu tartışma ışığında bazı çözümlere ve önerilere yer verilmektedir.

Anahtar Kelimeler: *Eğitimsel araştırma, metodoloji, araştırma araçları.*

I. Introduction

The methodology of educational research encompasses a large body of theoretical and practical guidelines that help the researcher in the process of scientific investigation. It is the result of different ideas and methods taking place during different periods of time. Thus, it has witnessed a great development throughout history by shifting from the generation of theoretical assumptions about the process of research in the domain of pedagogy to the refinement of specific tools for data collection and analysis.

In fact, the journey of the quest for a methodology of research in education started many centuries ago when Greek philosophers provided ideas about educational theories. Moreover, research in all disciplines benefited from the establishment of the principles of logic since Plato advocated deductive reasoning and Aristotle advocated inductive reasoning (Roony, 2013). Muslim thinkers also contributed to the development of the methods of scientific investigation that have been applied in natural and social sciences as well as educational research. In the tenth century, Ibn al-Haytham introduced the first version of the scientific method embodying observation, the statement of the problem, hypothesis, testing, analysis and results (Ganchy, 2009). In the eleventh century, Ibn Sina, who is known as Avicenna tackled the idea of empiricism which refers to the acquisition of knowledge via inductive reasoning derived from experience and observation. In the fourteenth century, Ibn khaldoun established the historical method (Riddell, 1999).

In the seventeenth century the quest for knowledge was shaped by rationalism which was advocated by René Descartes to refer to the application of logic and deductive reasoning for the generation of knowledge. By the end of this century, John Locke highlighted the importance of empiricism. Thus, this method of enquiry which became dominant in the 18th century was adopted in the domain of educational research. By the end of the eighteenth

century, Immanuel Kant called for a combination of rationalism and empiricism (Gutek, 1995).

In reality, the practice of educational research became prominent in the nineteenth century. In 1803, the Swiss educationalist, Johann Heinrich Pestalozzi, who is considered as the father of modern pedagogy, advocated the study of education in a scientific way. By the second half of the nineteenth century, educational research was based on investigation undertaken in the domain of psychology. In the 1860's, the German psychologist, Wilhelm Wundt began using the experiment as a method of research (Chandra & Sharma, 2004).

According to Verma and Mallick (1999), Wundt has largely contributed to the emergence of the field of educational research as he set up the first laboratory of experimental psychology in Leipzig in 1879. During the 1880's, pedagogical research was characterized by child study which is also referred to as paidology; it implies making research about children by following a scientific approach. This movement was established by a group of psychologists including Granville Stanley Hall who advocated research about children through the use of observation. He also introduced the use of questionnaires as a research tool for collecting data about young learners in 1894. Moreover, the idea of mental tests appeared in 1890. Also, Joseph Rice introduced spelling tests in 1897.

The introduction of experimental methods in the field of education led to the appearance of experimental pedagogy by the beginning of the twentieth century. Consequently, educational research has been characterized by experimental studies that relied on the measurement approach involving the use of tests as research instruments. Thus, it was influenced by quantitative methods during the period lasting from 1900 to 1930. The survey method was widely used from 1900 to 1920. Moreover, action research appeared in education in the 1920's (Chandra & Sharma, 2004). In the same period, the case study method was introduced in the domain of education. Then, it was rejected starting from the 1950's (Newby, 2013). During the 1920's and 1930's, Jean Piaget developed a method of research based on the use of interviews as a research tool.

In the 1930's the method of observation which was advocated by the German educators, Else and Peter Peterson, began to be used in educational research. Starting from the 1960's, there was the advocation of qualitative research methods in the domain of education. During the 1960's and 1970's, the Piagetian method of research became a prominent tool of investigation about learners' failure in achieving learning tasks in the United States (Novak & Gowin, 1984). In the 1980's, documentary research became a

prominent instrument of investigation that helped to collect data drawn from educational materials (Scott & Morrison, 2006). By the 1990's, researchers advocated the practice of mixed methods research by combining quantitative and qualitative methodologies.

In the 21st century, importance is given to neuroeducational research which links neuroscience to education (Pritchard, 2014). Furthermore, educational research has largely benefited from the exploitation of the internet which has facilitated the process of data collection and has introduced new domains of investigation at the level of virtual instruction and e-learning. The above account of the history of educational research highlights the development of this activity via the establishment of a set of theoretical and practical principles stemming from a set of philosophical foundations determining the scope of scientific investigation within a specific research philosophy.

II. The Philosophy of Research

The researcher has to choose an interesting, innovative and manageable topic. Then, he has to think about the way of investigating the problematic issue. In fact, the process of research incorporates two interrelated dimensions including the philosophy and practice of research. The practical aspect of this activity is reflected in a specific methodology derived from the philosophy of research which refers to a theoretical framework denoting the principles and models of investigation that have to be followed by the researcher. This philosophy of research embodies a set of perspectives including particular research paradigms that guide the researcher in his work.

A. Research Perspectives

A research perspective refers to a specific point of view and ideology dealing with the principles of investigation. It describes the nature of inquiry. The main research perspectives are: scientism, anti-scientism, the critical perspective and pluralism. Scientism is a research perspective focusing on science; it implies the use of experimentation, testing and observation for data gathering (Newby, 2013). It denotes rationalistic inquiry which relies on the application of positivism; it involves the employment of quantitative data. The philosophy of scientism has been advocated in educational research in the 20th century.

On the other hand, anti-scientism is the perspective that rejects the application of scientism in social sciences; it favours the use of qualitative methods. It is related to naturalistic inquiry which is also called qualitative research (Catane, 2000). It is reflected in the practice of interpretivism. The critical perspective is also called critical inquiry. It aims at discovering the reasons of problems for the

sake of finding solutions leading to social change. "Critical inquiry refers to research informed by critical theory and provides a vital alternative to mainstream organization studies and strategy research" (Greckhamer & Cilesiz, 2012: 9). Its methodology turns around criticism. It is embodied in the transformative paradigm.

Pluralism or the pluralist perspective is based on the use of eclectic methods for the purpose of data collection. It refers to a strategy of research. It is classified into three types: theoretical, paradigmatic and methodological. Theoretical pluralism represents the use of various theories from different perspectives. Paradigmatic pluralism means that the ideas of various paradigms are combined together to lead to a philosophy of research that advocates mixed method approaches.

Methodological pluralism which is also called the triangulation methodology implies the utilization of a variety of methods as well as the use of qualitative and quantitative tools. It allows the practice of triangulation to collect rich and varied information and to generate new ideas. It implies that the research design is based on several research questions that need responses generated from the collection of qualitative and quantitative data (Cohen et al., 2011). Therefore, pluralism refers to eclecticism or mixed methods research that combines qualitative and quantitative methods (Graff, 2014). Generally speaking, each perspective adopts a methodology determined by the principles of a specific paradigm of research.

B. Research Paradigms

A research paradigm is a philosophy of science that guides the researcher in his work. It helps him to identify the studied phenomenon, the purposes of research and the methods that should be followed to reach the research results. A research paradigm tries to answer five questions involving ontology, epistemology, methodology, axiology and rhetoric. The ontological question concerns the nature of the studied object. The epistemological question deals with knowledge; the methodological question is related to the methods and tools that have to be employed by the researcher. The axiological question revolves around the ethics of research. Finally, the rhetorical question focuses on the language of research (Betz & Fassinger, 2012).

In reality, the existence of different research perspectives has led to the emergence of various research paradigms including positivism, interpretivism, the transformative paradigm, pragmatism and complexity theory. Positivism is based on empiricism and quantitative methods. It was introduced by Auguste Comte in 1830. In the 1920's, a group of researchers called the Vienna Circle refined

this approach and labelled it as logical positivism. This paradigm encourages deductive reasoning and the selection of quantitative information. It relies on studying phenomena using the scientific method and objective analysis. Positivism aims at explanation achieved through scientific description (Cohen et al., 2011). It assumes that the researcher does not influence the studied object (Shirish, 2013). It constitutes a scientific approach within the research methodology of natural sciences and quantitative research in the domain of social sciences (Hennink et al., 2011).

Another version of positivism appeared after the Second World War. It is called post-positivism. It is a type of positivism that permits the use of qualitative research tools like participant observation and the interview. Post-positivism advocates the use of triangulation and a variety of research tools (Monthino & Hutcheson, 2011). Also, it does not forbid interaction between the informants and the researcher (Shirish, 2013). Furthermore, "one of the most common forms of post-positivism is a philosophy called critical realism" (Monthino & Hutcheson, 2011:1). It emerged in the 1970's; it is related to complexity science. In fact, it "…is a social theory which attempts to reconcile positivist and post positivist views of the world… Critical realism is based on a critique and a rejection of empiricism" (Scott & Morrison, 2006: 46). In educational research, the application of positivism and its different types was prominent in the period lasting from the beginning of the 20th century to the 1970's.

Interpretivism is also called constructivism. Its purpose is to provide an understanding of social problems; it is based on subjectivity. Moreover, it allows the researcher to interact with the informants (Cottrell, 2014). Interpretivism appeared in the 1970's to challenge the ideas of positivism (Hennink et al., 2011). It focuses on naturalistic inquiry. It employs qualitative methods and favours inductive reasoning (Graff, 2014). It implies the use of interpretation. Interpretivism was advocated as a methodology of research in education in the late 1970's. Within the same period, another type of methodology started to take place. It is represented in the transformative paradigm which appeared in the 1970's and 1980's; it is based on the principles of the critical perspective. It is referred to as post-modern or emancipatory paradigm. It aims at providing information about the causes that lie behind a problematic situation to allow a sort of reflection about the existing state and the kind of change required (Danahar et al., 2013). It includes critical theory and feminist theory (Mertens, 2009).

Critical theory attempts to understand the phenomenon in order to change the existing situation; its purpose is to reach

emancipation and equality. It relies on ideology critique which studies the role of ideologies in educational contexts via reflective practice that is based on description, explanation and interpretation. Also, it utilizes action research. On the other hand, feminist theory focuses on the impact of gender on the studied case. It portrays instances of oppression and exploitation. In education, feminist research tries to advocate equality, collaborative learning and respect of diversity especially at the level of race and gender via the study of teachers and learners relationships. It employs multiple methods including action research and ethnography (Cohen et al., 2011).

In the domain of educational research, the transformative paradigm hinges on the use of action research as a method. In fact, action research is viewed as a participatory method that involves action and collaboration. It is based on reflection and the application of theory into practice. It exploits various research tools including observation, questionnaires, interviews and focus groups (Danahar et al., 2013). Furthermore, action research refers to the practical side of educational research; it is a form of individual investigation about a specific issue undertaken for the purpose of finding remedies and improving the existing situation (Chandra & Sharma, 2004).

Despite the existence of the transformative paradigm, one can assert that the philosophy of research has revolved around positivism and interpretivism since the former represents the quantitative paradigm and the latter refers to the qualitative paradigm. Hence, the period of the 1980's was characterized by the paradigm wars which concerned the struggle between the qualitative and quantitative methodologies. In the beginning of the 1990's, Egon Guba introduced the idea of the paradigm dialogue which supported the use of two approaches (Johnson & Christensen, 2012). In this respect, Cohen et al. (2011: 26) claims that "the advocates of mixed methods research hail it as an important approach that is driven by pragmatism… mixed methods research has been taking place for years, before it was given the cachet of a new paradigm".

Thus, pragmatism represents the methodology that can stop the debate between positivism and interpretivism as it combines the principles of these two paradigms. It was introduced as a research paradigm in the 1990's; it seeks to provide knowledge through the use of suitable methods that are appropriate for the research design and can lead to get answers to the research questions. It implies the combination of research tools (Johnson & Christensen, 2012). Moreover, pragmatism is based on methodological pluralism. It advocates the utilization of any strategy that can help the researcher to achieve successful results. This paradigm gives the possibility to

work with qualitative and quantitative tools; it allows the use of objective or subjective judgement according to the nature of the studied object (Graff, 2014). Hence, pragmatism hinges on the employment of mixed methods. It constitutes an assortment of qualitative and quantitative research.

Mixed methods research also includes complexity theory. This paradigm was originally known as chaos theory. It appeared in the 1970's to propose a shift in paradigms. In the 1980's, chaos theory became called complexity theory. In the 1990's, the ideas of chaos theory became part of a larger domain referred to as complexity science which is embodied in a transdisciplinary research paradigm (Morrison, 2002). Thus, complexity science or complexity theory is based on a pluralistic methodology. It makes a bridge between qualitative and quantitative research. The incorporation of this paradigm in the methodology of social sciences implies the use of the mixed methods approach. In fact, complexity theory turns around the study of phenomena from multiple perspectives via the use of multiple methods. It is considered as a new research paradigm. It relies on qualitative research involving case study methodology and action research.

Furthermore, complexity theory advocates holistic analysis of the studied phenomenon (Cohen et al., 2011). In the mid 1990's, its ideas started to be applied in educational research to make studies about educational change and the strategies that can lead to pedagogical development (Fenwick et al., 1998). Consequently, complexity theory emerged as a paradigm in educational research by the beginning of the 21st century (Cohen et al., 2011). As a conclusion, one can assert that research paradigms embody a set of theoretical principles that determine the type of methodology that should be adopted by the researcher. In reality, research methodology refers to the techniques and procedures that are followed in the process of research. It concerns the specification of the research methods and the identification of the research design.

III. Research Methods

Research methods may be quantitative or qualitative. Quantitative methods are divided into two types: experimental and non-experimental. The experimental method represents the use of experiments for gathering data. There are various types of experiments including laboratory, field, demonstration, comparative and natural experiments. The laboratory experiment takes place at the laboratory. The field experiment involves natural settings like a city, a village or a classroom where the group of people concerned by the investigation are interacting. It is also called the naturalistic experiment. The demonstration experiment can take the form of

laboratory experiment or field experiment. However, it involves just one group which is referred to as the experimental group. The comparative experiment implies the comparison of the findings of a study involving two groups of participants who are submitted to distinct experimental treatments; it entails a random selection of two samples of the same size to identify the type of treatment that provides satisfactory results. The natural experiment is also called quasi-experiment. It requires the observation of subjects in a natural setting; it does not need experimental control and the researcher does not attempt to manipulate the variables under study (Sarantakos, 2013).

Generally speaking, the experimental methods are classified into two categories: true experimental and quasi experimental. The true experimental design is based on a randomized assignment of the studied subjects while the quasi experimental one does not need randomization (Ary et al., 2014). There are different forms of quasi-experiments including the pre-experimental design which involves the one group pre-test-post-test design or the one-group post-test-only design or the non-equivalent post test only design. In addition to this, the quasi-experiment may take the form of pre-test-post-test non equivalent group design (Cohen et al., 2011). In educational research, true experiments can not be used. This is why quasi-experiments are the most common quantitative methods employed in the domain of education because they do not require randomized assignment (Ary et al., 2014).

Non-experimental methods do not rely on experiments. They include the survey, correlational research and the ex post facto research. Survey research is also known as descriptive research. It attempts to collect data from groups of people to study their characteristics or attitudes. Survey research is also called a descriptive study. It is a non-experimental method that aims at describing a phenomenon by using questionnaires or interviews (Ary et al., 2014). It focuses on the study of the change occurring in a set of variables. The survey has been considered as the most frequently employed method in educational research (Chandra & Sharma, 2004).

Correlational research investigates the relationship between variables through the use of questionnaires or rating scales and the correlation of the gathered data. It studies the relationship of variables among the same group (Ary et al., 2014). This method may be employed in education to study the relationship between learners' performance and their gender or age. Ex post facto research, also known as the causal-comparative study, is a method that studies the facts happening in the past to understand the causes of the current

problem for the purpose of providing remedies. It deals with a retrospective investigation about the factors that caused a problem to exist; it resembles an experiment but the researcher does not influence the situation (Cohen et al., 2011). In education, ex post facto research may deal with the effect of training on teachers' methodology or the causes of learners' failure.

In fact, quantitative methods investigate about cause and effect. Their design is developed before starting the study. They use a deductive approach and rely on large samples. They employ statistical analysis of quantitative data. However, qualitative methods focus on a phenomenon. Their design is developed during the study. They use an inductive approach and involve small samples. They hinge on interpretation and narrative description (Ary et al., 2014). Qualitative methods embody the case study, ethnography, phenomenology, narrative inquiry and the historical method. The case study concerns one unit which may involve an individual, a group, a program or an organization. It attempts to provide a holistic description of the studied case. It is based on the use of different research instruments including observation, questionnaires, interviews and archives. It helps to furnish data that can lead to the generalization of results (Kothari, 2004). Nowadays, the case study is viewed as the most prevalent research method in education.

Moreover, educational research utilizes ethnography which is sometimes called field research as it studies human behaviour in natural settings. This method employs various research tools like observation, artefacts, documents and interviews. There are two types of ethnography: realist and critical. The realist ethnography attempts to portray the situation as it is by providing facts and excluding the researcher's criticism and subjectivity. The critical ethnography describes the real life of marginalized groups and calls for the necessity of improving their situation (Ary et al., 2014). The application of ethnography in the domain of education implies the study of the life and culture of groups gathered in educational settings. It may focus on classroom behaviour and culture. Thus, educational ethnography concerns the study of the learning process and classroom management as well as teachers and learners' values (Newby, 2013).

On the other hand, phenomenology puts emphasis on the description of the experience of an individual by analysing his thought and feeling from the data gathered via the unstructured interview (Ary et al., 2014). In educational research, this method may focus on learners' or teachers' feelings and thoughts. For instance, it may deal with the experience of a teacher or a gifted learner (Johnson & Christensen, 2012). Also, in the domain of education,

narrative inquiry which provides a study and a narrative analysis of people's stories may be used to give an account of teachers' reflection on their teaching experience (Ary et al., 2014).

Another prominent method is embodied in historical research that supplies information about past events through the analysis of data gathered from documents, interviews or eyewitnesses. In education, the historical method helps to study the historical development of pedagogical practices and provide a description of the current educational state for the purpose of improving the pedagogical situation. This method was widely used in educational research in the period of the 1920's. Then, it has seen disregarded in the 1930's. Nowadays, the historical method has received more attention as it is viewed as a tool for gathering data about the history of education to understand the kind of changes that happened and identify the ways of coping with educational issues (Verma & Mallick, 1999).

Hence, there is a variety of research methods that may be utilized in education. However, the selection of the suitable method depends on the nature and the purposes of research. Once having chosen a research method, the researcher has to undertake a set of practical activities embodied in the research design.

IV. Research Design

A research design concerns the elicitation of the studied variables, the identification of the sources of data and sampling as well as the selection of research tools and the methods of data analysis (Daniel & Sam, 2011). It represents the strategies undertaken to answer the research questions and furnish information about the research problem that constitutes an outcome of the relationship and interaction between a set of variables.

A. Types of Variables

The choice of the topic is interwoven with the identification of the type of variables involved in the study. In fact, various kinds of variables can be distinguished. They include the independent, dependent, moderator, control and intervening variables. The independent variable refers to the stimulus or input that can influence the individual's behaviour. It can be manipulated or measured. It refers to the factor that creates a change in the other variables. It can be in the form of the period of practising a certain skill. The dependent variable refers to an observable behaviour or output that is affected by the types of changes occurring in the independent variable. It can be observed and measured. For instance, learners' performance of a specific skill represents a dependent variable.

The moderator variable represents a secondary independent variable that is studied to explain its impact on the primary independent variable and how this effect will cause a change in the dependent variable. It may be represented in the factor of age, gender, intelligence or geographical areas like the distinction between urban and rural settings. The control variable means the element that is manipulated or altered by the researcher to eliminate the factor that may influence the other variables. Thus, it is controlled to decrease its impact on the studied case. Examples of control variables include noise and the content of tasks (Chandra & Sharma, 2004).

The intervening variable is the factor that leads the independent variable to affect the dependent one. It is referred to as the mediator or mediating variable (Johnson & Christensen, 2012). It represents an element that causes a change in the studied phenomenon as it has an impact on the variables related to the studied situation. However, it can not be observed, controlled or measured. Instances of intervening variables are the learning process, attitude and habit (Chandra & Sharma, 2004). Generally speaking, the type of the examined variables depends on the nature of the research problem that is elicited and explained via the analysis of data collected from various sources.

B. Sources of Data

A source of information may refer to a person, a book, a document or a statement. There are three types of data sources: primary, secondary and tertiary sources. Primary sources are also referred to as field sources. They imply first hand information. They can take two forms. The first one includes original works produced in the shape of books, letters, diaries or manuscripts. The second type embodies first hand data produced by an individual who collected them from a group of people; this category includes questionnaires and interviews (Daniel & Sam, 2011). Primary sources mean raw data; they are employed as a basis for the research work as they furnish information that allow the researcher to confirm or reject the research hypotheses.

On the other hand, secondary sources refer to previous research works that enable the researcher to get background knowledge about the research topic, to write a literature review and to list additional arguments (Booth et al., 2008). They are also called documentary sources. They constitute available information used by the researcher to bring evidence for his work; they are not produced by the researcher but they were gathered and presented by another person. They can be in the form of books, journals, newspapers, diaries, letters, historical documents, radio and television

programmes, reports, the internet and public speeches (Daniel & Sam, 2011).

Tertiary sources provide a summary and analysis of primary and secondary sources (Singh, 2013). They present an overview of different sources through bibliographic information. They help the researcher to choose a subject of research and find references (Booth et al., 2008). They can be in the form of yearbooks, a bibliography of bibliographies or a union catalogue. A yearbook is a yearly publication that gives recent data. When it is devoted to a precise domain, it is named an annual. A yearbook is also called a ready reference source because it supplies the researcher with updated information. It can deal with a particular subject, domain or country. It may be a general yearbook discussing a specific topic or it may be a supplement to an encyclopaedia when it is published to furnish up-to date information about the subjects tackled previously within the encyclopaedia.

Additionally, a bibliography of bibliographies presents a list of references according to the topic, person or place. It includes a guide to reference books, current bibliography of bibliographies and retrospective bibliography of bibliographies. However, a union catalogue denotes a catalogue that supplies a description of the list of publications available in a library. It helps the researcher to locate books and documents (Singh, 2013). Hence, the different sources of information enable the researcher to gather data from spoken and written materials as well as a sample represented by a group of informants selected via a particular type of sampling.

C. Sampling

Sampling is a very important process in research. It depends on two types of sampling paradigms: the information-rich and the representative sampling paradigm. The information-rich sampling paradigm aims at providing rich data via the utilization of samples having a small size as it gives importance to the quality of information (Perry, 2005). It does not focus on the generalization of the research results; it is based on transferability which implies the transfer of ideas to other researchers who will make judgement about the research findings and try to relate them to other contexts thanks to the detailed description and large amount of data supplied by the given research work (Scott & Morrison, 2006).

However, the purpose of the representative sampling paradigm is to make generalizations of the research findings. Thus, it focuses on samples that are representative of the target population (Perry, 2005). These sampling paradigms involve the use of distinct sampling methods. The selection of information-rich samples hinges on the employment of non-probability sampling while the choice of

representative samples necessitates the application of probability sampling (D'Cruz & Jones, 2004).

Probability sampling is often used in quantitative approaches. It looks for generalization. Thus, it ensures that each member in the population has the chance of being selected to participate in the study. It requires a sample characterized by representativeness. It includes different kinds of sampling. They are simple random, systematic, stratified, cluster, double, multiple and multistage sampling. Simple random sampling guarantees that the members of the target population have the chance of being selected to take part in the study. It is characterized by objectivity but it produces a sample that lacks representativeness (Chandra & Sharma, 2004). Systematic sampling relies on the calculation of a sampling interval by dividing the population size by the sample size. This interval is obtained via the formula:

$$K = \frac{N}{n} \quad (1)$$

Where K= sampling interval; N=population size; n=sample size; the sampling interval helps to acquire a systematic sample by selecting every K^{th} element (Medhi, 1992). Stratified sampling means the division of the population into groups or strata according to a set of features. Cluster sampling implies choosing a sample that is divided into sub-groups or clusters. Double sampling refers to a process of sampling within two phases. Hence, data are collected from a sample. Then, they are checked by gathering the missing information from another sample. However, this type of sampling can be employed just with small samples. It is based on the use of two samples. Multiple sampling means the employment of more than two samples.

Finally, multistage sampling involves the selection of a sample through stages (Chandra & Sharma, 2004). It is a type of complex random sampling that requires choosing members of a sample in more than one phase. For instance, a researcher may use a multistage sampling involving five stages moving from countries, towns, schools, classes to students in the final stage (Singh, 2007). In fact, probability sampling represents the most prominent method of sampling in educational research.

On the other hand, non-probability sampling is usually related to qualitative research. Hence, it is often employed in action research since it does not attempt to generalize the research findings (Chandra & Sharma, 2004). It does not give importance to representativeness and generalization. Also, it does not ensure equal selection of the population members as not all the persons have the same chance of being chosen for the study (D'Cruz & Jones, 2004).

This method involves four types of sampling: convenience, quota, purposive and snowball sampling. Convenience sampling which is also called accidental or incidental sampling relies on gathering information from persons who are available for the researcher (Chandra & Sharma, 2004). Quota sampling utilizes a sample selected via the use of proportions to gather data about specific groups of people within the target population; it is employed in market research (Newby, 2013). Purposive sampling involves the selection of a sample according to the purposes of research. Snowball sampling means gathering information from a person or a small group of respondents who provide information about a sample that is difficult to reach. It is employed when the target population is inaccessible or hard to question (Singh, 2007). Actually, the process of sampling gives the possibility to select a sample that represents a source of information gathered via the exploitation of various research tools.

D. Research Instruments

Educational research relies on the utilization of different types of research tools including questionnaires, interviews, observation, tests and documentary research.

D.1. Questionnaires

A questionnaire is a set of questions that are answered by the informants in a written form. It is a research instrument that belongs to the methodology of positivism; it is often employed in quantitative research. It can be used in the domains of natural sciences as well as social sciences (Scott & Morrison, 2006). Three kinds of questionnaires can be utilized. They are: the mail survey, the group-administered questionnaire and the household drop-off survey. The group-administered questionnaire helps to get information from a sample concerning a group of informants who are given this instrument while they are gathered for a specific goal like a class of students. The household drop-off survey is a questionnaire handed over to people living together or family members who have the possibility to complete it and give it back later. The mail survey refers to a questionnaire sent to the informants by mail (Wilkinson & Birmingham, 2003).

Moreover, a questionnaire may encompass closed-ended, multiple choice and open-ended questions. The close-ended question is answered by yes or no. The multiple choice question which is also called ranking question requires the respondent to choose responses from a limited number of answers. The open-ended question requires a long response as it does not limit or control the informants' answers. A questionnaire may also incorporate scale items which refer to questions asking the informants to rank answers

in a scale or a list by arranging them depending on specific criteria. Scale items may follow different approaches including the likert scale which implies the classification of responses using descriptors to measure attitudes (Wilkinson & Birmingham, 2003). In addition to questionnaires, interviews are frequently utilized in educational research.

D.2. Interviews

The interview refers to a conversation between the researcher and the informant. It helps to furnish more information about the studied phenomenon as it is often employed to gather data that can not be collected by the questionnaire. There are three types of interview: structured, semi structured and unstructured interview. The structured interview is a questionnaire administered orally. The questions of the structured interview follow the same wording and order (Wilkinson & Birmingham, 2003). The semi-structured interview implies the use of an outline of the research topic. Thus, the given questions do not have the same wording and order. Also, they do not limit the respondent's answers to a restricted number of responses. The unstructured interview takes the form of a general discussion of the research subject by the informant. It enables the respondent to express himself freely using his own words (Scott & Morrison, 2006).

Generally speaking, interviews fulfil various purposes within the domain of education. They are usually used in case studies, surveys and ethnographies (Thomas, 1998). They can be very useful since the researcher is in direct contact with the interviewees; this enables him to give clarifications and push the participants to supply more details. However, this type of research tools can not provide data about the informants behaviour as it focuses on verbal answers. Thus researchers may also rely on the use of observation.

D.3. Observation

Observation refers to the act of gathering information by watching and examining participants' behaviour and attitudes. Generally speaking, one can identify four categories of observation that may be classified according to the researcher's degree of involvement in the study, the organization and format of observation, the researcher's respect of the principle of informed consent and the degree of the manipulation of the observed situation. The first category, which depends on the researcher's degree of contribution to the actions taking place in the observed situation, incorporates participant and non-participant observation. Participant observation connotes that the researcher participates with the observed persons and takes part in the observed interactions; non-participant observation means that the investigator just observes the studied

situation without participating in the observed instance (Kothari, 2004). Thus, within this category the researcher may play several observational roles ranging from complete participant to complete observer.

Observation is also classified according to the nature of its planning and organization. This category includes structured, semi-structured and unstructured observation. Structured observation means that the researcher prepares a plan specifying the elements he will examine before the observation takes place; unstructured observation does not involve the preparation of an observation schedule as the researcher does not make any organization or planning of the procedures he will follow when observing. However, the semi-structured one incorporates the methodology of the two previous types as the observer prepares an outline of the main points that have to be observed without establishing a detailed observation schedule (Sarantakos, 2013).

The third category of observation depends on the researcher's degree of respect of one of the most important components of research ethics embodied in the principle of informed consent; it embodies overt and covert observation. Overt observation implies that the researcher informs the observed persons that he has to observe their behaviour to achieve a specific purpose while covert observation means that the researcher hides his identity and does not tell the observed people that he is observing them.

The last category involves controlled and uncontrolled observation; it shows the extent of the researcher's manipulation of the observed context. In fact, uncontrolled observation is also called simple observation. It implies observing the situation as it is. It denotes the type of observation that occurs in a natural setting; it involves spontaneous examination of the informants' behaviour. On the other hand, controlled observation is referred to as objective, systematic or scientific observation. It has a specific purpose that should be achieved by controlling and manipulating the observed phenomenon. It does not happen in a natural setting since it is based on the use of experimental procedures following a specific plan designed in advance (Kothari, 2004).

In reality, observation furnishes valuable data about learners or teachers' behaviour and attitudes. In addition to this, more accurate information can be obtained from examinations and tests.

D.4. Tests

Tests are measurement instruments that assess learners' performance for the achievement of specific purposes like making a decision concerning the students' placement in a precise level and their success or failure in learning. Moreover, they can be used as

research tools. At the level of the content and purpose of tests, one can identify two types of tests that are employed in educational research: psychological tests and educational tests (Johnson & Christenson, 2012). Psychological tests are utilized for the evaluation of learners' behaviour. They aim at diagnosing general mental abilities, special abilities, attitudes, creativity and personality traits (Chandra & Sharma, 2004). They constitute important tools for the identification of individual differences at the level of their aptitude, abilities, personality or interests. On the other hand, educational tests measure the learners' traits and performance (Weiten, 2007; McMillan, 2001).

At the level of test construction, there are two types of tests that are utilized in education; they are: standardized and researcher-made tests. Standardized tests refer to those published tests that have been constructed by specialists for specific academic goals; they are based on the instructions and principles put forward by test publishers (Ary et al., 2014). They may be oral or paper-pencil tests. They are formal tests that can be used for several purposes; they may assess the learners' level of achievement, aptitude, intelligence or personality traits. In this case, the function of the assessment tool is understood from the title of the test which is employed as a research instrument (Thomas, 1998). On the other hand, researcher-made tests are designed by the researcher when he finds that standardized tests do not suit the research objectives. Generally speaking, educational research mainly relies on the use of achievement tests as tools for data gathering (Ary et al., 2014). Moreover, diagnostic tests are applied as research instruments (Chandra & Sharma, 2004). In addition to tests, documentary research represents a valuable tool of data collection.

D.5. Documentary Research

Documentary research or document analysis is a research instrument used for the collection of data from documents like samples of students' work or examination papers, textbooks, timetables, lesson plans, diaries, notes, biographies, memoirs, archives, books, articles, artefacts, pictures, photographs and curriculum documents as well as audio-tapes and video records (Wellington, 2000). It is considered as a tool of information gathering as well as data analysis.

Document analysis is employed in educational research to achieve various objectives. It can constitute a source of information about the studied issue and the way of planning the undertaken investigation. Also, it may help the researcher to know about the terminology of the research work and the types of research tools needed to get results. Furthermore, it supplies additional data about

the studied case. The success of documentary research is based on the existence of four criteria: authenticity, credibility, representativeness and meaning (Scott & Morrison, 2006). In reality, the exploitation of a variety of research tools helps to furnish rich and varied data that are analyzed through the application of distinct analytical methods.

E. Data Analysis

The nature of data analysis depends on the category of the gathered information. In fact, there are two types of data: quantitative and qualitative. Quantitative data are in the shape of numbers or numerical information; qualitative data are also referred to as categorical or verbal data; they are not computable and are presented in textual information; they can be in the form of words or images (Singh, 2007). Consequently, these kinds of data are analysed differently through the application of quantitative and qualitative analysis.

E.1. Quantitative data analysis

Quantitative data analysis involves various steps which are: editing, coding, classification, tabulation and graphic representation. Editing implies the examination of the gathered information for the purpose of detecting errors or incomplete data. Coding means that the researcher assigns symbols or numbers to the obtained responses in order to classify them into particular categories. Classification denotes the process of assorting the collected data into classes or categories depending on specific features. Tabulation refers to the use of tables that provide a summary of the gathered information and the research results (Kothari, 2004). Graphic representation implies the incorporation of graphs for the explanation of the calculated data and obtained frequencies; it may include various types of graphs like the bar graph, pie chart and the histogram. The bar graph or bar chart is employed for summarizing qualitative data; the pie chart serves to illustrate percentages; the histogram presents a description of quantitative data.

In fact, quantitative data analysis is based on the use of statistics. There are three types of statistics: descriptive, inferential and psychometric statistics. Descriptive statistics refer to a set of numbers that provide a description of the collected information (Perry, 2005). They give a summary of numerical data; they encompass frequencies, measures of central tendency, measures of variability and the coefficients of correlation (Weiten, 2007). Frequencies indicate the number of occurrence of items or similar responses. They are classified into two kinds: absolute and relative frequency. The absolute frequency shows the number while the relative frequency denotes the percentage. Measures of central

tendency are: the mean, the median and the mode (Kothari, 2004). The mean represents the average of a set of grades. The median refers to the half way score in a list of marks; it is used to rank scores while the mode is the frequently repeated score (Ary et al, 2014).

Measures of variability are also called measures of dispersion; they show the spread or dispersion of a set of marks which designates the degree of the deviation of the scores from the mean. They include the range, the standard deviation and the coefficient of variation (Pathak, 2011). The range refers to the distance or difference between the highest and lowest marks in a list of scores. The standard deviation indicates the distance of the marks from the mean. Coefficient of variation is also referred to as the coefficient of relative variability; it illustrates the dispersion of data in the form of a percentage. It is calculated as follows:

$$C_v = \frac{S}{\overline{x}} \times 100 \qquad (2)$$

Cv= coefficient of variation; S= standard deviation; $\overline{x}$=mean.

In addition to this, correlation is analysed through the use of the scatter diagram method and measures of correlation. The scatter plot or scatter diagram implies representing two sets of scores in a graph and identifying the position of their intersection. It takes the form of a graphic representation including a horizontal axis for x scores and a vertical axis for y scores; the scores are correlated by using dots that show the relationship between the variables if the points are assembled successively on a line, the direction of the formed slope indicates the type of correlation. Thus, the correlation is positive if there is a positive slope and it is negative in the case of a negative slope. Moreover, if the dots are scattered and do not form a straight line, there is zero correlation (Pathak, 2011).

On the other hand, measures of correlation which are also called measures of association or relationship are expressed via a coefficient taking the form of a numerical index that shows the direction of association which may be positive or negative (Weiten, 2007). The main correlation coefficients used in education are: Pearson's coefficient of correlation and spearman's coefficient of rank correlation (Pathak, 2011). The following formula illustrates Pearson's coefficient of correlation.

$$r = \frac{N\sum Xy - \sum X \sum y}{\sqrt{[N\sum X^2 - (\sum X)^2][N\sum y^2 - (\sum y)^2]}} \qquad (3)$$

Where N= number of paired observations; X= scores of x; Y= scores of y. Additionally, Spearman's coefficient of rank correlation is represented as follows:

$$r = \frac{6\sum d^2}{N(N^2-1)} \qquad (4)$$

N= number of paired observations; d= difference between paired ranks.

Generally speaking, descriptive statistics give an account of the gathered data. However, inferential statistics provide numerical data that enable the researcher to make a decision about the possibility of making generalizations of the research results (Perry, 2005). They help to describe the degree of the representativeness of the target population by the studied sample. The main inferential statistics used in education are ANOVA, T-test and Chi-square. ANOVA or the analysis of variance is employed for checking if the means of two groups portray one population or two distinct populations (Thomas, 1998). It is expressed through the use of the F-test which is estimated as:

$$F = \frac{MS_{bg}}{MS_{wg}} \quad (5)$$

MS_{bg}= variation between groups; MS_{wg}= variation within groups. In fact, ANOVA is the most popular form of inferential statistics employed in educational research (Thomas, 1998). On the other hand, the T-test enables the researcher to measure the extent to which the sample represents the population. The formula of the T-test is as follows:

$$t = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{(S_1 - S_2) - 1}} \quad (6)$$

t=T-test; $\overline{X}$= mean, S= standard deviation. In addition to these statistics, Chi-square is employed to make a comparison between a set of observed and expected cases (Pathak, 2011). Its formula is:

$$X^2 = \sum \frac{(F_O - F_e)}{F_e} \quad (7)$$

X^2= Chi-square; F_o= observed number of frequencies; F_e= expected number of frequencies. Thus, the Chi-square depicts the degree of resemblance between a hypothetical case and an observed sample. Moreover, inferential statistics involve the calculation of the sampling error (Cohen et al., 2011). It shows the difference between the sample and the population. The sampling error is estimated through the standard error of proportion whose formula is:

$$SE = \frac{\sqrt{P \times Q}}{N} \quad (8)$$

SE= standard error of proportion; P= the percentage in favour; Q=100 percent-P; N= the sample size. Another important equation is employed which is the effect size (Ary et al., 2014). It is estimated through Cohen's d whose formula is:

$$d = \frac{\overline{X_1} - \overline{X_2}}{\sqrt{\frac{\sum X_1^2 + \sum X_1^2}{n_1 + n_2 - 2}}} \quad (9)$$

D= effect size; $\overline{X}_1$= mean of one group; $\overline{X}_2$= mean of the other group; X_1= deviation scores in the first group; X_2= deviation scores in the second group; n_1= number of scores of the first group; n_2= number of scores of the second group. Thus, the effect size indicates the distinction in the marks of two groups.

In addition to inferential statistics, educational research hinges on the use of psychometric statistics which provide an evaluation of the quality of tests. They refer to the methods of psychometric analysis that aims at estimating the degree of reliability of tests. They include reliability coefficient and standard error of measurement (Biddle, 2006). The reliability coefficient is expressed through the formula:

$$r = \frac{(K)(S^2)-\overline{X}(K-\overline{X})}{(S^2)(K-1)} \quad (10)$$

K= number of test items; S= standard deviation; $\overline{X}$= mean. Furthermore, the formula of the standard error of measurement is:

$$SEM = S\sqrt{1-r} \quad (11)$$

SEM= standard error of measurement; S= standard deviation; r=reliability coefficient. Moreover, reliability statistics include split-half reliability and Cronbach's alpha (Sapp, 2002). The formula of split-half reliability equals:

$$r_u = 1 - \left[\frac{{S_d}^2}{{S_t}^2}\right] \quad (12)$$

r_u= split-half reliability; S_d^2= variance of the differences between the marks of the two half-tests; S_t^2= variance of total marks. On the other hand, Cronbach's alpha which is called coefficient alpha is estimated as follows:

$$\alpha = \frac{K}{(K-1)\left[1-\frac{\sum {S_i}^2}{{S_t}^2}\right]} \quad (13)$$

α= coefficient Alpha; K= number of items; S_i^2= variance across the test items; S_t^2= variance of total marks. Additionally, Kappa coefficient or Cohen's kappa coefficient is used to measure interrater reliability (Ary et al., 2014). Its formula is:

$$K = \frac{P_o-P_e}{1-P_e} \quad (14)$$

Where K= proportion of agreement; P_o= observed agreement coefficient; P_e=expected chance agreement. Therefore, quantitative analysis takes the form of statistics. It is often combined with qualitative analysis.

E.2. Qualitative data analysis

Qualitative data analysis involves the researcher's personal interpretation. It goes through various phases including coding, classification and categorization as well as explanation and interpretation. It can be done by hand or with the help of the

computer. When employing the computer, this type of analysis is called computer-assisted qualitative data analysis. Hence, the computer is employed for the storage and retrieval of data, coding and visual representation that includes concept mapping and diagrams (Ary et al., 2014). In this case, data analysis may rely on the exploitation of a Computer Assisted Qualitative Data Analysis Software (CAQDAS) that facilitates the researcher's task through storage, retrieval and coding of data (Shirish, 2013).

In fact, the analysis of texts and documents is based on the use of different analytical approaches like hermeneutics, content analysis, discourse analysis and semiotic analysis (Robinson, 2010). Hermeneutics or hermeneutic analysis refers to the science of interpretation; it has been used in the humanities, the social sciences and education in the 1960's (Thomas, 1998). It is considered as a qualitative instrument used for the analysis of the information collected from texts or documents. Hermeneutic analysis may take different forms. It may rely on the researcher's own interpretation. This is referred to as the hermeneutic circle which implies that the researcher makes an analysis of the text or document depending on his own understanding. Moreover, interpretive analysis may be double hermeneutic when it denotes the researcher's interpretation of other interpretations of the text (Usher, 1996).

Content analysis is a method used for the analysis of information gathered from documents. It means the description of the content of the studied material. It may imply counting the number of occurrences of words, concepts, themes or responses within the document and representing data in tables. Also, it may rely on the employment of scales for the analysis of texts to describe the occurrence of specific words or the number of words utilized per sentence (Anderson & Arsenault, 2005).

Discourse analysis implies the study of human communication and language use. In educational research, it is utilized to scrutinize the interactions happening between the teacher and learners in the classroom. Also, discourse analysis is used to analyse the language provided in textbooks, learners' written productions and written texts in general as well as the analysis of interviews used as research tools (Kelly, 2014).

On the other hand, semiotic analysis attempts to provide an interpretation of the meaning of signs that can take the form of symbols, gestures, pictures or texts including images. It focuses on the analysis of visual data like photographs and pictures. In educational contexts, it may involve the study of images provided in textbooks, photographs, classroom settings and texts (Klein & Agostinone, 2012). In fact, both quantitative and qualitative analyses

are employed in educational research for the purpose of providing valid and reliable results.

V. The Interface between Theory and Practice

Research methodology enables the researcher to produce a research work composed of a theoretical part reflected in the literature review of the study and a practical part incorporating an exploration of the studied issue via the exploitation of a research method and various research instruments. Hence, the applied methodology helps to gather information that will be analyzed and interpreted for the sake of providing a set of suggestions that aim at improving the existing situation. Nevertheless, the methodology of educational research may be shaped by certain obstacles.

At the level of the methodological principles, one can assert that there is a large amount of information about the philosophy and practice of educational research. However, the researchers may be confused due to the existence of various ideologies that create a difficulty in selecting the right method. Therefore, the existing literature displays a set of methodologies instead of a single methodology. For instance, the novice researchers may not succeed in the application of the methodological principles if they are not well knowledgeable about them. Moreover, pragmatism seems to be the most helpful paradigm but in reality it does not provide a clear description of the quantitative-qualitative continuum. Subsequently, the researchers are responsible for the degree of quantification and description of information. Thus, they have to make a balance between the types of data he supplies. Otherwise, they may fail to be objective and their subjectivity will affect the reliability of the results.

Furthermore, there is the issue of generalization which is viewed as the basic objective of educational research since it establishes a degree of understanding of the target population via the sample for the purpose of generating practical suggestions and remedies. In addition to this, the idea of transferability does not help to develop the research scope as the findings of each research work will represent the studied case only.

In fact, generalization requires large representative samples but sometimes the sample is inaccessible or it is small because some members of the target population may refuse to participate in the study. This means that the sample size constitutes an important element that determines the possibility generalization. However, there is a debate concerning the acceptable size of a sample since some researchers suggest the use of a sample size calculator while others advocate the idea that there is not an exact number that should be opted for. Hence, the size of the sample depends on the

research objectives, the type of research tools and the manageability of data analysis.

Consequently, the quality and amount of gathered data do not depend on the sample size since large samples may not guarantee the collection of rich information if the participants are not motivated to take part in the study or are not knowledgeable about the studied issue. Thus, the researchers should look for a good sample that is supposed to possess representativeness, generalizability and homogeneity.

Another concern may appear at the level of research ethics especially the principle of informed consent. In effect, the researchers are supposed to ask for the permission of the informants for the right of collecting data. However, the covert observation reflects an instance where the researchers neglect this principle by hiding their real objectives. In this case, it is claimed that the informants will behave more naturally when they do not know that they are observed. As a result, the participants are deprived from their right of accepting or refusing to take part in the study for the sake of authenticity. Nevertheless, the opinions and attitudes of the informants remain their own property. Therefore, the researchers should ask for their consent; and if they doubt about the collected information, they may use several research instruments to ensure the reliability of data.

Concerning the informants, one can mention the problem of attrition since the questioned persons may not provide responses. Thus, the real number of respondents will be less than the expected one. Furthermore, the informants' subjectivity may also affect the results. The respondents' attitude towards a certain type of research tools may lead to the unreliability or lack of data. For instance, shy learners may not respond positively to an interview. Besides, learners' anxiety and mood may affect their results of the tests used as research instruments. Consequently, the researchers have to take into consideration the participants' level, their background, knowledge and their mastery of the language employed for collecting data as well as their degree of understanding of the jargon of the research domain.

Moreover, the researcher is the principal element in the success of research. S/he has to follow the research ethics and avoid plagiarism to ensure creativity or at least innovation. Also, s/he should possess social skills like how to interact with the informants especially if s/he relies on the use of interviews. Additionally, s/he should try to decrease subjectivity by avoiding the use of questions that influence the respondents and introduce bias. In addition to this, the exploitation of the computer for the achievement of statistical

analysis has helped to save time and effort; but, in some cases, it may lead to shallow data analysis if the researcher relies on the final results given by the computer without understanding the function of the utilized formula and its operands which denote a set of values that help to describe the variables under study. This is why researchers and students should have efficient training concerning the application and interpretation of statistical analysis.

VI. Conclusion

The methodology of educational research derives its rules from the principles of the methodology of social sciences which is shaped by the existence of a set of research perspectives embodying a variety of paradigms that are considered as models of scientific inquiry.

In fact the researcher's tasks may be summarized into three main activities: reflection, planning and conducting research. The first activity implies thinking about the research topic and the way of studying it. It results in the adoption of a specific philosophy of research that determines a particular way of reasoning about the nature of the studied issue, the quality of knowledge that should be sought and the methodology that has to be applied. This step will facilitate the achievement of the two remaining activities which constitute the core of the research methodology.

The present article has attempted to portray the main principles and procedures of the methodology of educational research. It described the theoretical framework of this discipline by listing the main assumptions of the research perspectives and paradigms that constitute the philosophical foundations of scientific investigation. Then, it gave an account of the practical aspect of methodology represented in the research methods and instruments as well as the main approaches of data analysis.

As a conclusion, one can affirm that the methodology of educational research constitutes a large discipline that has developed throughout time to reach its current status. It helps the researcher to investigate educational issues. However, the success of the research work does not rely only on the adopted methodology but it is also affected by the researcher's background knowledge, experience and personality.

REFERENCES

ANDERSON, G., & ARSENAULT, N. (2005). *Fundamentals of Educational Research*. USA: Routledge.

ARY, D., JACOBS, L.C., SORENSEN, C., & WALKER, D. (2014). *Introduction to Research in Education* (9th Edition). USA: Wadsworth.

BETZ, N., & FASSINGER, R. (2012). Methodologies in counselling psychology. In E. Altmaier & J.I. Hausen (Eds.), *The Oxford Handbook of Counselling Psychology* (pp. 237-269). Oxford: OUP.

BIDDLE, D. (2006.). *Adverse Impact and Test Validation: A Practitioner's Guide to Valid And Defensible Employment Testing*. England: Gower Publishing Limited.

BOOTH, W., COLOMB, G., & WILLIAMS, J. (2008). *The Craft of Research* (3rd Edition). Chicago: The University of Chicago Press.

CATANE, J. (2000). *Conducting Research: A Practical Application.* Philippines: JMC Press, Inc.

CHANDRA, S. S., & SHARMA, R.K. (2004). *Research in Education*. New Delhi: Atlantic Publishers and Distributors.

COHEN, L., MANION, L., & MORRISON, K. (2011). *Research Methods in Education* (7th Edition). UK: Routledge.

COTTREL, S. (2014). *Dissertations and Project Reports: Step by Step Guide.* UK Palgrave Macmillan.

D'CRUZ, H., & JONES, M. (2004). *Social Work Research*. London: Sage Publications Ltd.

DANAHAR, M., COOK, J., DANAHAR, G., COOMBES, P., & DANAHAR, P. A. (2013). *Researching Education with Marginalized Communities*. UK: Palgrane Macmillan.

DANIEL, S., & SAM, A. (2011). Research Methodology. Delhi: Kalpaz Publications.

FENWICK, T., EDWARDS, R., & SAWCHUK, P. (2011). *Emerging Approaches to Educational Research: Tracing the Sociomaterial*. UK: Routledge.

GANCHY, S. (2009). *Islam and Science, Medicine and Technology*. New York: The Rosen Publishing Group, Inc.

GRAFF, C. (2014). Mixed Methods Research. In H. Hall & L. Roussel (Eds.), *Evidence Based Practice: An Integrative Approach to Research, Administration and Practice* (pp. 45-64). USA: Jones and Bartlett Learning.

GRECKHAMER, T., & CILESIZ, S. (2012). Critical and Postructuralist Approaches to Strategy Research: Theoretical and Methodological Suggestions. In C. Wang, D. Ketchen & D. Bergh (Eds.), *West Meets East: Building Theoretical Bridges* (pp. 3-38). UK: Emerald Group Publishing Limited.

GUTEK, G. (1995). *A History of the Western Educational Experience* (2nd Edition). USA: Waveland Press, Inc.

HENNINK, M., HULTER, I., & BAILEY, A. (2011). *Qualitative Research Methods.* London: Sage Publications Ltd.

JOHNSON, B., & CHRISTENSEN, L. (2012). *Educational Research: Quantitative, Qualitative and Mixed Approaches.* USA: Sage Publications, Inc.

KELLY, G. (2014). Discourse Practices in Science Learning And Teaching. In N. Lederman & S. Abell (Eds.), *Handbook of Research on Science Education* (pp. 321-336). New York: Routledge.

KLEIN, S., & AGOSTINONE, W. (2012). Visual Research, Visual Data. In S. Klein (Ed.), *Action Research Methods Plain and Simple* (pp. 81-104). USA: Palgrave Mcmillan.

KOTHARI, C.R. (2004). *Research Methodology: Methods and Techniques*. New Delhi: New Age International Publishing.

MCMILLAN, J. (2001). *Essential Assessment Concepts for Teachers and Administrators.* USA: Corwin Press, Inc.

MEDHI, J. (1992). *Statistical Methods: An Introductory Text*. New Delhi: New Age International Publishers.

MERTENS, D. (2009). *Transformative Research and Evaluation*. New York: The Guilford Press.

MONTHINO, L., & HUTCHESON, G. (2011). *The Sage Dictionary of Quantitative Management Research*. London: Sage Publication Ltd.

MORRISON, K. (2002). *School Leadership and Complexity Theory.* UK: Routledge.

NEWBY, P. (2013). *Research Methods for Education*. New York: Routledge.

NOVAK, J., & GOWIN, B. (1984). *Learning How to Learn*. Cambridge: CUP.

PATHAK, R. P. (2011). *Statistics in Education and Psychology*. India: Pearson Education.

PERRY, F. (2005). *Research in Applied Linguistics. Becoming a Discerning Consumer.* New Jersey: Lawrence Erlbaum Associates.

PRITCHARD, A. (2014). *Ways of Learning: Learning Theories and Learning Styles in the Classroom.* UK: Routledge.

RIDDELL, P. (1999). Islamic Nations and Cultures. In K. Boyd (Ed.), *Encyclopaedia of Historians and Historical Writing* (pp 599-602). USA: Fitzroy Dearborn Publishers.

ROBINSON, W. (2010). Documentary Research: In D. Hartas (Ed.), *Educational Research and Inquiry: Qualitative and Quantitative Approaches* (pp. 186-197). London: Continuum.

ROONY, A. (2013). *The History of Physics*. New York: The Rosen Publishing Group, Inc.

SAPP, M. (2002). *Psychological and Educational Test Scores: What Are They?* USA: Charles C. Thomas Publishers, Ltd.

SARANTAKOS, S. (2013). *Social Research* (4th Edition). UK: Palgrave Macmillan.

SCOTT, D., & MORRISON, M. (2006). *Key Ideas in Educational Research.* London: Continuum International Publishing Group.

SHIRISH, T. S. (2013). *Research Methodology in Education*. USA: Lulu Publication.

SINGH, G. (2013). *Information Sources, Services and Systems*. New Delhi: PHI Learning Private Limited.

SINGH, K. (2007). *Quantitative Social Research Methods*. New Delhi: Sage Publication.

THOMAS, R. M. (1998). *Conducting Educational Research: A Comparative View.* USA: Greenwood Publishing Group, Inc.

USHER, R. (1996). A Critique of the Neglected Epistemological Assumptions of Educational Research. In D. Scott & R. Usher (Eds.), *Understanding Educational Research* (pp. 9-32). London: Rutledge.

VERMA, G., & MALLICK, K. (1999). *Researching Education: Perspectives and Techniques*. UK: Falmer Press.

WEITEN, W. (2007). *Psychology: Themes and Variations*. USA: Thomson Wadsworth.

WELLINGTON, J. (2000). *Educational Research: Contemporary Issues and Practical Approaches*. London: Continuum.

WILKINSON, D, & BIRMINGHAM, P. (2003). *Research Instruments: A Guide for Researchers.* London: Routledge Falmer.