RESEARCH PARADIGMS AND DESIGNS WITH THEIR APPLICATION IN EDUCATION

by
Brighton Kumatongo and Kenneth Kapalu Muzata
The University of Zambia

Abstract

This is a theoretical paper of research paradigms and designs and how such terminologies are applied in educational research. Research provides the basis for understanding natural phenomenon and can be used as a tool to find solutions to human problems. A researcher's understanding of research paradigms and designs in education forms the basis for an effective research undertaking. The application of research paradigms and designs in education is the focus of this article. The paper is divided in two major sections. Section one is on research paradigms and covers philosophical foundations of research and research paradigms or world views such as positivism, post-positivism, interpretivism, constructivism and pragmatism are included in this paper. Section two covers research designs, types of quantitative, qualitative and mixed research designs and provides basic knowledge on research designs.

Key words: *Constructivism, Interpretivism, Research Design, Paradigm, Education Research, Positivism,*

Introduction

Research methodology is one of the key aspects of research due to the fact that an empirical study requires exploration of a phenomenon using scientifically accepted methods, which are components of research methodology. The philosophical concept provides foundation to a sequential organisation of components under research methodology, thus a brief philosophical concept of research is provided in this article before exploring research paradigms and designs so as to provide a sequential perspective of their application in educational research.

Philosophical Concept of Research

Philosophies are typically used as the foundation of research (Cresswell, 2013). In research, philosophy denotes the epistemological, ontological and axiological assumptions. The term epistemology originates from the Greek word epistêmê, meaning knowledge. In simple terms, epistemology is the philosophy of knowledge or how we come to know (Krauss, 2005). Epistemology, being the theory of knowledge (Selvam, 2017) describes 'how' a researcher knows about the reality and assumptions about how knowledge should be acquired and accepted. Ontology explains 'what' knowledge is and assumptions about reality whereas axiology reveals the assumptions about the value

system (Simui, 2018). Ontology is concerned with reality. It is the scientific study of being. The reality can be external to individuals or produced by an individual's consciousness (Cohen et al., 2000).

Research Paradigms

Paradigms are general viewpoints or ideologies (Perera, 2018). Research paradigms are a set of common beliefs and agreements shared by scientists on how problems can be understood and address (Perera, 2018). Research paradigms can also be referred to as ways scientists respond to three basic questions of ontology, epistemology and methodological questions (Perera, 2018). Research paradigms can be categorised in positivism, interpretivism, post-positivism, Critical theory (ideology), Constructivism and/or Pragmatism. The research paradigms of focus in this article are; positivism/postpostivism, interpretivism and constructivism as well as pragmatism.

Positivism and Post-positivism

The positivist paradigm of exploring social reality is based on the philosophical ideas of the French Philosopher August Comte who believed in observation and reasoning as best means of understanding human behaviour and that true knowledge is based on experience of senses and can be obtained by observation and experiment (Henning, Van Rensburg & Smit, 2004).Thus positivism is construed a way of measuring reality from an objective point of view. Selvan(2017) states that, positivists hold a view that reality is a single unitary world that can be accessed through scientific methods. Scientific methods such as experiments only give objective answers that are not prone to multiple interpretations.

In line with ontological, positivists assume that reality is objectively given and is measurable using properties which are independent of the researcher and his or her instruments. Knowledge is believed to be objective and quantifiable. Positivists adopt scientific methods and systematise the knowledge generation process with the help of quantification to enhance precision in the description of parameters and the relationship among them. Positivism is concerned with uncovering truth and presenting it by empirical means (Henning, Van Rensburg & Smit, 2004). The preference of positivism in sciences is because, objective facts accumulate to support laws; and the purpose of science is to establish universal laws (Selven, 2017).

Positivism is therefore closely linked to objectivism which argues that reality exists external to the researcher and must be investigated through a rigorous process of scientific inquiry. Such rigorous process of scientific inquiry requires a repertoire of skills and sophisticated machinery to interpret data in order to have a reality. Could we say positivism is peculiar therefore to highly industrialised countries with sophisticated measures of research? But an argument ensures as to what objective reality is. If

objectively reality is a construction of a context, we could then argue that positivism does not exist. Even machines are controlled and can give different interpretations depending on how they are programmed and used by operators.

The term post-positivism represents the thinking after positivism, challenging the traditional notion of the absolute truth of knowledge, the understanding that absolute positive knowledge may not apply when studying human behaviour and actions. The use of post-positivism paradigm provides researchers with an opportunity to identify and assess the causes that influence outcomes, such as those found in experiments (Creswell & Creswell, 2018). Post-positivists promote the triangulation of qualitative and quantitative methods to explore the diversity of facts researchable through various kinds of investigations but respecting and valuing all findings as the essential components for the development of knowledge (Hameed, Sanaullah & Ali, 2017).

The knowledge generated through post-positivism is based on careful observation and measurement of the objective reality (Creswell & Creswell, 2018), and developing numeric measures of observations as well as studying the behaviour of individuals becomes paramount for a post-positivist. In reference to post-positivism, Khaldi(2017) states that post-positivism has paved the way for the inclusion of social sciences in the realm of science and that research in social sciences is now perceived to be similar to that in natural science. Post positivists therefore assume that social reality is composed of measurable objective facts which a researcher can precisely measure using statistics to test causal relationships (Khaldi, 2017). However, statistics alone do not provide absolute meaning if no interpretation of the numbers is given. Further, there is a limit in statistics, in terms of the extent of applicability. One example is the use of the chisquare to determine relationships or significant differences between or among variables. In many cases, once a relationship or a difference is established, the reasons for such relationships or difference remain unanswered, thus prompting further research in search of reality of the causes of disparities or similarities in variables. Thus, reality is therefore constructed from the use of a combination of methods and approaches in research. One single method cannot provide the 'whole' reality. Another vivid example of reality is when studying the minority populations such as the disabled which may not require huge numbers to be more statistical, thus requiring taking the toll in making deductive conclusions (Muzata, 2020).

Interpretivism

Interpretivist researchers believe in reality based on people's subjective experiences of the external world. *Interpretivists* believe there is no single correct route or particular method to knowledge and that no objective knowledge is independent of thinking or human reasoning (Aliyu, Bello,Kasim & Martin,2014),hence they attempt to derive their constructs from the field by an in-depth examination of the phenomenon of interest.

Interpretivists assume that knowledge and meaning are acts of interpretation; thus they refute an objective view towards knowledge.

The premise of interpretive researchers is that access to reality is only through social constructions such as language, consciousness and shared meanings (Aliyu, Bello,Kasim & Martin,2014), implying that it is how the way a person interprets what he or she has seen or experienced. It is about a full description of a phenomenon with all its variables that are well identified, interpreted and described that the whole truth can be said or seen.

The quality that an object being studied is what makes it real and not the number of time it appears or behaves. Whether the object changes colours or behaviour many times, it still remains the same object being interpreted differently. Thus, objectivists would easily give a permanent tag to an object once measured but the interpretivist would provide a description as it is at the time the object is seen in its natural environment. In this context, reality is therefore not permanent.

Interpretivists employ methods that enable them to generate qualitative data. Although numerical data could be generated in the process, it is not relied upon. The purpose of numerical data in qualitative research is not to make deductions or conclusions. Qualitative numbers are describable, meant to provide rigour to the understanding of the phenomena under study in any case. Even figures and tables can give further meaning in qualitative research. For instance, NVIVO generated text density can illustrate coding of data and show the popular response by participants.   Methods that can yield qualitative data include: Open-ended interviews which can be standardised open-ended interviews, semi-standardised open ended interviews, and/or informal conversational interview.

Observations, filed notes, personal notes, document analysis can also be used by the researcher (Rehman & Alharthi,2016). For as long as the aim is to gather in-depth information about a phenomenon, open-ended questionnaires can be used to help respondents freely think and explain their thoughts or experiences without presence of the researcher as would be the case in interviews. Interviews may act as interference in the thought and expressive process of the respondent, in that the interviewer tends to demand immediate answers from the respondent hence they can be said to be intimidating.

Constructivism

Constructivism or *social constructivism* is based on the premise that people seek to understand the world they live in through development of subjective meaning of their experiences (Creswell & Creswell, 2018).   A constructivist's goal is to rely as much as possible on the participants' views of the situation under study and interpret the meanings that the participants attach to the world around them. Jean Piaget is credited for

championing constructivism and his suggestion of interplay of *assimilation* "integration of experiences" as well as *accommodation* which is modification of cognitive schemata based on new experiences to enable assimilation (Riegler, 2012).

The ability of an individual to construct knowledge of reality provides the genesis of the philosophical paradigm of social constructivism. From the learners perspective, constructivist believe that learning occurs only when learners discover knowledge through the spirit of experimentation and doing, implying that learning does not occur from the traditional method of teachers standing in front of the class and teaching (Adom, Yeboah , & Ankrah, 2016). Individuals construct meaning by engaging in the world they live in. The interaction between an individual and one's environment makes one's perception of the world one lives in and thus, reality is socially constructed.

Pragmatism

Pragmatism embraces both quantitative and qualitative designs, hence it underpins the mixed method philosophical paradigm (Creswell & Creswell, 2018). Pragmatics are pluralists in that they are not inclined to one system of philosophy like positivists and interpretivists. The use of mixed designs by pragmatics enables researchers to have a thorough understanding of the phenomena under study. Researchers in social sciences prefer pragmatism (Morgan, 2007; Creswell & Creswell, 2018), due to the flexibility inherent in the paradigm to choose the methods, techniques, and procedures appropriate to the needs and purposes of the research. Pragmatism fits in applied settings where there are complex social phenomena, making it the most common paradigm in mixed research methods (Pole, 2007).

Research Designs

Research requires one to undertake a systematic process guided by a theory and/or hypothesis when investigating natural phenomena. Kasonde-Ng'andu (2013) refers to research as a systematic process of collecting, examining and interpreting data, for the purpose of providing answers to the unusual questions about nature or a phenomenon. The term research methodology is generally used to describe several aspects of a study, which include the design, procedures of data collection, methods of data analysis, selection of subjects, and details of the specific treatments (Khaldi, 2017). Researchers are often guided by research paradigms and designs.

A research design is a scheme, an outline or a plan a researcher uses to generate answers to research questions (Kasonde-Ng'andu, 2013). It is a framework comprising the methods and strategies that a researcher uses to solve a research problem. Research designs are traditionally associated with research paradigms and approaches. Thus, there are research designs that are associated with quantitative research and those

associated with qualitative research. When a researcher chooses to use both quantitative and qualitative approaches, the research design qualifies to be a mixed approach.

Quantitative Research Designs

Quantitative research approach is aimed at testing theories, determining facts, demonstrating relationships between variables and predicting outcomes. According to Muzata, (2017), quantitative research is the objective form of conducting research where knowledge should be proved by scientific methods and not by feelings, opinions, values and personal interpretations. A quantitative researcher uses methods from the natural sciences that are designed to ensure objectivity, generalisability and reliability (Weinreich, 2009). Statistical methods are used to test a predetermined hypothesis regarding possible relationships between identified variables. The quantitative researcher's design in the tool kit include: experimental, comparative, causal, survey and correlational designs. It is also well to say that quantitative designs are divided into two major categories; experimental and non-experimental designs.

Experimental Designs

Experimental studies seek to determine how or if a specific treatment influences an outcome (Creswell & Creswell, 2018). Experimental studies can be a true experiment, a quasi-experiment or a single case study. The latter is very rarely used in educational research because it is concerned with only one subject. The single-subject study may be likened to a true experiment because it has a long and respected tradition in empirical research particularly in psychology (Khaldi, 2017). Mildner(2019) states that a two-group posttest-only design is the simplest experimental design, and is good for assessing causal relationships. An experimental group and a control group formed by randomly, by selection or matching are involved. The two groups are compared after treatment (applied to experimental group only). In a two-group pretest-posttest design are involved and the two groups are formed randomly by selecting and assigning of subjects. Pretest and posttest measurements in both groups are conducted, and treatment is only applied to an experimental group.

Experimental studies are highly controlled for threats to internal validity, but external validity may be jeopardised by the subjects' knowledge that they are being tested (Mildner, 2019). Caution should be taken when conducting experiments that involve humans and control groups. The damage caused to one group that receives the treatment may be unethical and irreversible whereas the advantage given to the treatment group should not leave the untreated group disadvantaged. Researchers should understand the consequences involved in the application of such designs and precautions should be preplanned and interventions provided.

Non Experimental Designs

Non experimental studies do not involve manipulation of the independent variable by the experimenter either for ethical reasons or because of their abstract nature. For instance *age, gender, ethnicity opinions* cannot be manipulated (Khaldi, 2017).The researcher should therefore observe and interpret what is observed. Non experimental research can cover designs such as; *descriptive, causal-comparative, correlational, ex post facto* designs (Khaldi , 2017), as well as surveys.

a) *Descriptive research* enables the researcher to collect data about conditions, situations, and events that occur in the present.

b) *Causal-comparative research* aims at investigating the relation between the variables under study in order to identify possible causal relationships between them.

c) *Correlational research* is concerned with establishing possible but not necessarily present relationships between variables.

d) *Ex post facto research*: Expost facto literally means "*from what is done afterwards*". It focuses first on the effect, and then tries to determine possible causes and questions will remain about the effect following the cause, or vice versa. In *Expost facto* research, the researcher cannot control the variables, implying that the role of the researcher is limited to reporting the outcome of an action or what is happening.

e) *Surveys:* A survey is a systematic method used to gather information from (a sample of) entities in order to construct quantitative descriptors of the attributes of the larger population of which the entities are members (Avedian, 2014). Surveys are used to gather information that reflects population's attitudes, behaviours, opinions and beliefs that cannot be observed directly (Avedian, 2014). Surveys enable researchers to provide a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population, it can be a cross-sectional and longitudinal study using questionnaires or structured interviews for data collection with the intentions of generalising findings from a sample to a population (Creswell & Creswell, 2018). Kraemer (1991) identified three characteristics of a survey research; a) survey designs are used to quantitatively describe specific aspects of a given population, which may involve examining the relationships among variables; b) data collected from people in survey research is subjective; and c) a selected portion of the population is used in a survey research from which the findings can later be generalised back to the population.

Most quantitative research in the social sciences and education in particular is non-experimental, in that it is used to inform policy and improve the state of teaching and learning in schools. For instance, availability of teaching and learning resources as well as teachers in schools can be established using surveys. Education sciences such as chemistry, biology and physics can also employ experimental designs in some tests.

Qualitative Research Design

Qualitative studies seek to explore individuals' understanding of a social phenomenon. Mohajan (2018) defines a qualitative research is a form of social action focusing on how people interpret, and make sense of their experiences to understand the social reality of individuals. Qualitative studies are largely investigative processes in which researchers gradually make sense of a social phenomenon by means of contrasting, comparing, replicating, cataloguing and classifying the object of study (Creswell & Creswell, 2018). Mkandawire (2019) notes that while discussing qualitative data collection methods in research, qualitative design qualifies as a subjective method of assessing opinions, behavior, attitudes and social interactions.

In qualitative studies, interviews, diaries, journals, classroom observations and immersions; and open-ended questionnaires to obtain, analyse, and interpret the data are used, as well as content analysis of visual and textual materials, and oral history (Mohajan, 2018). Qualitative research can be interactive or non-interactive, implying that a researcher may either be in contact with participants or not (Astalin, 2013). A researcher using qualitative research method can use designs such as; Phenomenology, Hermeneutics, Ethnography, Grounded Theory, Case Study, Historical or Narrative Design.

Phenomenology

Phenomenology means the study of *phenomena*. Phenomena may be events, situations, experiences of people or concepts (Simui, 2018). Founded in the early 20th century by Edmund Husserl and Martin Heideggar, the goal of phenomenology is to describe experiences as they are lived by participants. Uniqueness of an individual's lived situations is examined, because every person has his or her own reality and reality, thus reality is subjective. Astalin (2013) states that, in a phenomenology study, the researcher explores the effects of the phenomena on peoples' lives and problems it may cause.

A phenomenological study might explore, for instance, the effect of *back pain* on the sufferers' relationships with other people by describing the strain that it may cause in marriages or the effect of parental disability on children (Astalin, 2013). The reality of such pain is described from the view point of a person describing pain. In this design, a variety of methods can be used to generate data. Interviews, analysing documents, watching

videos, visiting places and events can be used for the purpose of understanding the meaning participants attach to whatever is being examined.

Hermeneutics

Hermeneutics can be traced way back in the 17th century as an approach for interpreting biblical texts (Patterson & Williams, 2002; Holroyd, 2007). Scholars used hermeneutics to interpret the scripture.   Holroyd (2007) states that etymologically the word hermeneutics is rooted in the Greek verb 'hermeneuein', translated as "interpret" or "understand", whereas the noun hermeneia means the utterance or explication of thought. Hermeneutics can therefore refer to a research design in which a researcher seeks to interpret lived experiences of participants based on their utterances in order to generate understand of a phenomenon.

Hermeneutics just like phenomenology is thus the study of lived experiences. In phenomenology, the emphasis is on the world or reality as lived by a person, not the world or reality being treated as something separate from the person (Laverty, 2003), whereas in hermeneutic phenomenology, the focus is toward illuminating details that are seemingly trivial aspects within experiences that may be taken for granted in our lives, with a goal of creating meaning and achieving a sense of understanding (Laverty, 2003) of reality.

Types of hermeneutics or what Patterson & Williams (2002) refer to as hermeneutic research traditions which include; *hermeneutic divination*, *hermeneutic reenactment*, *hermeneutic reconstructivism* and *hermeneutic productive*. In hermeneutic divination, the researcher seeks to achieve insight of the author's text, in that it is based on the premise that the correct interpretation of a text can only be achieved by divining the author's original thought (Patterson & Williams, 2002) and its context.

Hermeneutic reenactment also known as reproductive *hermeneutics* stresses emphasis on interpretation and understanding of a phenomenon through bracketing or preconceptions. The researcher puts oneself in another's place, and imaginatively reliving the actual and possible experiences of others. Hermeneutic *re-constructionism* or *critical hermeneutics* is characterized by a belief in the existence of a "false consciousness" capable of distorting our understanding of human experience, whereas in *productive* or *projective hermeneutics,* researchers maintain that an individual plays an active role in creating the interpretation of the text when reading it. Implying that the interpreter or researcher helps "produce" meaning in the process of analysis the text(Patterson & Williams, 2002).

In interpretive hermeneutics, a researcher generates meaning from participants' lived experiences. Participants describe their lived experiences, which become the data of the study, which be later interpreted using hermeneutic circle that consists of reading, reflective writing and interpretation (Laverty, 2003; Simui, 2018).

During data collection, respondents are likely to exhibit certain signs that may provide additional sources of information such as facial expressions or body movements. In this context, based on the tenet of interpretive hermeneutics on which a researchers is able to make inference regarding informants' experiences beyond what is conveyed, the researcher has the liberty to interpret the unspoken, unconscious, and hidden meaning that may be perceive to exist in the phenomenon under study (Simui, 2018), unlike merely providing a full description of the data as provided by participants. Body language such as shading tears, being emotional and facial expressions can carry meaning that requires perception to interpret. For individuals with hearing impairments, facial expressions or non-manual makers and other forms of manual signs require interpretation in that they form part of communication abilities for the deaf (Muzata & Mahlo, 2019; Muzata, 2021).

Ethnography

A researcher who is interested in studying people's culture, way of life, norms and attitude can use ethnography. Ethnography allows the researcher to live the life of the people he or she is studying. A researcher in this context becomes one of the participants under study, living similar life style and eating the same food as participants. Astalin (2013) writes that ethnography is a branch of *anthropology* that provides scientific description of individual human societies Anthropology is the social science that studies the origins and social relationships of human beings. The purpose of ethnography is to describe a culture's characteristics. A researcher who adopts ethnography design has to be in the field for more than six months (Astalin, 2013), implying that such a researcher requires more time be immersed in the culture and life of the people being studied.

The cultural parameter is that the people under investigation have something in common. These parameters include; geographical location, religious, tribal or other, provided the people being studied shared common experiences and life style. Mainly, the researcher uses observation and interaction to collect data. Other methods include interviews (Astalin, 2013).

Grounded theory

Grounded theory was developed in 1965 by Glaser and Strauss(Selvam,2017) and aims at constructing middle-range theory using systematic yet flexible methods for collecting and analysing data to construct theories 'grounded' the data. It is a type of qualitative research methodology that allows a theory or theories to emerge from the data that is collected (Astalin, 2013), and involves formulation, testing, & re-development of propositions until a theory is developed.

In grounded theory, the researcher does not commence the process of research with a *predetermined theory* in mind, the formulation of theories stem from the data that allows one to explain how people experience and respond to events. The theory is

generated by means of coding the data meticulously (Selvam, 2017). Coding involves attaching levels to segments of data depicting what each segment is all about. The use of coding distils data, sorts them and enables easy comparison with other segments of data. Sample sizes are often larger, between 20 to 60 participants so that a sample can help to establish a theory.

Case study

A case study is an intensive study about a person, group of people, unit, phenomena or institution. A case study can also be defined as an intensive, systematic investigation of an individual, group, community or some other unit in which the researcher examines in-depth data in relation to several variables (Heale &Twycross, 2018). A case study involves a deep understanding through multiple types of data sources and can be explanatory, exploratory, or descriptive. The case study can be done in social sciences and life sciences.

A researcher using a case study design can employ any and all methods of data collection from testing to interviewing using audiotape and videotape, direct, non-participant observation, participant observation, field notes, journals, logs and focus group interview among other instruments (Astalin, 2013). Although the known norm is that case studies are qualitative and that findings cannot be generalised to a broader community in which the unit under study is found, findings are generalised to the unit studied.

Case studies help to understand the unit as a whole. For instance, the operations of the school, college or the performance of a selected category of learners can be studied and conclusion about the unit given. Thus case studies can allow transferability to some degree. Case studies can also provoke further investigations of a phenomenon in other settings and even prompt a quantitative study of the same phenomenon to see whether the findings would be broadly generalised. Thus, case studies can eventually lead to generation of theory.

Historical and Narrative Designs

Historical research aims at examining and describing events of the past to understand the present and anticipate potential future effects. In historical analysis the researcher aims at establishing descriptions and coming up with explanations of what had occurred (Astalin, 2013). Narrative designs are applied by researchers studying the lives of people. The process involves asking one or more individuals to narrate stories about their lives (Creswell & Creswell, 2018; Riessman, 2008), the stories that are later retold or re-storied by the researcher into a narrative chronology. The narrative may combine views from the participant's life with those of the researcher's life in a collaborative narrative (Creswell & Creswell, 2018).

Mixed Research Designs

Mixed methods research, which is frequently referred to as the 'third methodological orientation' (Teddlie and Tashakkori 2008), draws on the strengths of both quantitative research and qualitative research designs (Berman, 2017). In mixed research, an investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative methods in a single study or a programme of inquiry (Tashakkori &Creswell, 2007; Creswell, 2008), implying that researchers do not restrict themselves to a limited range of conventional research methods (Whitehead & Schneider,2013). The use mixed research designs or methods is methodological triangulation (Pluralism), and originated from social science in the 1950s (Whitehead & Schneider, 2013).

The goal of mixed research methods is corroboration of data. Thus, data collected by means of quantitative methods is checked and verified by qualitative data and vice versa. Data sets should be able to support each other before drawing conclusions. Anyhow the sets may not support each other and so generalisations are affected. Mixed methods researchers should be well conversant with both qualitative and quantitative procedures from collection to analysis and conclusions. Mixed methods researchers have increased data reliability. For instance, a study of prevalence of girl pregnancies can also provide reasons in depth for such pregnancies. One does not have to wait for another time to conduct a study on pregnancies. Data may be collected at the same time depending on the mixed method design chosen. There are a number of mixed method design options a researcher can choose from. These include convergent design, explanatory sequential design, exploratory sequential design or nested designs.

Types of Mixed Research Designs

Three basic mixed methods designs identified by Creswell (2015) are; convergent design, explanatory sequential design, and exploratory sequential design. Mixed methods can be either sequential designs or concurrent in nature. Sequential designs usually involve multiple phases of data collection during which either a qualitative or quantitative data collection method (Kroll & Neli, 2009; Creswell, 2012), whereas concurrent mixed methods research strategies, involves the collection of both qualitative and quantitative data at the same time or in parallel (Kroll & Neli, 2009).

Convergent designs are mixed research designs in which the researcher collects quantitative and qualitative data concurrently (Fischler, 2019), and analysis of the two data sets is separately done but mixing the two databases by merging the results during interpretation or sometimes during data analysis (Creswell, 2013; Fischler, 2019). The purposes for using Convergent Design by the researcher is aimed at obtaining a more

complete understanding from two databases, corroborate the results from different methods and compare multiple levels within a system (Fischler,2019).

Sequential Designs

Sequential designs include; sequential explanatory, sequential exploratory and sequential transformative. *Sequential explanatory* involves the collection of quantitative data in the initial phase. The researcher using explanatory sequential design starts by collecting and analysing quantitative data (Bian, 2019), followed by collection and analysis of qualitative data in a second phase as a follow-up to the quantitative results (Creswell, 2016; Fischler, 2019). Connection of the two phases by the researcher is done using the quantitative results to shape the qualitative research questions, sampling, and data collection (Creswell, 2013). The use of explanatory design aimed at using qualitative data to help explain quantitative results that need further exploration (Fischler, 2019); as well as to using quantitative results to purposefully select best participants for qualitative study. The use of explanatory sequential design in mixed methods helps the researcher to draw inferences about how the qualitative results help to explain the quantitative results (Zheng, 2015).

Sequential exploratory design begins with qualitative data, followed by quantitative data. The researcher using exploratory research collects and analyses qualitative data first followed by quantitative data (Fischler, 2019; Creswell, 2012; Creswell & Creswell, 2018). The analysed qualitative data provides the basis for building subsequent quantitative phase and connects the phases by using qualitative results which enable the researcher to shape the quantitative phase by specifying research questions and variables, developing an instrument or intervention (Zheng, 2015).

Explanatory design aims at explaining the quantitative findings and/or to contextualise the quantitative findings (Berman, 2017), the purpose of using exploratory design is for the researcher to first explore (Fischler, 2019), because the variables, theories and hypothesis are unknown, hence the exploration facilitates the development of unavailable instrument or typology; and helps the researcher to assess and have insights into whether qualitative themes generalise to a population.

In a sequential exploratory design, a researcher uses themes developed after analysing qualitative data to develop quantitative instruments to further explore research problem(Berman,2017), hence creating three stages; that is the qualitative phase, followed by quantitative phase and integration phase to connect the two strands(Berman, 2017). *Sequential transformative* has no predominant implementation sequence characteristic of sequential exploratory and sequential explanatory designs, implying that the researcher using sequential transformative is guided by a particular theoretical

orientation or advocacy lens (Hanson et al. 2005) and findings are integrated during the interpretation phase.

Concurrent Designs

A researcher using concurrent designs can use; concurrent triangulation design, concurrent nested design or concurrent transformative design**.** *Concurrent triangulation* involves collection of qualitative and quantitative data at the same time in a single study ((Whitehead & Schneider, 2013), with a view of validating the findings generated by each method through evidence produced by the other, Muzata (2017) used this as a convergent parallel mixed methods design, as borrowed from Creswell, (2014). *Concurrent nested design* involves collection of both qualitative and quantitative data at the same time, but one of the methods dominates whilst the other one is embedded or nested in it.

The researcher using nested design selects a sub-sample of the main sample for a deeper investigation. For instance, in a quantitative study, a group of *respondents* may be selected for qualitative research (Berman, 2017), whereas in a qualitative study, some of the *emergent themes* can be quantitatively examined. In *Concurrent transformative design***,** just like other concurrent designs**,** both the qualitative and quantitative data are collected at the same time. However, concurrent transformative design is informed by a theoretical perspective and data are integrated during the interpretation phase.
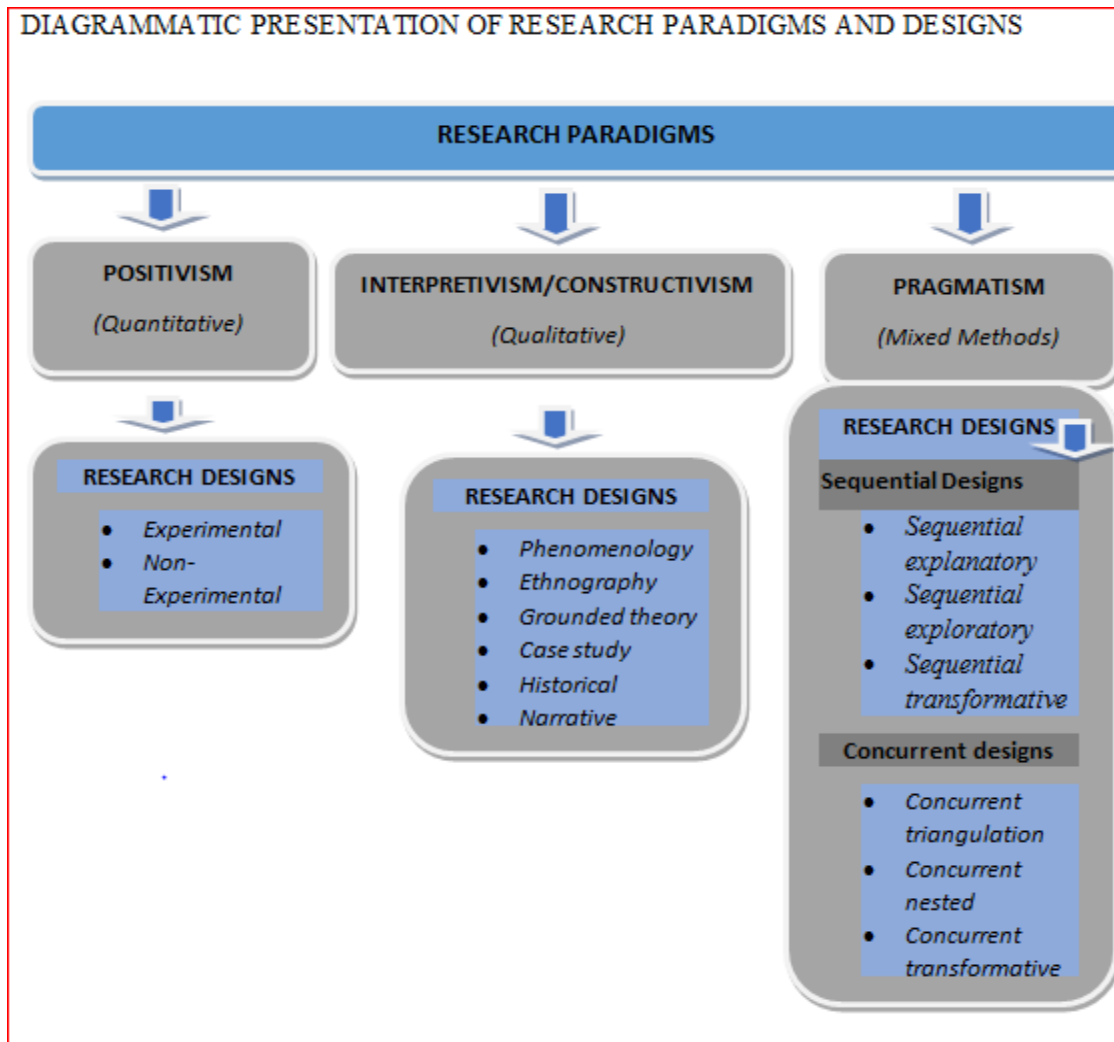
Figure 1*: Indicates the connection between paradigms and research designs. A researcher who chooses a particular research design should understand the philosophical basis or paradigm on which the choosen design is anchored.*

Conclusion

Conducting research requires a plan or framework comprising methods and strategies that can provide a sequential systematic way to complete the study. The research paradigms and designs covered in this paper can help a researcher undertaking a study requiring the use of quantitative, qualitative or mixed methods. The diagrammatical presentation of research paradigms and designs in figure 1 depicts linkage of some paradigms and designs, indicating that research methods are intertwined. A good connection between research paradigms and designs is key in research methodology and forms appropriate transition to other elements of research methodology.

References

Adom,D., Yeboah ,A., & Ankrah,A.K.(2016). Constructivism Philosophical Paradigm:
    Implication For Research, Teaching And Learning. *Global Journal of Arts
    Humanities and Social Sciences, 4* (10), 1-9

Aliyu, A.,A.,Bello,M.U.,Kasim,R., & Martin,D.(2014). Positivist and Non-Positivist Paradigm in
    Social Science Research: Conflicting Paradigms or Perfect Partners? *Journal of
    Management and Sustainability 4* (3)79-95

Avedian,A.(2014). *Survey design*. Retrieved on 12th October, 2019 from *hnmcp.law.harvard.edu
    › Arevik-Avedian-Survey-Design-PowerPoint*

Astalin,P.K.(2013). Qualitative Research Designs: A Conceptual Framework. *International
    Journal of Social Science & Interdisciplinary Research, .2* (1) 118-124

Berman, E.A. (2017). "An Exploratory Sequential Mixed Methods Approach to Understanding
    Researchers' Data Management Practices at UVM: Integrated Findings to Develop
    Research Data Services."*Journal of Science Librarianship 6*(1): e1104.
    https://doi.org/10.7191/jeslib.2017.1104

Bian, H.(2019). *Mixed Methods Research*. Retrieved on 10th October,2019 from
    core.ecu.edu › ofe › statistics research › mixed methods new

Creswell, J. W. & Creswell, J. D. (2018). *Research design: Qualitative, quantitative and mixed
    approach*(5th ed). Los Angeles: SAGE publication, Inc.

Creswell, J. W. (2015). *A concise introduction to mixed methods research*. Thousand Oaks, CA:
    Sage.

Creswell, J.W. (2013) "*Steps in Conducting a Scholarly Mixed Methods Study*" (2013).DBER
    Speaker Series. 48. Retrieved on 10th October, 2019. Retrieved from:
    http://digitalcommons.unl.edu/dberspeakers/48

Creswell , J. W. (2012). *Educational research: Planning, conducting, and evaluating
    quantitative and qualitative research* (4thed.). Upper Saddle River, NJ: Pearson
    Education.

Creswell , J. (2008*). Educational research: Planning, conducting, and evaluating quantitative
    and   qualitative research*   (3rd ed.). Upper Saddle River, NJ: Pearson Education.

Fischler, A.S.(2019) *Mixed Methods*. Retrieved on 10th October, 2019 from
    https://education.nova.edu/Resources/uploads/app/35/files/arc_doc/mixed_methods.pdf.

Hameed,P,A, Sanaullah;,A.,& Ali,S.A.(2017). Post-Positivism: An Effective Paradigm for Social
    and Educational Research. *International Research Journal of Arts and
    Humanities,45(45).*

Heale,R., & Twycross, A.(2018). What is a case study?. *Evid Based Nurse, 21*(1)7-8

Holroyd, A.E.M.(2007). Interpretive Hermeneutic Phenomenology: Clarifying Understanding.
    Indo-Pacific Journal of Phenomenology, Vol. 7, (2)1-12

Kasonde-Ng'andu, S.(2013). *Writing a Research Proposal in Educational Psychology*. Lusaka:
    University of Zambia Press.

Khaldi, K.(2017). Quantitative, Qualitative or Mixed Research: Which Research Paradigm to
    Use?. *Journal of Educational and Social Research, 7* (2)15-24

Kraemer, K. L. (1991). *Introduction*. Paper presented at The Information Systems Research
    Challenge: Survey Research Methods.

Krauss, S. E. (2005). *Research Paradigms and Meaning Making: A Primer .The Qualitative
    Report,10*(4),   758-770. Retrieved from http://nsuworks.nova.edu/tqr/vol10/iss4/7

Laverty, S. M. (2003). Hermeneutic phenomenology and phenomenology: A comparison of
    historical and methodological considerations. *International Journal of Qualitative*

        Methods,2(3).Article 3. Retrieved on 23 rd March, 2020 from
        http://www.ualberta.ca/~iiqm/backissues/2_3final/pdf/laverty.pdf

Mildner,V. (2019). *The SAGE Encyclopedia of Human Communication Sciences and Disorders:*
        Experimental Research. Thousand Oaks: SAGE Publications, Inc

Mkandawire, S. B. (2019). Selected Common methods and tools for data collection in research.
        IN M.K. Banja, *Selected Readings in Education,* 2, 143-153.

Mohajan, H.(2018). Qualitative Research Methodology in Social Sciences and Related Subjects.
        Journal of Economic Development, Environment and People, 7 (1)23-48

Morgan, D. (2007). Paradigms lost and pragmatism regained: Methodological implications of
        combining qualitative and quantitative methods. *Journal of Mixed Methods Research,*
        1(1), 48–76.

Muzata, K.K. (2017). Curriculum implementation for learners with special education needs: the
        case of selected inclusive and special schools in Zambia. PhD Thesis, University of
        South Africa, http://uir.unisa.ac.za/handle/10500/24571

Muzata, K.K. (2020). Complexities of sampling in special education research: a Zambian
        contextual analysis. *European Journal of Special Education Research*, 6 (3), 96 – 109.

Muzata, K.K., & Mahlo, D (2019). Deaf education in Zambia: Lessons from the 2013
        Curriculum Implementation. *UNESWA Journal of Education*, 2 (1), 289-305.

Muzata, K.K. (2021). *Special and Inclusive Education Provision in the Zambian Context*.
        Lusaka, UNZA Press.

Patterson, M.E & Williams, D.R.(2002). *Qualitative data: Hermeneutic Principles, Methods and*
        Case examples. Illinois: Sagamore Publishing

Perera, S.(2018). *Research Paradigms*. Retrieved on 12th October,2019 from www.natlib.lk › pdf
        › Lec_02

Pole,K.(2007). Mixed Method Designs: A Review of Strategies for Blending Quantitative and
        Qualitative Methodologies. *Mid-Western Educational Researcher* Vol. 20, (4) pp. 1-4

Rehman,A.A.& Alharthi,K.(2016). An Introduction to Research Paradigms. *International*
        Journal of Educational Investigations,3 (8) 51-59.

Riegler, A.(2012). *Constructivism*.Retrieved on 14th January, 2019 from
        http/www.constructivist.info/riegler/pub/index.cgi?show.

Selvan, S.G.(2017). *Empirical research*: A study guide. Makuyu: Paulines Publication Africa

Simui, F.(2018*). Lived Experiences of Students with Visual Impairments at Sim University In*
        Zambia: A Hermeneutic Phenomelogical Approach. PhD Dissertation: The University of
        Zambia.

Tashakkori, A., & Creswell, J. W. (2007). The New Era of Mixed Methods. Journal of Mixed
        Methods Research 1(1):3–7

Whitehead, D., & Schneider,Z.(2013). *Mixed-methods research*. Retrieved on 8th October, 2019
        from: https://www.researchgate.net/publication/255950311

Zheng,,M.(2015). Conceptualization of Cross-Sectional Mixed Methods Studies in Health
        Science: A Methodological Review. *International Journal of Quantitative and*
        Qualitative Research Methods 3(2) 66-87