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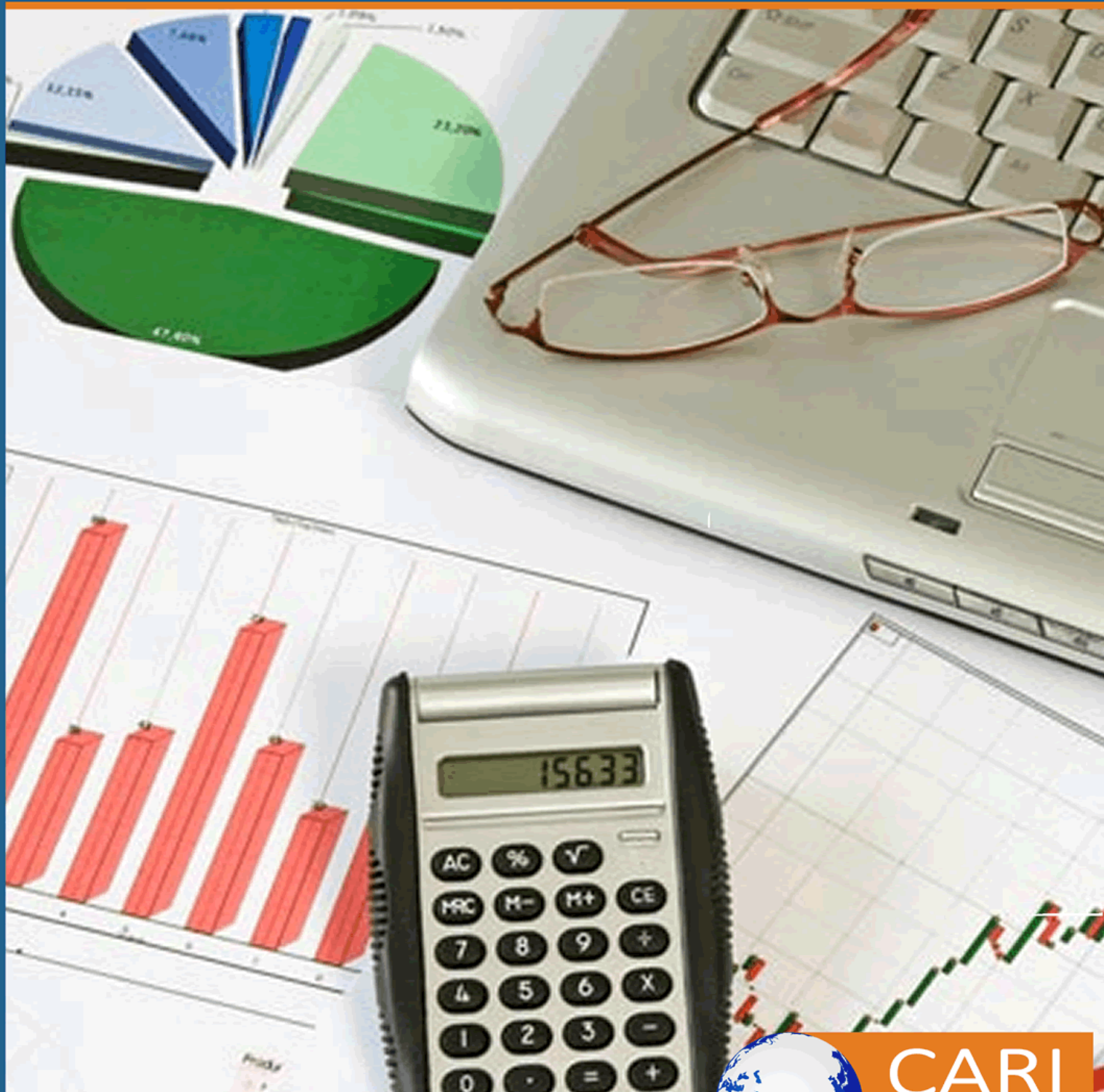

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Mixed Methods Research Design Explained

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Abstract

Purpose: This paper examined how research paradigms determine, among many other things, the types of data collected and the methods used to collect and analyze the data. The key differences and similarities between qualitative and quantitative approaches were identified, before explaining why and how mixed methods research is conducted.

Methodology: The paper reviewed extant literature touching on qualitative, quantitative, and mixed methods research designs.

Findings: The paper highlighted the conditions that favor the use of the mixed methods research design. In addition, the advantages associated with mixed methods research design were emphasized in the paper.

Unique Contribution to Theory, Policy and Practice: The paper pointed the need to consider a researcher's paradigm, ontology, epistemology, axiology, methodology, and methods when deciding the research design to adopt. The authors recommended greater adoption of the mixed methods research design among academicians and practitioners, especially when the research issues are multifaceted, broad, and complex.

Key words: *Paradigms, Qualitative Research, Quantitative Research, Mixed Methods Research, Research Design*

Introduction

Scholars and practitioners seeking to do research have to choose between adopting a purely qualitative or purely quantitative approach, or combining both in what is often termed as mixed methods research (Guetterman, Molina-Azorin, & Fetters, 2020). Each approach is based on a particular view of the world (paradigm), some assumptions about what needs to be known (ontology), the relationship between the investigator and the respondents (epistemology), and how to go about knowing what needs to be known (methodology).

When designing a study, particularly among the social scientists, Denzin and Lincoln (2017) recommend that a researcher should consider how his or her view of the world influences the research, interactions with the respondents, strategies adopted in the study, the role of the researcher's values, and the methods or tools used to collect and analyze the data. That way, a researcher will avoid contradictions in the design of a study. If this reasoning is privileged, there are clear differences and similarities between quantitative and qualitative studies. Owing to these differences, some researchers consider one approach to be superior to the other, which may be true depending on the nature of the investigation. In addition, some academic institutions recommend the use of the quantitative approach while ignoring the qualitative approach; others advocate the use of either approach, or a combination of both approaches, so as to cover the weaknesses of a single approach while building on the strengths of the two approaches (Johnson & Onwuegbuzie, 2004).

Research Paradigms

In order to enhance a better understanding of mixed methods research, it is advisable to examine some of the research paradigms that exist. A caution at this point is that social sciences are ridden with multiple interpretations and consensus is rarely achieved. At a basic level, a paradigm is a way of thinking and conducting research, a framework or view of the world for filtering knowledge, or an opinion held by a group of researchers based on their common values, concepts, assumptions, and practices (Guba & Lincoln, 2017). Paradigms are basically views or lenses through which an individual sees the world. In spite of their differences, several researchers indicate that the main paradigms are positivism, constructivism, critical theory, and realism, among many others (Easterby-Smith *et al.*, 2018). Each paradigm is based on a particular ontology, epistemology, methodology, methods, and the role of values (axiology). An understanding of how paradigms influence the research process, therefore, eliminates controversies in research design.

Ontology refers to what needs to be known, that is, the form and nature of reality, which is also the research problem that is being solved. On its part, epistemology refers to how the researcher and the respondents relate with each other during the research process. It is the process of knowing the solution to the problem and the role of values and theory in research. Methodology is concerned with the particular practices used to find out the truth, including the techniques of

collecting data, examples of which are case studies, surveys, and structured and semi-structured interviews. On their part, methods refer to tools used to collect and analyze data for a particular study, and they include focus group discussion questions, interview guides, and questionnaires (Creswell & Creswell, 2022).

Guba and Lincoln (2017) further recommend that researchers should be concerned with axiology, which simply refers to ethical behavior in research, especially the role played by a researcher's values in research. Quantitative research excludes the researcher's values from the research, while qualitative research acknowledges that the researcher's values play an important role in research. Ethical issues, including the role of values, are logical concerns since social sciences often deal with human subjects and animals (Schindler, 2021). Ethical behavior, therefore, ensures that no harm is caused to the researcher, research assistants, or the respondents (Bougie & Sekaran, 2020). In addition, researchers ought to concentrate on topics that are ethical. Among the methods used to ensure adherence to ethical behavior include getting authorization from the relevant bodies that control research in a country, and encouraging voluntary, non-discriminatory, and non-coerced participation in research (Babbie, 2019).

Participants should be informed of a study's purpose, procedures, risks, discomforts, and benefits before they take part in it (Bell, Harley, & Bryman, 2022), and they should have the liberty to withdraw from the research at any time of their choice without being subjected to any negative consequences. In addition, the identity of the respondents should be concealed, meaning that their privacy should be guaranteed through anonymity. A researcher should not deceive the respondents by deliberately misinforming them about the nature of the study, or exposing them to embarrassments and other painful emotional experiences. Researchers should also be truthful and honest, not fabricating, falsifying, or omitting any relevant data.

The research paradigms of positivism, constructivism, critical theory, and realism can be differentiated in terms of ontology, epistemology, methodology, methods, and axiology. The positivism paradigm holds that the aim of research is to discover truth that already exists. It assumes that truth, or the solution to what requires to be known, exits in a singular form and anyone can discover it using scientific means. The researcher's job, therefore, is to uncover that truth objectively. The researcher detaches himself or herself from the research through all possible means (Saunders, Lewis, & Thornhill, 2019). In addition, positivism advocates the existence of natural laws that define relationships among study variables (Crotty, 2020).

Ontologically, positivism assumes that there is a single and objective truth which does not depend on who researches on it. Epistemologically, the investigator and the respondents are separate and independent of each other, implying that the researcher does not have to influence, or be influenced, by the issue being investigated. The researcher plays a neutral role, without including his or her values in the study. Therefore, the research is value-free, enabling the findings of the research to be objective and generalizable. The findings are also theory-free. In

terms of methodologies, positivism is mainly used in quantitative studies where hypotheses are involved, hence experimental and manipulative methodologies tend to be ideal. These include surveys and experiments that facilitate direct measurements and observations of the issues being investigated (Guba & Lincoln, 2017).

The tools for data collection under positivism are mainly quantitative, with emphasis on questionnaires, measurements, scaling, and statistical analysis. However, some qualitative tools, such as focus group discussions and interview guides may be used, albeit rarely, with the data obtained being analyzed statistically. Positivism is mainly used for quantitative research where relatively larger samples are used compared to qualitative research, and the samples are selected statistically to ensure true representation of the population from which they are drawn; this enhances generalization of the findings. Nevertheless, positivism is criticized for assuming that people behave in rational ways, which is not always true. Impulse buying is an example of an irrational behavior. People differ in a wide variety of ways, meaning that they see, hear, smell, sense, and perceive everything in different ways, which makes it difficult to arrive at a consensus on any one issue

Constructivism, also known as naturalistic enquiry or interpretivism, holds the ontological view that there is no single reality or truth. Each person perceives or interprets situations (reality) in his or her own way, and individuals can interpret reality as a group. This implies that there are multiple realities, meaning that there are many ways of solving a problem. In addition, what can be considered to be knowledge depends on the situation, and this may change with time. Epistemologically, the researcher interacts with the respondents to jointly create the findings. The researcher's values influence the study, implying that it is value-laden. The investigator actively participates in the study, employing methodologies such as participant observations, ethnographies, in-depth unstructured interviews, discourse analysis, and focus group discussions to collect data. The tools for data collection include unstructured interview guides, focus group discussion questions, and observation schedules. Mainly qualitative data is collected (Babbie, 2019).

The critical theory is based on the ontological view that some realities, or social injustices, have been propagated historically based on cultures. For instance, some gender discrimination issues like women not inheriting property in some African cultures have been institutionalized through political, economic, and socio-cultural structures. The researcher and the respondents interact with each other in the process of the enquiry, and the perceptions of the researcher or team of researchers as well as those of the respondents are considered to be the reality. The researcher, who is considered a transformative intellectual, seeks to change the injustice using methodologies like focus group discussions. Critical theory relies mainly on unstructured interview guides to allow the respondents to provide all types of information, some of which emerge as the enquiry unfolds. Mainly qualitative data is collected.

The realism paradigm is also known as the critical realism, post-positivism, or neo-positivism. Ontologically, it holds that the world is too complex and human beings have too many limitations, making it difficult, if not impossible, to know or discover reality in totality (Saunders, Lewis, &Thornhill, 2019). A value-awareness approach is adopted, meaning that it acknowledges the role played by the values of all those involved in the research. The researcher, however, tries to maintain objectivity in order to increase the relevance of the research. Single or multiple cases are studied using qualitative methodologies like focus group discussions, participant observations, ethnographies, discourse analysis, in-depth semi-structured, and unstructured interviews as well as quantitative methodologies like surveys and experiments. Realism relies on questionnaires and interview guides to collect both quantitative and qualitative data.

Quantitative Research Design

Quantitative research uses numerical data to test theories or hypotheses, and to examine how variables relate to each other. A theory or hypothesis can be confirmed to be true, in which case the researcher relies on patterns in the data to make inferences on the population. This is an inductive way of reasoning. On the contrary, a theory or hypothesis can be dis-confirmed, in which case the researcher uses patterns in the data to formulate new hypotheses and theories, following a deductive way of reasoning (Schindler, 2021). The main paradigms guiding quantitative research are positivism and realism.

Creswell and Creswell (2022) opine that quantitative data is collected using experimental and non-experimental strategies. Experiments involve a control and treatment group, and their aim is to test cause-and-effect relationships. True experiments are mainly used in the natural sciences, but quasi-experiments are more common in the social sciences. Survey is a non-experimental strategy in which a researcher uses a sample of the population to collect data for a study. Quantitative data is mainly collected using structured interviews and surveys; the data is analyzed using mathematical models and statistical tools. Quantitative reports are often presented in impersonal, third person prose using numbers. For instance, a researcher can use a phrase like "the research findings indicate…" Quantitative research is cost-effective for investigating a wide range of issues, cases, people, and situations; it enables patterns to emerge from the data (Patton, 2002). The rigor and objectivity of a quantitative study increases its reliability and generalizability (Saunders, Lewis, & Thornhill, 2019).

Qualitative Research

Qualitative researchers are led by the interpretivism and constructivism paradigms (Crotty, 2020; Guba & Lincoln, 2017). Interpretivism implies that the researcher interprets reality as it unfolds, while constructivism argues that both the researcher and the respondents jointly create the findings. Qualitative research is used to formulate new theories and hypotheses, or to describe phenomenon, especially when scanty information exists about the phenomenon. This means that

it is mainly exploratory in nature (Hair, Page, & Brunsveld, 2019). In this case, exploratory implies venturing into social aspects that have not been adequately explored, such as people's cultures and experiences (Watkins, 2022).

In terms of ontology, qualitative research assumes that people differ widely hence there are multiple interpretations of situations, based on each person's perception of the situation (Guba & Lincoln, 2017). In addition, reality or knowledge is assumed to be constantly changing. This is to say that one cannot cross the same river twice because the water keeps flowing and every crossing is a totally different experience. Epistemologically, the researcher empathetically relates with the researched to jointly and mutually create the findings (Creswell & Creswell, 2022). Qualitative research emphasizes processes and meanings. Given that qualitative research is exploratory in nature, it seeks answers the 'what', 'why' and 'how' type of questions as opposed to the 'how many' or 'how much' type of question.

Some of the methods used to collect qualitative data include participants' observations, in-depth interviews, immersions into the world of the respondents, lived experiences, ethnographies, discourse analysis, document analysis (like reviewing newspapers, journal articles, etc.), audio-visual materials (e.g. videos, audio recordings), and focus group discussions. The researcher is an object of data collection in the sense that he or she interacts with the participants and observes them in the process of collecting the data. Data collection can pose serious challenges to the researcher, especially when he or she has to immerse himself or herself in a dangerous situation. Consider a researcher interested in understanding the behavior of drug addicts, sex workers, or criminal gangs. The subjects are studied in their natural settings and their responses do not have to be categorized, as happens in quantitative research.

Open-ended responses ensure that the researcher captures reality as perceived by the respondents. Ideally, the researcher examines all the data and identifies the themes emerging from it (Kiger & Varpio, 2020). Direct quotations capture the depth of the respondent's feelings, experiences, and thoughts (Patton, 2002). The samples selected do not have to be representative of the larger population. On the contrary, the samples comprise small numbers, or unique cases, purposefully selected on the basis of their information-richness. The researcher keeps interviewing the respondents until the point of saturation, also known as data redundancy, where themes repeat themselves and nothing new emerges (Hennink & Kaiser, 2019).

Qualitative researchers may not be interested in generalizing their findings beyond the particular group in which the research was conducted, although this can be considered to be a weakness (Johnson & Onwugbuzie, 2004). Nevertheless, it is possible to generalize the findings to similar situations. For instance, the causes of homelessness may be similar in a number of developing countries, especially when the countries are in the same continent. As the research progresses, the researcher uses his or her initiative to change the nature of the interrogations, depending on the direction taken by the study; unexpected variables may also emerge and be added to the

study. This implies an emergent approach. For instance, the researcher may start with an interview but decide to include observation as the investigation progresses. The data is presented in the form of texts, graphs, and pictures. The final report tends to be narrative and interpretative in nature, and it may contain lots of writings and direct quotations obtained from the expressions of the participants. These reports are then used to advance particular arguments or propositions. Nevertheless, it takes relatively longer to collect and analyze qualitative data and the results may be influenced by the investigator's perspectives (Young & Ryan, 2020).

Arguments Presented for the Use of Mixed Methods Research

Having examined the differences and similarities between quantitative and qualitative researches, a third paradigm known as mixed methods research emerges. Ideally, any research can be considered to fall in a continuum, with the extreme points being fully quantitative or fully qualitative (Johnson & Onwuegbuzie, 2004). A combination of both approaches, in whatever proportions, is referred to as mixed methods research (Tashakkori & Teddle, 2021). The exact nature of the combination depends on the research questions, the context of the study, and the practical issues being investigated. While it is common for some authors to refer to this combination as mixed methods approach (Leavy, 2023), Johnson, Onwuegbuzie, and Turner (2007), among many others, consider the term *mixed research* to be more appropriate since the differences go beyond just the methods.

Mixed methods research involves the collection, analysis, interpretation, and reporting of both quantitative and qualitative data, sequentially or concurrently, in a single investigation, or in a series of investigations, in order to understand problems better (Watkins, 2022). Concurrently implies that both approaches are used independently, while sequentially implies that one approach is used first followed by the other approach (Creswell & Plano Clark, 2018). Therefore, mixed methods research adopts a broader view of issues, meaning that it works in a synergistic or integrated manner to provide broader and deeper coverage of issues (Creamer, 2022). Breadth and generalizability are provided by the quantitative aspect, while the qualitative data is the basis for the depth of the study.

Mixed methods research bridges the gap between quantitative and qualitative research, particularly when the aim is to describe, explain, or evaluate a situation. Mixed methods researchers, therefore, combine the positive aspects of quantitative and qualitative researches to make better sense of the human and social world, particularly when the research issues are complex (Poth & Munce, 2020). It discovers what would have been missed had only one approach been used, and it provides a better picture of the research problem (Creswell & Plano Clark, 2018; Jick, 1979). For instance, qualitative research findings are not generalizable although they are a legitimate form of inquiry. Similarly, quantitative research may not capture some of the underlying explanations provided by the qualitative research.

The mixing is done in a way that complements the strengths of each approach while minimizing their individual weaknesses. For instance, the mixing of methods such as interviews, observations, and surveys can provide very useful and complementary or corroborated information. In essence, mixed method researchers argue that a research design is influenced by what a researcher wants to find out and not by any predetermined epistemological positions. Jonson and Onwugbuzie (2004) advice that investigators should embrace epistemological and methodological pluralism in order to conduct more effective research, given that contemporary research is increasingly becoming interdisciplinary, dynamic, and complex.

The mixing can be done at any stage of an investigation, such as at the research design, data collection, data analysis, and report writing stages, or in all of them (Tashakkori & Teddle, 2021). For instance, a researcher can use quantitative data to pick a representative sample and to identify outliers, or deviant cases, while qualitative data can be used to refine the tools used for data collection; all these can be done at the research design stage of an investigation. At the data collection stage, the quantitative investigation can provide objective and unbiased data which corroborates the qualitative findings. In this case, quantitative data collection methods, such as surveys, are combined with qualitative data collection methods like observations, in-depth interviews, and focus group discussions.

The data collection exercise can take several forms. One form is to collect quantitative and qualitative data concurrently in the same study, with equal priority being placed on both types of data (QUAN + QUAL); the plus (+) sign indicates concurrent activities (Creswell & Plano Clark, 2018). That may mean, for instance, designing an open and closed-ended questionnaire, or a questionnaire and an interview guide. A researcher can also use focus group discussions to obtain the qualitative data. After data collection, the researcher analyses the two types of data separately. The results of both approaches are combined and compared in order to identify any contradictions and similarities (Ngulube, 2022).

A second approach is to design a quantitatively dominant study that relies heavily on quantitative data and less on the qualitative data (QUAN + Qual research). In this case, the researcher begins by collecting quantitative data. Afterwards, qualitative data is collected and used to refine the findings associated with the quantitative data (Quan → qual); the arrow implies a sequential order of activities. It is also possible to start by collecting qualitative data before the quantitative data, or even to collect both types of data concurrently. This is suitable for studies based on the explanatory research design, with quantitative rigor being emphasized. Thirdly, a researcher can emphasize qualitative data (qualitatively dominant) rather than the quantitative data (QUAL+ quan research). Here, the researcher either collects both types of data concurrently, or he or she collects one type of data first followed by the other type. For instance, he or she can collect qualitative data and then validate it with the quantitative data (Qual→ quan); qualitative findings can be the basis for framing quantitative studies. In this case, standards for qualitative rigor have to be followed.

A researcher who does not use mixed methods research will have to use a purely qualitative or purely quantitative approach. Whichever type of data is emphasized, research rigor related to that dominant type of data must be maintained. Mixed methods research, therefore, implies using quantitative and qualitative data in a single study or in a series of studies, where one type of data is collected first and the other type collected afterwards, or both types of data are collected concurrently. Equal emphasis can be paid to both types of data, or one type is prioritized over the other.

In addition, the mixing can also be done at the data analysis stage, where the analysis can be done sequentially, depending on the type of data emphasized. For instance, a researcher who emphasizes quantitative data over qualitative data can follow the sequence of QUAN → Qual, while a researcher emphasizing qualitative data can follow the sequence of QUAL → Quan. Where the researcher gives equal weight to both types of data, the process can start with either. Creswell and Creswell (2022) summarize the main concerns of mixed methods research as the timing, weighting, mixing, and theorizing.

Greene, Caracelli, and Graham (1989) argue that mixed methods research is suitable for triangulating, complementing, developing, initiating, and expanding an investigation. Triangulation seeks to find convergence and corroboration of the results obtained by using the two approaches, where data from the two approaches is collected concurrently and given equal weight (Ngulube, 2022). Triangulation can occur at the levels of the data (i.e., when several sources of data are used in an investigation), investigator (when several investigators are involved in an investigation), theory (where several theories are used in an enquiry), and methods (where several methods are used to solve a problem) (Denzin, 1978). According to Jick (1979), triangulation enables researchers to develop greater confidence in the results of their enquiries, while also facilitating innovation in data collection methods. It also integrates several theories, including testing the complementarity of competing theories.

Triangulated data is thicker and richer, enabling contradictions to be uncovered. Researchers use triangulation to provide broad and comprehensive coverage of issues. On its part, complementarity is the process of verifying, illustrating, elaborating, and enhancing the findings obtained from one approach with those obtained from the other approach, thereby enabling the provision of a better picture of the issues being investigated. Development refers to the process of using the findings obtained from one approach to inform the other approach. For instance, an exploratory study using the qualitative approach can be the basis of a quantitative study.

The aim of initiation is to discover paradoxes and contradictions raised by different methodologies, thereby leading the researcher to reframe the research questions. Expansion implies broadening or expanding the breadth and content of the research, such as including new study variables, as a result of using different methodologies. For instance, while the quantitative approach collects data from a large number of respondents for purposes of generalizing the

findings, the qualitative data provides in-depth coverage of the research issues, using a relatively smaller number of respondents. This widens a study by expanding its breadth and depth.

Challenges of using Mixed Methods Research

Several challenges have been levelled against mixed methods research. Firstly, the collection of quantitative and qualitative data can be lengthy, costly, and time consuming for a researcher (Linnander *et al.,* 2019). This becomes more challenging when deadlines and limited time is involved. It may involve an interdisciplinary team of researchers as opposed to a single researcher – one team does the qualitative part while the other does the quantitative part. Secondly, the integration of the quantitative and qualitative data can pose serious challenges to novice researchers who lack guidelines on how to do it. The researcher should be knowledgeable on quantitative and qualitative research methodologies, and be able to contrast and compare the findings from both approaches (Tashakkori & Teddle, 2021). Thirdly, the two approaches are based on different paradigms, and the findings from one approach may contradict those of the other approach. This might create problems related to paradigms, reliability, and validity of the findings.

Conclusion and Recommendations

This article sought to explain how a research design is determined by a researcher's paradigm, ontology, epistemology, axiology, methodology, and methods. The paper reviewed extant literature in the areas of qualitative, quantitative, and mixed methods research designs. The authors explained a systematic line of thought that can guide researchers when selecting the appropriate research design to adopt. This systematic reasoning can avoid contradictions in the design of a study, an example of which is collecting qualitative data where the researcher is a positivist. The paper concludes that a researcher can choose to conduct a purely qualitative or purely quantitative study, or combine the two approaches in the form of a mixed methods research design. All of them are valid research approaches, with the mixed methods research design having more strengths as explained in the paper.

This article makes a number of recommendations, based on the literature reviewed. Firstly, given the strengths of both the qualitative and quantitative research designs, it is advisable for educational institutions to include both approaches in their curriculum, as opposed to emphasizing only one approach. This would include taking learners through the qualitative and quantitative research approaches, each being taught as a unit on its own, or both being emphasized in the process of the learning. Secondly, a researcher considering the use of mixed methods research design should be able to justify that choice, besides being competent enough to handle the challenges associated with mixed methods research studies. Thirdly, there should be no contradictions on the paradigms, data collection and analysis approaches, sampling procedures, and research designs associated with each particular approach. The researcher should

be certain that the issues being investigated are best suited for mixed methods research, meaning that they cannot be solved by using a single approach.

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