

Explanatory Sequential Mixed Method Design as the Third Research Community of Knowledge Claim

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Abstract Educational fraternity is moving towards research based practices to improve educational standards. Many novice educational researchers are in dilemma to adopt research design in order to explore reality through their research endeavor because of a tag of war on ontological epistemological and axiological perspectives among qualitative and quantitative researchers. In this confounding situation, this article guides them to fuse both qualitative and quantitative stand points to explore reality from another perspective which is known as pragmatic paradigm. In this connection, this article aims at explaining the holistic ideas of mixed method design focusing particularly on philosophical premises, generating research questions, data collection and analysis process, potential ethical issues, quality of inference and teaching mixed methodology. This article highlights on the growing interest of educational researchers on sequential mixed method design in order to collect and analyze data for legitimize knowledge claim. This article is expected to be useful to novice researchers who are in quandary to adopt explanatory sequential mixed method as a research method and it also creates a roadmap in educational research indicating methodological possibilities for new knowledge claim.

Keywords: *Mixed Method Design, Philosophical Premises, Generating Research Questions, Data Collection and Analysis, Ethical Issues, Quality of inference and Teaching Mixed Methodology*

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1. Introduction

The Educational researchers are still in dilemma to choose a particular methodological stand point to approach a research problem. They often find difficulties to choose possible alternative methods to carry out their research work. This confusing state has been created sometimes because of conflicting situations in paradigm. In this context, Denzin and Lincoln [4], Geven [6], Tashakkori & Teddlie [13,14], Bryman [20], Ritchie and Lewis [21] and Klenke [22] state that there are three communities of researchers in the educational field: qualitative oriented methodologists, quantitative oriented methodologists and mixed methodologists. Based on their knowledge claim they are constructivists, positivists and pragmatists respectively. The positivist believes that the knowledge is universal and absolute whereas the later believe that there may be more than a fixed knowledge and it is fallible in the universe by non-positivism thought. Based on their knowledge claim, positivists adopted quantitative method to state reality in the world whereas constructivists espouse qualitative method to construct the meaning of the phenomena under investigation. Pragmatism on the other hand, embraces mixed method as the third research community in order to avoid either or view of positivism and constructivism.

Here every educationist raises a question: Which method is appropriate to claim reality in the educational field? To find the answer of this question, I read several issues in the three communities and found that the answer is still unsolved and left for the future researcher? This gave a new insight into the lane of my mind to further inquire some questions in order to create arguments within the existing body of knowledge. Can positivists or constructivists alone explore the entire reality of phenomenon under educational vicinity? Cannot we combine them into one to claim reality which could be more valid and reliable than single approach? These questions led me towards mixed method tradition to review its tradition.

The mixed methods research tradition is less well known than QUAN or QUAL traditions because it has emerged as a separate orientation during only the past 20 years. Mixed methodologists present an alternative to the QUAN and QUAL traditions by advocating the use of whatever methodological tools are required to answer the research questions under study. In fact, throughout the 20th century, social and behavioral scientists frequently employed mixed methods in their studies and they continue to do so in the 21st century, as described in several sources [1,7,13].

As Tashakkori & Teddlie [13] defined mixed method as 'a types of research design in which QUAL and QUAN approaches are used in types of questions, research methods, data collection and analysis procedures and

inferences' (p. 711). In this regard, it would be worth effective to mention Teddlie & Tashakkori [14] as they say mixed method research provides better inferences and minimizes unimethod bias. Many researchers select mixed method in order to search out the opportunity for a greater assortment of divergent views. Many researchers are worried to answer the question: What happens if the QUAN and the QUAL components lead to two totally different conclusions? According to Erzberger and Prein (1977 as cited in [14]), 'divergent findings are valuable in that they lead to a reexamination of the conceptual frameworks and the assumptions underlying each of the two components' (p.35).

The review of tradition on mixed method above underscores the fact that it has been a growing interest educational researcher to avoid methodological bias in order to better understand the reality of the phenomenon being investigated. Many mixed methodologists [5,9,14,20,21] claim mixed method as the best paradigm of research because of a number of reasons. First of all it gives a paradigm that philosophically embraces the use of mixed model designs. Secondly, it eschews the use of metaphysical concepts that has caused much endless discussion and debate. Finally it presents a very practical and applied research philosophy. If this design is the best for educational research, why are educational researchers reluctant to use it widely in their research process? The literature above also claims that out of six mixed method design, explanatory sequential design is popular among educationists. My question is: Why have not they used it as a method in their research? Is it because they understand what aspect of it not the how aspect? In this backdrop, Creswell et al [2] say that despite its popularity and straightforwardness, this mixed-methods design is not easy to implement. Researchers who choose to conduct a mixed method explanatory sequential study have to consider certain methodological issues. Such issues include the in implementing MM designs. Priority or weight given to the quantitative and qualitative data collection and analysis in the study, the sequence of the data collection and analysis, and the stage/stages in the research process at which the quantitative and qualitative phases are connected and the results are integrated [2,8]. Although these issues have been discussed in many books, some methodological aspects of this design procedure still require clarification. For example, how researchers decide on which method to assign priority in this design, how to consider implementation issues, how and when to connect the quantitative and qualitative phases during the research process, and how to integrate the results of both phases of the study to answer the research questions.

The gap above in the existing body of literature on mixed method explanatory sequential design led me to explore some more practical guidelines in solving those issues which could help researchers to make the right and prompt decisions when designing and implementing mixed-methods explanatory sequential studies.

2. Philosophical Premises of Mixed Method Design

Klenke [22] points out that each paradigm makes assumption about the nature of reality or ontology, how

knowledge is constructed or epistemology, and assumes that the values (axiology) a researcher brings to selection of method, participants, data collection, analysis and interpretation influence the research process. As we go through Tashakkori and Teddlie [14], Bryman [20], and Ritchie and Lewis [21] we come to know that ontologically, the pragmatist believes that there is an external world independent of our minds. On the other hand pragmatists deny that 'truth' can be determined once and for all. Pragmatism rejects either-or view on constructivism and positivism, rather embraces both points of view. It believes that researchers may be both objective and subjective in epistemological orientation over the course of studying research question. On the axiological ground pragmatists believe that inquiry is value free. They believe that values play a large role in conducting research and drawing conclusions from their studies. Regmi [11] writes that pragmatic research is driven by anticipated consequences. Pragmatic choices about what to research and how to go about it are conditioned by where we want to go in the broadest senses.

3. Generating Research Questions for Mixed Method Design

Once the objectives of a research study are enunciated, researchers can drive specific questions and hypotheses. As Tashakkori & Teddlie [14], Bryman [17,20], and Ritchie and Lewis [21] state that mixed methods research questions are concerned with unknown aspects of a phenomenon and are answered with information that is presented in both numerical and narrative forms. They further clarify that a unique aspect of any given mixed method study is that it requires at least two research questions (one QUAN, one QUAL). In this respect, Creswell [3] also argue that research questions are important than methodology in mixed method design. This indicates that research questions drive the selection of research methods, which are often mixed method in nature the complexity of those research questions. In this context, Bryman [17] commented on the centrality of the research question and said:

One of the chief manifestations of the pragmatic approach to the matter of mixing quantitative and qualitative research is the significance that is frequently given to the research question... This position with regard to the debate about quantitative and qualitative research prioritizes the research question and relegates epistemological and ontological debates to the sidelines. In doing so, it clears the path for research that combines qualitative and quantitative research. (p. 118).

Perhaps the most difficult intellectual exercise that individuals undergo in conducting their own research is the generation of researchable questions in a content area of interest. The process is even more complicated in mixed method research because these researchers typically want to integrate the QUAN research questions with QUAL research questions. After reviewing many mixed research studies, I found a suitable research questions in the work of Teddlie and Stringfield [16]. These researchers conducted a longitudinal mixed method study in which they examined school and classroom processes in eight

matched pairs of differentially effective elementary schools. Following were some of the research hypotheses for their study:

Research Hypothesis 1: Classrooms in more effective schools will have higher time- on-task than will classroom in less effective schools.

Research Hypothesis 2: Classrooms in more effective schools will have better discipline than classrooms in less effective schools.

Research Hypothesis 3: Classrooms in more effective schools will have a friendlier ambience than classrooms in less effective schools.

They tested these hypotheses using QUAN data gathered in the classrooms by trained observers. These results were interesting to the researchers but they were equally interested in how the relationship between effective schooling and teaching occurred. Consequently, they set out to study the relationship between school and teacher effectiveness processes using the following QUAL research questions:

Research Question 1: How are teachers selected at more effective schools as opposed to less effective schools?

Research Question 2: How are teachers socialized at more effective schools as opposed to less effective schools?

Research Question 3: What are the differences in school- level academic leadership in more effective schools as opposed to less effective schools?

Research Question 4: What are the differences in school- level faculty cohesiveness in more effective schools as opposed to less effective schools?

The discussion above draws attention to some of the attributes of mixed method research questions. A relatively unexplored issue remains to be investigated: How should we frame research questions in a mixed method study? Two general approaches are found in the current literature: 1) a single question that is overarching in nature and incorporates both the QUAN and QUAL sub questions or 2) separate QUAN and QUAL questions, followed by a question regarding the nature of integration [18].

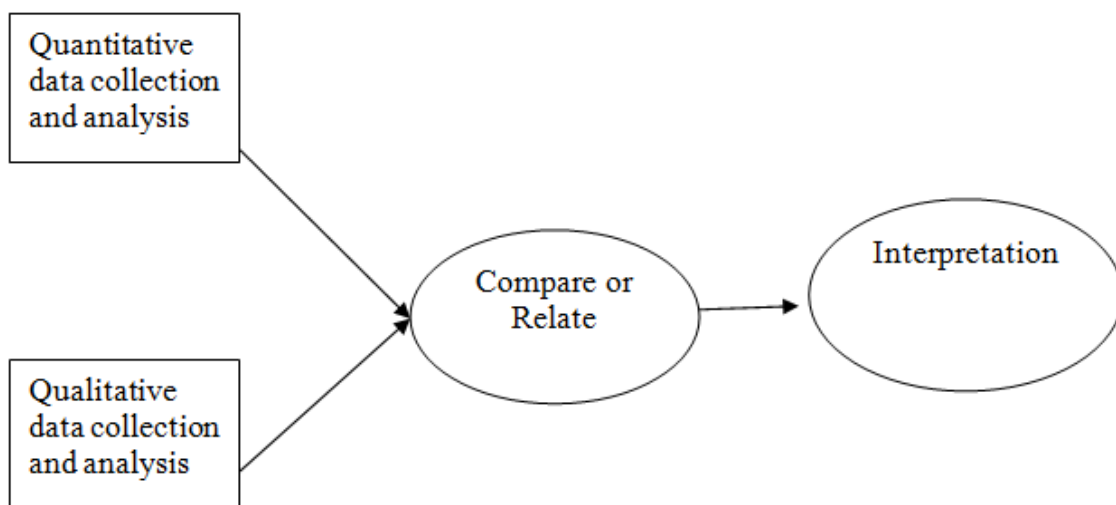
The first approach entails first proposing an overarching mixed research question and then expanding it into separate QUAN and QUAL sub questions. We believe that in most mixed method studies an overarching question is necessary for justifying the choice of a mixed method design for the study and paving the way for alignment of the purpose and question. For example, a researcher might ask the following questions: What are the effects of intervention package X on the behavior and learning of groups A and B? Anyone can easily understand why this question necessitates a mixed method design. Such a question might be followed by three sub questions: Are groups A and B different on variables Y and Z? What are the perceptions and constructions of participants in groups A and B regarding intervention package X? Why does intervention package X work differently in the two groups? The sub questions are answered in separate strands of the study.

The second approach according to Creswell and Plano Clark [18] includes separate QUAN and QUAL questions followed by an explicit question about the nature of integration. For example, an investigator might ask: “Do the quantitative results and the qualitative findings converge?” or “How do follow up qualitative findings help explain the initial quantitative results?” (p. 107)

Data Collection and Analysis in Various Mixed Method Designs

As we go through Creswell [3], we come to know six types of mixed method design. They are: the convergent parallel design, the explanatory sequential design, the exploratory sequential design, the embedded design, the transformative design and the multiphase design.

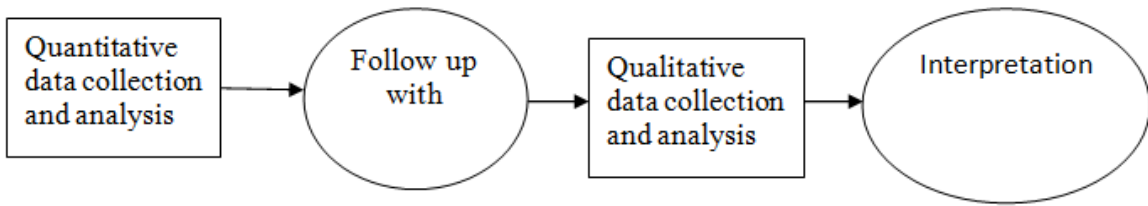
Creswell [3] says that the researcher in the convergent parallel design, gathers both quantitative and qualitative data, analyzes both datasets separately, compares the results from the analysis of both datasets, and makes interpretation as to whether the results support or contradict each other. The direct comparison of the two datasets by the researcher provides a convergence of data sources.



Convergent Parallel Design

An explanatory sequential design according to Plano Clark (2011) consists of first collecting quantitative data and then collecting qualitative data to help explain or elaborate on the quantitative results. The rationale for this

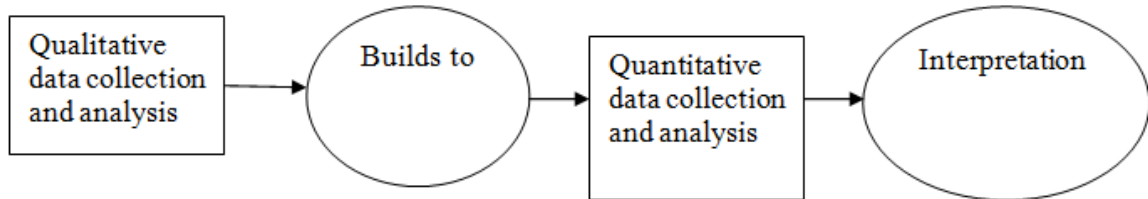
approach is that the quantitative data and results provide a general picture of the research problem; more analysis, specifically through qualitative data collection is needed to refine, extend or explain the general picture.



Explanatory Sequential Design

In exploratory sequential design, according to Creswell and Plano Clark (2011) explain that the researcher first collects qualitative data and then quantitative data. The purpose of an exploratory sequential mixed methods

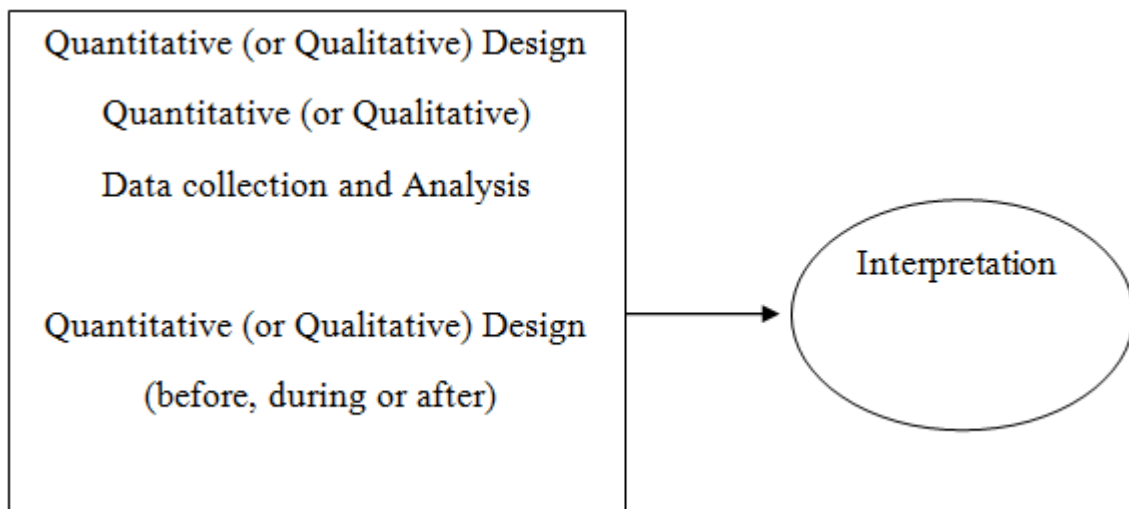
design involves the procedure of first gathering qualitative data to explore a phenomenon and then collecting quantitative data to explain relationships found in the qualitative data.



Exploratory Sequential Design

The purpose of embedded design, as Creswell and Plano Clark (2011) state; is to collect quantitative and qualitative data simultaneously or sequentially, but to have one form of data play a supportive role to the other form

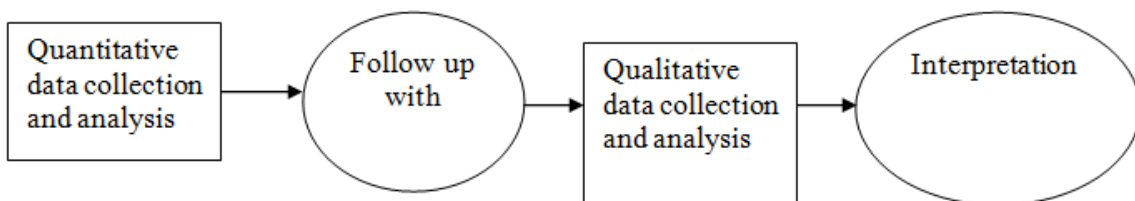
of data. The reason for collecting the second form of data is that it arguments or supports the primary form of data. The supportive data may either qualitative or quantitative.



Embedded Design

The intent of the transformative mixed methods design, as Creswell and Plano Clark (2011) state; is to use one of the four designs (convergent, explanatory, exploratory or embedded), but to encase the design within a transformative framework. This framework provides an orientating lens for the mixed method design. it informs

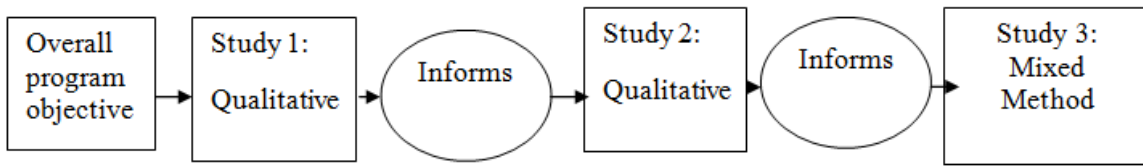
the overall purpose of the study, the research questions, the data collection and the outcome of the study. The intent of the framework is to address a social issue for a marginalized or underrepresented population and engage in research that brings about change.



Transformative Design

Like the transformative design, the multiphase design is a complex design that builds on the basic convergent, explanatory, exploratory and embedded designs. Multiphase mixed methods designs occur when

researchers or a team of researchers examine a problem or topic through a series of phases or separate studies (Creswell and Plano Clark (2011)).



Multiphase Design (Source: Creswell ([3], p. 541))

Out of six mixed method designs explained above, the explanatory sequential design is highly popular among researchers. In this design, according to Plano Clark (2011) consists of first collecting quantitative data and then collecting qualitative data to help explain or elaborate on the quantitative results. The rationale for this approach is that the quantitative data and results provide a general picture of the research problem; more analysis, specifically through qualitative data collection is needed to refine, extend or explain the general picture. As discussed earlier, this design consists of two distinct phases: quantitative followed by qualitative [2]. In this design, a researcher first collects and analyzes the quantitative (numeric) data. The qualitative (text) data are collected and analyzed second in the sequence and help explain or elaborate on the quantitative results obtained in the first phase. The second, qualitative phase builds on the

first, quantitative phase, and the two phases are connected in the intermediate state in the study. The rationale for this approach is that the quantitative data and their qualitative data and their analysis refine and explain those statistical results by exploring participants view in more depth. The ideas expressed above by Creswell [2] may not be explicit to the novice researchers in the field of education. Then the question is: How can the process of explanatory sequential design be more pragmatic to the novice researchers? The literature above is silent on procedure and product under each phase of the explanatory sequential design. After reviewing possible books and articles on explanatory sequential designed, I came to the following process in order to make holistic process of it more realistic. The holistic idea can be shown in the following tabulated form.

Phase	Procedure	Product
Quantitative Data Collection	Cross sectional survey	Numeric data
Quantitative Data Analysis	Use of descriptive and inferential statistics	Meaningful measures
Connecting Quantitative and qualitative Phase	Selection of participants purposefully and interview questions development	Interview protocol
Qualitative Data Collection	In- depth interview	Textual data
Qualitative Data Analysis	Coding and thematic analysis Theme development cross thematic analysis	Codes and themes similar and different themes and categories cross thematic matrix
Integration of the Quantitative and Qualitative results	Interpretation and explanation of the quantitative and qualitative result	discussion implication future research

4. Process for Selecting an Appropriate Mixed Methods Design

As we discussed earlier, there are six mixed method designs and they require certain strategies in order to claim new knowledge. Typology of mixed method design causes difficulties to the novice researchers to choose the best one which addresses their research problems. This leads to a research for literature which can solve the problem of selecting an appropriate mixed method design out of many for the research endeavor. This has been a hurdle for novice educational researchers to choose mixed method in their research as a methodology. This has also been a main cause of choosing either quantitative method or qualitative method by the novice educational research in their research. To solve this problem many mixed method researchers (like [1,5,7,9,14,20,21]) have created a large body of literature on their works. After reviewing their works, I found Tashakkori & Teddlie [14] appropriate to explain the steps in selecting an mixed method design that best fits the requirements of the investigator's research questions. According to them the following steps take the researcher from the determination of the appropriateness of a mixed method design to the selection / development of the best mixed method research design for a study.

1. The novice researchers must first determine if their research questions require a mono method or mixed method design. Here, Tashakkori & Teddlie [14] want to make it clear to the novice researchers that step 1 decision is made primarily on the nature of the research questions and whether both QUAL and QUAN data are required to answer those questions. If all of the research questions can be answered by either QUAN data or QUAL data then a mono method design is more appropriate.
2. The novice researchers should be aware that a number of typologies of mixed method research design exist, and you should know how to access details regarding them. Here they mean, the novice researchers have to gather a lot of information on typologies of mixed method research design
3. Select the best available mixed method research design for your study, but you realize that you may have to eventually generate your own. Here they mean researchers' job is to recognize all the possible typologies of mixed method research design but they are free to choose the most appropriate or single best available research design rather than the perfect fit.
4. The novice researchers need to be aware of the criteria emphasized by each of the mixed method design typology and of their implications for their study. To make this step explicit, I want to quote Creswell et.al [19] as they used four criteria: implementation, priority, stage of integration and theoretical or ideological perspective. These criteria identify the important components of the typology.
5. The novice researchers should list the general criteria before they select the specific criteria that are most important to their study. Here they mean to say that there are general criteria in each typology based on implementation, priority, stage of integration and theoretical or ideological perspective. The researchers should make their mind up on them before they go for any specific criteria.
6. Apply the selected criteria to potential designs, ultimately selecting the best research design for your study. Here they mean to say that any research must determine which research design is most in accordance with the desired qualities on the selected criteria. For example, if you believe that QUAL research will play the dominant role in your study, then you should select a design that emphasizes it. If theoretical or ideological perspective is important then you may use transformative designs.
7. In some cases, you may have to develop a new mixed method design, using flexibility and creativity, because no one best design exists for your research project, either when it starts or as it evolves.

5. Potential Ethical Issues in Mixed Methods Research

Since mixed methods research combines quantitative and qualitative research, ethical considerations need to attend to typical ethical issues that surface in both forms of inquiry. Quantitative issues relate to obtaining permissions, protecting anonymity of respondents, not disrupting sites and communicating the purposes for the study, avoiding deceptive practices, respecting vulnerable populations, being aware of potential power issues in data collection, respecting indigenous cultures, not disclosing sensitive information, and masking the identities of participants. Creswell [3] has mentioned the following ethical issues in mixed methods designs. They are:

- In a convergent design, the quantitative and qualitative sample sizes may be different. Care needs to be taken to not minimize the importance of a sample because of its size.
- In an explanatory design, researchers may use a large quantitative database for the initial phase of the research. In order to follow up on these individuals with qualitative interviews, there needs to be an identifier linked to the quantitative database. Some individuals may not want their quantitative data released. Using names without permission constitutes an ethical mixed methods issue
- In an embedded design, conducting initial qualitative interviews to build an intervention before an experiment may be helpful in designing the intervention. However, using the initial interview data to place to place participants into a control group where they do not receive a beneficial treatment presents an ethical issue.

6. Quality of Inference

Mixed methodologists prefer to use quality inference to avoid either or perspectives of quantitative and qualitative research for addressing trustworthiness or reliability and validity issues.

Tashakkori and Teddlie [14] have proposed the strategies for reducing and / or dealing with possible threats to inference quality. According to them random assignment to groups, matching, homogeneous grouping, comparing individuals with themselves, statistical control and double blind procedures are strategies for reducing and / or dealing with possible threats to inference quality in quantitative part.

Trustworthiness is a global qualitative concept introduced by Lincoln and Guba (1985). They have introduced four criteria (Credibility, transferability, dependability and conformability) that collectively could be combined to determine the trustworthiness of an inquiry. Different methods such as prolonged engagement, persistent observation, use of triangulation techniques, peer debriefing, negative case analysis, referential adequacy, member checks, thick description, dependability audit, conformability audit and reflective journal for determining the trustworthiness are strategies for reducing and / or dealing with possible threats to inference quality in qualitative part.

7. Teaching of Mixed Methodology

Many research teachers around the world have been developing syllabuses for teaching mixed methodology and sharing their best practices assuming common concerns for research teachers. In this perspective, many educational research teachers are raising a number of questions? What could be the ideal syllabus to teach mixed methodology? How can we develop an effective syllabus for teaching mixed methodology? What types of competencies are needed in a mixed method course? In this regards, Tashakkori and Teddlie [14] advocate Natalya Ivankova's syllabus as an excellent answer. The syllabus comprises required competencies in the form of 12 expected course outcomes:

1. Understand the philosophical assumptions underlying the use of mixed methods research.
2. Articulate the key characteristics of a mixed method research study.
3. Use appropriate search terms for locating mixed methods research studies using computerized databases.
4. Understand and explain the rationale for using a mixed methods research approach in a study.
5. Understand and explain the major types of mixed methods research designs; their strengths and weaknesses.
6. Develop a purpose statement and research questions for a mixed methods research study.
7. Summarize types of data that are often collected in mixed methods research and be able to distinguish between qualitative and quantitative.
8. Summarize the data analysis strategies within mixed method research design.

9. integrate or mix quantitative and qualitative data within mixed methods research design
10. Report and evaluate mixed methods research studies
11. Draw a visual model of mixed methods procedures used in the study
12. Apply the steps in designing a mixed methods research study and develop a mixed methods study proposal.

8. Conclusion

This paper highlighted the critical debate on choice of paradigm in educational research in order to claim new knowledge exploring signature literature on explanatory sequential mixed method design as the third research community of knowledge claim. The roadmap of a research is created on the basis of researchers' orientation on his philosophical premises like his/her ontological epistemological and axiological positions for his or her research endeavor. In this process, novice researchers who are in dilemma to adopt mixed method design because of the fear of divergent findings get better insight from this article. This article guides them through philosophical premises generating research question, data collection and analysis process, potential ethical issues, quality of inference and teaching mixed methodology. After reviewing several books and journals in mixed method design, I came to this point of understanding that there has been a growing interest of educational researchers for philosophical, metaphorical and practical reasons to adopt pragmatism to avoid methodological bias in order to better understand the reality of the phenomenon being investigated. Philosophically, pragmatists reject either or view on constructivism and positivism rather embraces both points of view. Epistemologically, pragmatism embraces both objective and subjective perspectives in order to answer research questions with value free inquiry. Mixed method research focused on two general approaches for generating research questions that is either single question which incorporate both QUAN and QUAL sub questions or separate QUAN and QUAL questions. There are six possible designs under mixed method to collect data. Out of these the explanatory sequential design is highly popular among researchers. In this design a researcher first collect quantitative data followed by qualitative and integrate both data in order to come to the conclusion. Mixed methodologists prefer to use quality inference to avoid either or perspectives of quantitative and qualitative research for addressing trustworthiness or reliability and validity issues. While adopting syllabus for teaching mixed method methodology if we adopt Natalya Ivankova's syllabus as advocated by Tashakkori and Teddlie [14] then we can properly track our students towards right direction in mixed method design.

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