Abstract - This interactive pre-conference workshop builds on a workshop offered at FIE 2010 that provided an introduction to mixed methods research and the concept of mixing. The workshop aims to advance the use of mixed methods research in engineering education by delving into quantitizing as one strategy for mixing qualitative and quantitative data during the process of data analysis. Quantitizing refers to the process of assigning numerical values to qualitative data collected through interviews or through participant observation. A typology of different techniques for quantitizing will be shared along with examples from the engineering education research literature. Participants will have the opportunity to work in small groups to consider different strategies for quantitizing qualitative data they have collected and to develop examples of the different ways to mix or merge qualitative and quantitative data. The purposes and rationale for using this strategy will be discussed, along with consideration of the paradigmatic objections raised about data transformation.

Index Terms – mixed methods research, research, methodology, engineering education

BACKGROUND INFORMATION

Mixed methods research is described in contemporary definitions as both a method and methodology. Creswell and Plano Clark, authors of a widely used textbook [1], define mixed methods research as:

Mixed methods research is a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and the analysis of data and the mixture of qualitative and quantitative approaches in many phases in the research process. As a method, it focuses on collecting, analyzing, and mixing both qualitative and quantitative data in a single study or series of studies. (p. 5)

Mixed methods studies are differentiated from studies where multiple forms of either qualitative (e.g. word oriented and emergent) or quantitative (numbers and deductive) are collected [1]. Mixed methods research has both an inductive and deductive component that offer the opportunity to conceptualize a research project in a way where theory and hypotheses can both be developed and tested. Reviews of the literature indicate that in practice results from the analysis of quantitative data often takes precedence, with the qualitative data often being used more for “human interest” and “window dressing.” Countering the notion of projects that are conceptualized from the onset as mixed methods research, some researchers turn to mixed methods after an initial round of analysis is completed in order to explain contradictory findings.

Reflecting epistemological underpinnings in the notion of triangulation, the concept of mixing is central to the methodological assumptions of mixed methods research. Mixing is the explicit relating of qualitative (e.g. words) and quantitative (e.g. numbers) data [1]. Integration is another word for mixing. The concept of triangulation is often evoked in discussions about mixed methods, but its focus on convergence in classical definitions makes it inappropriate as a foundational assumption [2]. Mixing can occur at any stage of a research project. It can range from simple connection by, for example, using results from a questionnaire to pick a sample of participants for a follow-up interview or, at a more sophisticated level, to develop a predictive theoretical model by merging or embedding the two types of data. At its best, mixing fits pluralistic discourse because it invites a dialectical perspective that engages different interpretations [2].

Of particular interest to this pre-conference workshop are strategies for the concurrent mixing of qualitative and quantitative data during the process of data analysis. This is arguably where mixed methods research has the greatest opportunity to advance knowledge of theoretical explanations for complex problems. Researchers have coined the expression “mixed model research” to differentiate research designs that explicitly set out to blend or merge the two types of data from other projects that merely employ both types of data [3]. These projects often involve a form of data transformation that is achieved through the process of either quantitizing or qualitizing data. Quantitizing refers to the process of assigning numerical values to data collected through interviews, observation, or media analysis [4]. Qualitizing refers to integrating quantitative data to produce case studies or narratives. Although it is not required, mixing of qualitative and quantitative data is often accomplished through data transformation.
A variety of strategies are used to mix qualitative and quantitative data. At the most basic level, the two types of data or juxtaposed or linked, but no data transformation is conducted. This would be the case, for example, if quotes from interview data were selected to illustrate different dimensions of a quantitative dependent variable, such as wellbeing or satisfaction. Another example of this basic level of mixing would be the sorting of intensity matrix that shows the presence or absence of selected categories of variables in interview transcripts with a dependent variable of interest. This type of strategy for mixing readily lends itself to visual displays through tables and figures that allow for conclusions and interpretations to be drawn, but not confirmed through any statistical procedures.

Under certain conditions, transformation of qualitative data to a numerical measure can make it possible to demonstrate a relationship, point to causality, and provide predictions. This can occur, for example, by developing a scaled variable from qualitative data that reflects a low-, medium-, and high-level presence of a variable, like well being, “fit”, or certainty about a career choice that can be linked to a quantitative index. This allows the use of statistical procedures to test the significance of relationships and potential for prediction.

There are a number of fairly substantial obstacles to data transformation, including paradigmatic objections about the commensurability of the two forms of data [5]. Procedures for data transformation probably require more changes to procedures typically used in qualitative research, than those used in quantitative research. To allow for meaningful data transformation, qualitative researchers would be required to move away from small purposive samples of participants to larger samples, which are intentionally structured to capture a range of manifestations of the dependent variable, including its absence. This requires a paradigm shift that some qualitative researchers will find challenging.

GOALS OF THE WORKSHOP

The over-riding purpose of the workshop is to advance the understanding of mixed methods research among engineering educators. The primary goals of the workshop are to:

1. To provide foundational information about the definition and purposes of mixed methods research designs.
2. To introduce the concepts of quantizing and qualitzing.

3. To illustrate a typology of different strategies for mixing or integrating qualitative and quantitative data.
4. To provides examples of different strategies that have been used to integrate qualitative and quantitative data in the engineering education research literature.
5. To acquaint participants with different strategies for quantitizing qualitative data.
6. To familiarize participants with some of the challenges and controversy involved in designing mixed methods research projects.
7. To help participants envision how they might design a mixed methods research project that includes data transformation.

OUTCOMES OF THE WORKSHOP

Participants completing this workshop will (1) have an understanding of the key distinguishing characteristics of mixed methods research designs, (2) be familiar with different strategies that can be used to integrate qualitative and quantitative data, (3) envision different ways to display the results of data transformation and (4) have a proposal for ways to mix qualitative and quantitative data in their own area of research.

CONTACT INFORMATION

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REFERENCES