CHAPTER THIRTEEN
MIXED METHODS RESEARCH

Chapter Objectives:

• Understand the purpose and premise underling mixed methods and evaluation research
• Understand how mixed methods research combines quantitative and qualitative methods
• Understand the difference between concurrent and sequential mixed methods designs.
• Understand triangulation and embedded procedures for concurrent mixed methods
• Understand explanatory and exploratory procedures for sequential mixed methods

Purpose and Premises

• *Mixed methods research* provides a new angle from which to conduct systematic, empirical inquiry. It combines and integrates quantitative
and qualitative methods in a single study.

The purpose of mixed methods research is to fully investigate a problem by drawing on quantitative measures to determine frequencies and relationship of variables as well as on qualitative tools to provide insight into meaning and understanding. It combines qualitative and quantitative methods in a way that emphasizes the strength of each method and avoids overlapping weaknesses. It involves the recognition that all methods have their limitations as well as their strengths. The fundamental principle is followed for at least three reasons: (a) to obtain convergence or corroboration of findings, (b) to eliminate or minimize key plausible alternative explanations for conclusions drawn from the research data, and (c) to elucidate the divergent aspects of a phenomenon. (p. )"

Some mixed methods research weighs the qualitative and quantitative strands equally, while others weigh one strand more heavily than another. It is important to distinguish mixed-methods designs from multiple (multi-) methods research that uses more than one method of data collection and analysis within the same research tradition. For example, ethnographies and case studies use interviews observations, and documents. Similarly quantitative studies may depend on both surveys and measures of academic achievement. A unique feature of mixed methods research is that qualitative and quantitative data are separately collected and analyzed and are then brought together in a final interpretation in what are known as meta-inferences or integrated mixed inferences. (Tashakkori and Teddlie, 2003).
The philosophy that undergirds mixed methods research is *pragmatism*, which is a quintessentially American philosophy advocated by William James, Pierce, and James Dewey that proposed that the value of an inquiry can best be judged by its practical consequences. Mixed-methods research fits the pragmatic idea because it makes practical use of both induction and deduction to achieve understanding and explanation (Johnson & Onwuegbuzie 2004, p. 14).

**Designs and Procedures for Data Collection and Analysis**

There are two basic mixed methods designs: concurrent and sequential.

**Concurrent Designs and Procedures**

- *Concurrent mixed methods designs* "are those in which the researcher converges or merges quantitative and qualitative data in order to provide a comprehensive analysis of the research problem" (Creswell, 2009 p. 228).

There are two procedures for data collection and analysis in concurrent designs: triangulation and embedded. Each is represented in a graphic below
In this procedure, there is one data collection phase in which the qualitative and quantitative data are collected simultaneously, and there are two separate analyses of the qualitative and quantitative data. In the interpretation phase, the findings are either merged, or they are compared in a discussion section. In this procedure the qualitative and quantitative strands are usually weighted equally.
Figure 2. Concurrent Embedded Design Procedures

This procedure is similar to triangulation in that there is one data collection phase in which qualitative and quantitative data are collected simultaneously. However, during the analysis phase one strand is nested within another stage, which is more heavily weighted.

For example, Feldon and Kafai (2008) conducted a concurrent embedded mixed methods study of the use of avatars in the game “Virtual Worlds” and used several methods of data collection and analysis. There were 595 participants in the game who created avatars that had to survive and progress in their environment, respond to other avatars, and deal with disease and health risks. Over 33% of participants in the game engaged in avatar activities through computer clicks, hits, and navigations. An avatar-related activity might be a change in physical appearance or the exchange of facial features as trade or
symbols of friendship. The participants visited over 6.93 million screen-locations over the six-month duration of the study.

The authors used log data, online and offline observations, interviews and surveys as data sources. The logs represented the raw data of participants’ actions-- the total count of “clicks and hits.” An online survey, consisting of 30-items, was administered after the outbreak of a smallpox virus, which produced spots on the face of each avatar. All but one of the survey questions were closed response questions that focused on general use and user preferences. Interviews of 35 participants were conducted at the end of the study and consisted of questions such as “How is your avatar like you and/or not like you?” and “How often do you change your avatar?” (p. 583). A researcher, who was embedded in the game as a reporter collected the observations. The researcher visited virtual locations to observe the movements and interactions of avatars.

Data from the server logs and the surveys were analyzed, and three types of users were identified: participant/users: casual users, social users, and heavy users. This categorization formed the basis for analyzing differences across the total sample and provided a key quantitative comparison for the overall time and effort spent on avatar-related activities. The comparison of the three groups used an Analysis of Variance (ANOVA, which showed that participants from the three groups were very similar in their avatar-related activities.

Altogether the combination of methods in this study provided an understanding of the incidence of participants’ activities, the details of their motivation and questions, and their concerns about their virtual experiences. The
researchers had attempted to balance quantitative and qualitative methods and designs. There was a progression of methods, beginning with server logs and quantitative methods and ending with interviews and observations, a good example of a mixed methods design.

**Sequential Designs and Procedures**

- *Sequential mixed methods designs* “are those in which researcher seeks to elaborate on or expand on the findings of one method with another method.” *(p.234)*

Within sequential designs, there are also two procedures for data collection and analysis: explanatory and exploratory; these are represented by the graphics below.

**Figure 3. Sequential Exploratory Procedures**

This procedure weighs the qualitative strand more heavily. The quantitative strand is used to assist in interpreting the qualitative findings.
In this procedure, the quantitative strand is weighted more heavily and informs procedures in the qualitative strand. The qualitative analysis is used to examine or clarify quantitative findings.

For example, Gasiewiski, Eagan, Garcia, Hurtado, and Chang (2011) "employed a sequential, explanatory mixed method approach to provide a richer understanding of the relationship between student engagement and introductory science instruction." (p. 229.) and explained, “With this research design, we sought not only to examine the predictive power of specific learning strategies and classroom contexts that relate to STEM students’ engagement in introductory courses but also to further support and enrich these findings through students’ narrative experiences of being enrolled in these courses” (p. 230). The researchers reviewed research on academic engagement, active learning pedagogies, motivation, and faculty behavior to establish a theoretical framework.
The more heavily quantitative strand was conducted first. The sample was drawn from 73 introductory STEM courses from 15 colleges and universities. The researchers administered surveys at the beginning and end of the courses; 2873 students completed both surveys. The dependent variable was academic engagement included these five factors: “frequency with which students, asked questions in class, discussed course grades or assignments with the instructor, attended professor’s office hours, participated in class discussions, tutored other students their introductory STEM course, reviewed class material before it was covered, attended review or help sessions to enhance understanding of course content, and studied with students from their introductory STEM” (p 237).

An extensive multivariate analysis “suggested that 3.1 and 4.1% of the variance in academic engagement was attributable to differences across classrooms and institutions, respectively. In other words, classrooms and institutions appear to have a marginal effect on students’ academic engagement, and the vast majority of variance we see in academic engagement can be attributed to differences between students” (p.239).

The qualitative strand used a purposive, criterion sample of eight universities selected from the original 73, based on survey responses and evidence of innovation in teaching practices. The researchers conducted forty-one focus groups with students who had completed the quantitative surveys or who were currently enrolled in an introductory STEM course. A constant comparative strategy was used to code and analyze data. In the final step of analysis and
interpretation, the researchers combined findings from the quantitative and qualitative strands. Though the statistical analysis had yielded no significant connection between student engagement and teaching practice, it did provide evidence about the relationship between student attributes such as excitement about learning, competitiveness, and career orientation and engagement and success in the courses. Interviews with students supported this connection and provided insights that furthered understanding.

The researchers integrated the quantitative and qualitative findings to develop two composite types of STEM instructors

• “Gatekeeper professors … who disregard individual learning styles because they are so focused on conveying the abundance of information that must be passed on to students who are worthy of passing through the gates. Their expectation is that students can and should understand the content at a sophisticated level “ (p.252).

• Engaging professors… who uses strategies that encourage active learning, cooperation among students, and student-faculty contact…. facilitates student excitement in the classroom through humor, enthusiasm, and practical application… facilitates student excitement in the classroom through humor, enthusiasm, and practical application… is highly accessible to students and encourages them to participate in additional learning opportunities offered by the university “ (p.253)

The researchers concluded, “If educators are the key change agents in this dynamic, the findings suggest that introductory STEM course instructors must
think just as carefully and thoroughl about how they interact with and come across to students as they do about the course content and how to assess its mastery, especially when it comes to scaling up STEM achievement and increasing student persistence.(p.256)."

**Evaluating Mixed Methods Research**

Evaluating the quality of mixed-methods studies involves the application of both the qualitative (trustworthiness) and quantitative (validity) criteria. There are three steps in evaluating mixed methods studies.

1. **Qualitative strand**: the criteria for evaluating trustworthiness (credibility of data, dependability of analysis, and transferability).
2. **Quantitative strand**: the criteria for evaluating validity (statistical conclusion validity and external validity).
3. **Mixing / interpretation**: Is there a clear description of how the data are mixed in the study? Is it mixed at the sampling, data collection, and/or data analysis (interpretation) stage?
   - **Timing**: what is the timeline of the study in terms of the sampling, data collection and data analysis? Is there a timeline that visually depicts the timing of each step?
   - **Weight**: What is the emphasis on each method? Does the study emphasize qualitative and quantitative equally? Or is there a clearly communicated emphasis on one or the other?
Mixed methods research has not been universally embraced. Methodological purists hold that research is either qualitative or quantitative and that nothing can exist in between. Despite these reservations, most researchers acknowledge mixed methods research as a promising development. The publication of *The Handbook of Mixed Methods Research* (Tashakkori & Teddlie, 2003) added to its legitimacy, as did the publication of *The Journal of Mixed Methods Research*. Further evidence of its entry into the mainstream is establishment of a special interest group within The American Education Research Association that has as its goal: “To support, encourage, and increase dialogue and idea exchange among educational researchers utilizing mixed methods and those interested in integrating qualitative and quantitative research approaches” (AERA).

However, there are some lingering concerns about mixed methods approaches; they take longer to implement, entail more resources, require separate inductive and deductive analyses, and add a step to articulate qualitative and quantitative results. After interviewing twenty social scientists how had conducted mixed methods studies, Bryman (2007 concluded that “insufficient attention has been paid to the writing up of mixed methods findings, and in particular to the ways such findings can be integrated. Indeed, it could be argued that there is still considerable uncertainty concerning what it means to integrate findings in mixed methods research” (p. 22).
Summary

• Mixed methods research combines qualitative and quantitative methods of data collection and analysis.

• The two mixed methods designs are concurrent and sequential.

• Concurrent mixed methods designs converge or merge quantitative and qualitative data

• Sequential designs expand on the findings of one method with another method

• Mixed methods researchers combine findings in a final interpretation, called meta-inferences/ integrated mixed inferences.

• Mixed methods research is evaluated according to the criteria of qualitative and
quantitative studies and also for timing, weight, and mixing interpretation.

Terms and Concepts

- mixed methods research
- multi-methods research
- pragmatism
- meta-inferences/ integrated mixed
- concurrent designs
- concurrent triangulation
- sequential designs
- sequential exploratory

Review, Consolidation, and Extension of Knowledge

1. Using an electronic database or a search engine, locate a mixed methods study on a topic of interest. Read the article and answer the questions below.

a. What research is reviewed? Does it provide a rationale for the study? Does it provide a rationale for using mixed methods?

b. What is the purpose of the study?

c. What design is employed? Concurrent (triangulation or embedded), sequential (explanatory or exploratory)

d. How are the strands weighted?

e. What is the result of the analysis of each strand?

f. How are the two analyses integrated? What is the researcher’s interpretation?

2. Using an electronic database or a search engine, locate an evaluation study on a topic of interest. Read the article and answer the questions below.

a. What is the purpose of the evaluation?
b. What kind of evaluation is it: formative or summative?

c. Who commissioned the evaluation? Who conducted the evaluation?

d. What methods of data collection were used?

e. How were data analyzed?

f. How would you rate the evaluation (high, medium, low) in relation to the standards?

___ utility
___ feasibility
___ proprietary
___ accuracy
___ accountability