

Preprint. To appear in *Online education and adult learning: New frontiers for teaching practices*.
Lowenthal, P. R., & Leech, N. (in Press). Mixed research and online learning: Strategies for improvement.
To appear in T. T. Kidd (Ed.), *Online education and adult learning: New frontiers for teaching practices*.
Hershey, PA: IGI Global.

Mixed Research and Online Learning:

Strategies for Improvement

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Abstract

As online education continues to grow, it is becoming increasingly important to understand the nuances of online learning. However, to date, research on online learning has largely been characterized as being low quality. To increase the quality and promote rigor in online education research, researchers are beginning to argue for the importance of using mixed research. Yet, to date, very little mixed research has been conducted in the area of online learning. Further, the little “mixed” research that has been conducted suffers from a host of problems. Researchers need to be aware of the complexities of conducting mixed research and some of the issues that can be overlooked. This chapter focuses on some important steps and key considerations that researchers of online learning must make when conducting mixed research, in hopes to increase the rigor and quality of online learning research studies.

Keywords: Mixed Research, Research Methods, Research Paradigms, Online Learning Research

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Introduction

Research on online learning has largely been characterized as being low quality (Bernard et al., 2004). Part of the reason for this classification is the near obsession of past researchers with conducting comparison studies; that is, studies that compare online learning to traditional face-to-face learning. Despite researchers' calls to conduct research with other types of designs, use of comparison studies have been increasing since the mid 1980s (Bernard et al.). In general, researchers have been preoccupied with demonstrating that online learning is as good as face-to-face learning (Wray, Lowenthal, Bates, & Stevens, 2008). However, in the past few years, comparison studies have come under increased scrutiny (Bernard et al.; Meyer 2004). This is because the majority, if not all, of comparison studies—like most research on online learning—have failed to employ robust research designs or control for extraneous variables (Bernard et al.; Meyer; Phipps & Merisotis, 1999).

Even when researchers have had the foresight to avoid conducting comparison studies, they have often overly relied on survey data (Goldman, Crosby, Swan, & Shea, 2005), or other limited types of data collection and analysis. While survey data, which is self-report data and the most often utilized method to study online learning (Hara, Bonk, & Angeli, 2000), is useful and has its place in educational research, this type of data alone is retroactive and insensitive to changes over time (Kramer, Oh, & Fussell, 2006). Therefore, this type of data is not appropriate to investigate all research problems. Even when researchers have chosen not to rely on self-

report data and instead to analyze what is said and conducted online, researchers have, for the most part, focused solely on the frequency of participation (Henri, 1992). Commonly, these frequency counts are then analyzed through the use of content analysis (De Wever, Schellens, Valcke, & Keer, 2006). Content analysis is arguably the second most popular type of analysis for studying online learning and the primary method used to analyze online discourse (De Wever, Schellens, Valcke, & Van Keer, 2006). While content analysis is a useful type of analysis, it too cannot, and should not, be used to answer all research questions (Berelson, 1952; Tesch, 1990).

Instead, researchers need to begin to employ different ways of studying online learning that will increase the rigor of the research results. Design based research is one increasingly popular approach that will likely strengthen some of the research conducted on online learning (see Akilli, 2008; Joseph, 2004; Kelly, 2004; Reeves, 2005; Reeves, Herrington, & Oliver, 2004, 2005). However, there are some important differences between design based research and mixed research (Akilli, 2008). Thus, in addition to conducting design based research, researchers should begin to employ mixed approaches to study online learning. While some researchers of online learning have argued for the importance of using multiple methods when studying online learning (Goldman, Crosby, Swan, & Shea, 2005; Gunawardena, Lowe, & Anderson, 1997; Hiltz & Arbaugh, 2003), the majority of research conducted on online learning currently is mono-method.

During the past five years, mixed research has become increasingly popular (Leech & Onwuegbuzie, 2007). However, despite this growing popularity, very little online learning research is conducted with mixed designs. Further, the little so called “mixed” research that has been conducted suffers from a host of problems. Researchers of online learning need to be aware of the complexities of conducting mixed research and some of the issues that can be overlooked.

Further, and even more importantly, online learning researchers need to be aware that intentionally and systematically applying mixed research has the possibility to improve online learning research and may increase the fields' understanding of the nuances of online learning. Thus, the purpose of this chapter is to delineate the common steps of the mixed research process—such as, research questions, research designs, sampling, and data analysis. First, a brief background of mixed research will be delineated. Next, the definition of mixed research will be presented. Finally, the major steps in mixed research will be described in hopes that the rigor of mixed research in online learning will increase in the future.

Understanding Mixed Research: A Brief Background

For years, researchers in the social and behavioral sciences have engaged in what has been called the paradigm wars (Johnson & Onwuegbuzie, 2004; Newman, Ridenour, Newman, & DeMarco, 2003). The paradigm wars have been between those who adopt a positivist/empiricist worldview—historically “quantitative researchers”—and those who adopt a constructivist/phenomenological worldview—historically “qualitative researchers” (Tashakkori & Teddlie, 1998). The positivists criticized the constructivists for being too subjective and too unreliable (Guba & Lincoln, 1988) while the constructivists criticized empiricist for being too reductionistic. The debates, though, were essentially between “purists” (Johnson & Onwuegbuzie) who focused more on the differences than on any similarities between the two positions (Onwuegbuzie & Leech, 2005a).

While these debates have typically been between quantitative and qualitative purists, most researchers have been led to believe that one way or the other is the “right way” to do research (Onwuegbuzie & Leech, 2005a). Purists on both sides believe that their paradigm is the

correct one for social science research (Johnson & Onwuegbuzie, 2004). Additionally, they have been arguing for some time that paradigms and research methodologies cannot be separated or mixed (Howe, 1988).

Currently, some researchers are now arguing that it is time to adopt a third paradigm, that of pragmatism (Morgan, 2007; Onwuegbuzie & Leech, 2005a). Pragmatists essentially hold that research methodologies are not necessarily positivist or constructivist (Onwuegbuzie & Leech); these researchers argue for the importance of integrating methods when it is appropriate. Thus, utilizing mixed research.

The concept of mixed research has been called a host of things over the years; researchers have referred to it as mixed methods, multiple methods, multiple or mixed approaches, integrated methods, mixed models, multiple models, qualitative plus quantitative approaches, and combined qualitative and quantitative methods (Smith, 2006). Mixed research is perhaps the most contemporary term (Johnson & Onwuegbuzie, 2004). Mixed research, according to Creswell and Plano Clark (2007),

is a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves the philosophical assumptions that guide the direction of the collection and 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 quantitative and qualitative data in a single study or series of studies. (p. 5)

Mixed researchers believe that “the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone” (Creswell & Plano Clark, p. 5). One common purpose of using a mixed approach is to facilitate

the richness of data and to expand the interpretation of the findings (Collins, Onwuegbuzie, & Sutton, 2006; Onwuegbuzie & Leech, 2004).

However, employing mixed research is more complicated than most researchers realize (Johnson & Onwuegbuzie, 2004). Mixed researchers must be proficient in not one but two different lines of research (Tashakkori & Teddlie, 2003). Further, because mixed research is relatively new, methodologists are still developing guidelines of sound practice (Leech & Onwuegbuzie, in press). Currently, Collins, Onwuegbuzie and Sutton (2006) have delineated 13 steps that a researcher should go through when conducting mixed research. These steps include the following: (a) determining the goal of the study, (b) formulating the research objective, (c) determining the research/mixing rationale, (d) determining the research/mixing purpose, (e) determining the research question(s), (f) selecting the sample design, (g) selecting the mixed research design, (h) collecting the data, (i) analyzing the data, (j) validating/legitimizing the data, (k) interpreting the data, (l) writing the mixed research report, and (m) reformulating the research question(s). These 13 steps were designed to assist researchers in conducting mixed research studies, from start to finish.

Mixed Research for Researchers of Online Learning:

Explicating the Major Steps

To help online learning researchers increase the rigor of their studies, mixed research studies can be conducted. The following sections outlines important components of mixed research and delineates specific factors that researchers of online learning must consider when conducting mixed research. Specifically, aspects of the mixed research question, research designs, sampling, and data analysis will be presented.

Research Questions

Research questions help narrow the focus of a study (Creswell & Plano Clark, 2007); they provide a framework, set boundaries, and give rise to the type of data that will be collected (Onwuegbuzie & Leech, 2006). Research questions hold a very important place for mixed research because they help determine whether a problem should be studied with a mixed framework. Moreover, Onwuegbuzie and Leech (2006) point out that research questions “dictate the type of research design used, the sample size and sampling scheme employed, and the type of instruments administered as well as the data analysis techniques” (p. 475).

Unfortunately, writing research questions for mixed studies is difficult. This difficulty stems from the fact that all mixed studies must entail at least one quantitative research question and one qualitative research question, or one research question that engulfs both qualitative and quantitative aspects. Therefore, mixed researchers must be proficient at creating both qualitative and quantitative research questions (Onwuegbuzie & Leech, 2006).

There are a few basic, yet important, concepts to keep in mind when developing research questions for a mixed study. First, most quantitative research questions are either descriptive, comparative, or relationship based (Onwuegbuzie & Leech, 2006). Further, and perhaps even more importantly, Onwuegbuzie and Leech) point out that,

Good quantitative questions should identify the population and dependent variable(s), whether they represent descriptive, comparative, or relationship research questions. If they represent comparative or relationship research questions, then the independent variable(s) also should be identifiable. Researchers should avoid starting a quantitative research question with the words, “Do,” “Does,” “Is,” or “Are” because they motivate

“yes/no” responses.... (p. 482)

On the other hand, qualitative research questions are more open-ended (Creswell, 1998). In fact, according to Onwuegbuzie and Leech, “qualitative research questions typically describe, rather than relate variables or compare groups” (p. 482). Further, qualitative research questions tend to address ‘what’ and ‘how’ questions. Therefore, quantitative and qualitative research questions can lead to very different samples, data, and analyses. These aspects need to be taken into consideration when writing multiple research questions (i.e., a research question that is quantitative and one that is qualitative in nature) for a mixed study.

Finally, mixed studies can also include mixed research questions. These are questions that include a quantitative and a qualitative question within the same question (Onwuegbuzie & Leech, 2006, p. 483). These questions require that data is “collected and analyzed either concurrently, sequentially, or iteratively before the question is addressed” (p. 483). Given these considerations, researchers of online learning must spend ample time at the research question phase to determine whether their research questions require taking a mixed approach.

Research Design

Another important step that must not be overlooked when conducting mixed research is carefully identifying an appropriate research design to use and clearly communicating the chosen design to one’s readers. Methodologists have identified a number of different mixed research designs (Creswell, Plano Clark, Gutmann, & Hanson, 2003; Leech & Onwuegbuzie, 2006). In general, researchers can conceptualize research designs as lying on a continuum. On one end of the continuum are monomethod designs (i.e., a design in which only one method is used). Partially mixed designs (i.e., mixing qualitative and quantitative methods in at least one of the 13

steps) are in the middle of the continuum, and fully mixed designs (i.e., mixing qualitative and quantitative methods at multiple steps) are on the other end of the continuum (Leech & Onwuegbuzie, 2007).

Most researchers are very familiar with monomethod designs. However, they are often not familiar with the differences between partially mixed and full mixed research designs.

Leech and Onwuegbuzie (2007) help explain the difference between these two:

whereas fully mixed methods involve the mixing of quantitative and qualitative techniques within one or more stages of the research process or across these stages, with partially mixed methods, the quantitative and qualitative phases are not mixed within or across stages. Instead, with partially mixed methods, both the quantitative and qualitative elements are conducted either concurrently or sequentially in their entirety before being mixed at the data interpretation stage. (Section 2, para 3)

To help make more sense of this, researchers have begun identifying different types of mixed research designs (Creswell, 2008; Leech & Onwuegbuzie). In fact, Tashakkori and Teddlie (2003) have identified practically 40 different mixed research designs (see Creswell & Plano Clark, 2007, for an in depth discussion of the different mixed research designs). Creswell and Plano Clark (2007) simplify matters by identifying four major types of mixed method research designs: the triangulation design, the embedded design, the explanatory design, and the exploratory design. But as useful as these four major types are, Leech and Onwuegbuzie offer a very self explanatory method of thinking about mixed research designs. They identified eight different types of mixed research designs in which they classify according to the extent to which the research designs include: (a) partially mixed vs. fully mixed (i.e., level of mixing), (b) concurrent vs. sequential (i.e., time orientation), and, (c) equal status vs. dominant status (i.e.,

emphasis of approaches).

Regardless of the mixed research typology used, the goal of any research design should be to effectively address the research questions of the study. It is important for researchers to be as explicit as possible about the research design used, so that future researchers are able to more effectively replicate their studies and build on previous research. As mixed research increases in popularity, and online learning mixed researchers continue to raise the bar and increase the rigor of the mixed studies, researchers are going to be expected to clearly describe the steps of the research study in order to get their work published.

Sampling in Mixed Research Studies

Sampling is a key step in any study because it helps establish the quality of inferences a researcher makes from the findings of a study (Collins, Onwuegbuzie, & Jiao, 2006). Therefore, careful and thoughtful sampling is another key component in mixed research that cannot be overlooked. While qualitative researchers have historically not placed the same amount of emphasis on sampling as quantitative researchers (Onwuegbuzie & Leech, 2007a), sampling is important in all research (Onwuegbuzie & Collins, 2007; Onwuegbuzie & Leech, 2005a, 2007b). In mixed research, sampling is more complicated (Onwuegbuzie & Collins, 2007), and therefore, arguably needs even more attention.

First, online learning mixed researchers need to remember to differentiate between sample size (e.g., the number of participants to select) and sampling schemes (i.e., how the participants will be selected) (Onwuegbuzie & Collins, 2007). In order to provide methodological guidance about sampling schemes, mixed methodologists have identified 24 different types of sampling schemes—ranging from simple and cluster (two types of probabilistic

sampling schemes) to snowball and typical (two types of nonprobabilistic sampling schemes) [see Collins, Onwuegbuzie, and Jiao (2006) or Onwuegbuzie and Collins (2007) for a discussion of these 24 types of sampling schemes]. Further, Onwuegbuzie and Collins (2007) have developed a framework that can help researchers make sound sampling decisions for their online learning study. For now, researchers of online learning need to recognize that convenience sampling and/or some form of purposeful sampling are only one of many types of sampling schemes available for researchers.

In addition to carefully considering what sampling scheme to use, online learning researchers must also carefully think about their sample size. Historically quantitative researchers have placed more emphasis on sample size than qualitative researchers (Onwuegbuzie & Leech, 2005b). However, sample size is important in qualitative research as well (Onwuegbuzie & Leech, 2007). While the sample size in a given study should ultimately be informed by the research questions and the research design used, methodologists have identified some minimum sampling size recommendations that can serve as a basic guideline or suggestion when conducting mixed research. For instance, a correlational design study should have 64 participants for one-tailed hypotheses, rather than the previously thought 30; a phenomenological design should have between 6 and 10 interviews (Morse, 1994; Creswell, 1998); and finally a grounded theory study should have between 20 or 30 (Creswell). Readers should consult Onwuegbuzie and Collins (2007) for a complete list of sample size recommendations.

In order for online learning researchers to effectively conduct mixed research, they must become bilingual; being fully aware of how the sample scheme and the sample size will ultimately impact the inferences that can be made from their research.

Data Analysis Techniques for Online Learning Mixed Research Studies

An in-depth discussion of data analysis for mixed research studies is beyond the scope of this chapter. However, a discussion of mixed research would be incomplete without addressing, if only briefly, the important role data analysis plays in mixed research. Leech and Onwuegbuzie (2007) have argued that relying solely on one type of analysis can lead researchers to make interpretive errors about the underlying phenomenon they are studying. Thus, researchers of online learning need to use multiple, as well as mixed methods, of data analysis to understand better the complexities of online learning. While most researchers—specifically “quantitative researchers”—are very familiar with the different methods to analyze quantitative data (i.e., utilizing different statistics), they are often not as familiar with the different techniques for analyzing qualitative data. Therefore, mixed researchers need to keep in mind that qualitative data can be analyzed with constant comparison analysis, keywords-in-context, word count, content analysis, domain analysis, taxonomic analysis, and componential analysis (see Leech & Onwuegbuzie for examples of each of these types of analysis).

Employing both quantitative and qualitative methods of data analysis can help investigate problems in ways that monomethod or even multiple method (i.e., two or more quantitative or two or more qualitative) approaches cannot. For instance, the first author’s area of interest is instructional communication—specifically, social presence. Most researchers have studied social presence by collecting survey data of users’ perceptions of social presence. A handful of researchers have actually analyzed course discussions to understand better what social presence looks like in online discourse. However, for the most part, these researchers have solely used content analysis to study social presence in online discourse. By relying on only one type of analysis, these researchers are possibly making interpretive errors. Therefore, it is important for

researchers conducting mixed research to have a host of data analysis tools—both quantitative and qualitative—available at all times. However, successfully conducting multiple forms of data analysis is easier said than done. As a result, Onwuegbuzie and Teddlie (2003) have identified seven stages of the data analysis process that researchers conducting mixed research should go through: (a) data reduction, (b) data display, (c) data transformation, (d) data correlation, (e) data consolidation, (f) data comparison, and (g) data integration.

Future Trends for Online Learning Mixed Research

Mixed research is going to increase in popularity over the next few years. Furthermore, mixed methodologists are going to continue to develop guidelines to assist researchers conducting mixed research. Hopefully as these phenomena take place, researchers of online learning will begin to increasingly conduct mixed research, which in turn will increase both the overall quality of research on online learning as well as what we know about online learning.

Conclusion

Conducting mixed research is more complicated than most researchers realize. It is more complex than simply conducting quantitative and/or qualitative studies separately. Further, because it is a relatively new form of research, very few researchers have ever had any formal training on how to conduct mixed research. This chapter focused on some important steps and key considerations that researchers of online learning must make when conducting mixed research, in hopes to increase the rigor and quality of online learning research studies.

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