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Mixed Methods Research: A Research Paradigm Whose Time Has Come

by R. Burke Johnson and Anthony J. Onwuegbuzie

The purposes of this article are to position mixed methods research (*mixed research* is a synonym) as the natural complement to traditional qualitative and quantitative research, to present pragmatism as offering an attractive philosophical partner for mixed methods research, and to provide a framework for designing and conducting mixed methods research. In doing this, we briefly review the paradigm "wars" and incompatibility thesis, we show some commonalities between quantitative and qualitative research, we explain the tenets of pragmatism, we explain the fundamental principle of mixed research and how to apply it, we provide specific sets of designs for the two major types of mixed methods research (*mixed-model* designs and *mixed-method* designs), and, finally, we explain mixed methods research as following (recursively) an eight-step process. A key feature of mixed methods research is its methodological pluralism or eclecticism, which frequently results in superior research (compared to monomethod research). Mixed methods research will be successful as more investigators study and help advance its concepts and as they regularly practice it.

For more than a century, the advocates of quantitative and qualitative research paradigms have engaged in ardent dispute.[1] From these debates, purists have emerged on both sides (cf. Campbell & Stanley, 1963; Lincoln & Guba, 1985).[2] Quantitative purists (Ayer, 1959; Maxwell & Delaney, 2004; Popper, 1959; Schrag, 1992) articulate assumptions that are consistent with what is commonly called a positivist philosophy.[3, 4] That is, quantitative purists believe that social observations should be treated as entities in much the same way that physical scientists treat physical phenomena. Further, they contend that the observer is separate from the entities that are subject to observation. Quantitative purists maintain that social science inquiry should be objective. That is, time- and context-free generalizations (Nagel, 1986) are desirable and possible, and real causes of social scientific outcomes can be determined reliably and validly. According to this school of thought, educational researchers should eliminate their biases, remain emotionally detached and uninvolved with the objects of study, and test or empirically justify their stated hypotheses. These researchers have traditionally called for rhetorical neutrality, involving a formal writing style using the impersonal passive voice and technical terminology, in which establishing and describing social laws is the major focus (Tashakkori & Teddlie, 1998).

Qualitative purists (also called *constructivists* and *interpretivists*) reject what they call positivism. They argue for the superiority of constructivism, idealism, relativism, humanism, hermeneutics, and, sometimes, postmodernism (Guba & Lincoln, 1989; Lincoln & Guba, 2000; Schwandt, 2000; Smith, 1983, 1984). These purists contend that multiple-constructed realities abound, that time- and context-free generalizations are neither desirable nor possible, that research is value-bound, that it is impossible to differentiate fully causes and effects, that logic flows from specific to general (e.g., explanations are generated inductively from the data), and that knower and known cannot be separated because the subjective knower is the only source of reality (Guba, 1990). Qualitative purists also are characterized by a dislike of a detached and passive style of writing, preferring, instead, detailed, rich, and thick (empathic) description, written directly and somewhat informally.

Both sets of purists view their paradigms as the ideal for research, and, implicitly if not explicitly, they advocate the *incompatibility thesis* (Howe, 1988), which posits that qualitative and quantitative research paradigms, including their associated methods, cannot and should not be mixed. The quantitative versus qualitative debate has been so divisive that some graduate students who graduate from educational institutions with an aspiration to gain employment in the world of academia or research are left with the impression that they have to pledge allegiance to one research school of thought or the other. Guba (a leading qualitative purist) clearly represented the purist position when he contended that "accommodation between paradigms is impossible . . . we are led to vastly diverse, disparate, and totally antithetical ends" (Guba, 1990, p. 81). A disturbing feature of the paradigm wars has been the relentless focus on the differences between the two orientations. Indeed, the two dominant research paradigms have resulted in two research cultures, "one professing the superiority of 'deep, rich observational data' and the other the virtues of 'hard, generalizable' . . . data" (Sieber, 1973, p. 1335).

Our purpose in writing this article is to present mixed methods research as the third research paradigm in educational research.[5] We hope the field will move beyond quantitative *versus* qualitative research arguments because, as recognized by mixed methods research, *both* quantitative and qualitative research are important and useful. The goal of mixed methods research is not to replace either of these approaches but rather to draw from the

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strengths and minimize the weaknesses of both in single research studies and across studies. If you visualize a continuum with qualitative research anchored at one pole and quantitative research anchored at the other, mixed methods research covers the large set of points in the middle area. If one prefers to think categorically, mixed methods research sits in a new third chair, with qualitative research sitting on the left side and quantitative research sitting on the right side.

Mixed methods research offers great promise for practicing researchers who would like to see methodologists describe and develop techniques that are closer to what researchers actually use in practice. Mixed methods research as the third research paradigm can also help bridge the schism between quantitative and qualitative research (Onwuegbuzie & Leech, 2004a). Methodological work on the mixed methods research paradigm can be seen in several recent books (Brewer & Hunter, 1989; Creswell, 2003; Greene, Caracelli, & Graham, 1989; Johnson & Christensen, 2004; Newman & Benz, 1998; Reichardt & Rallis, 1994; Tashakkori & Teddlie, 1998, 2003). Much work remains to be undertaken in the area of mixed methods research regarding its philosophical positions, designs, data analysis, validity strategies, mixing and integration procedures, and rationales, among other things. We will try to clarify the most important issues in the remainder of this article.

Commonalities Among the Traditional Paradigms

Although there are many important paradigmatic differences between qualitative and quantitative research (which have been frequently written about in the *Educational Researcher* and other places), there are some similarities between the various approaches that are sometimes overlooked. For example, both quantitative and qualitative researchers use empirical observations to address research questions. Sechrest and Sidani (1995, p. 78) point out that both methodologies "describe their data, construct explanatory arguments from their data, and speculate about why the outcomes they observed happened as they did." Additionally, both sets of researchers incorporate safeguards into their inquiries in order to minimize confirmation bias and other sources of invalidity (or lack of trustworthiness) that have the potential to exist in every research study (Sandelowski, 1986).

Regardless of paradigmatic orientation, all research in the social sciences represents an attempt to provide warranted assertions about human beings (or specific groups of human beings) and the environments in which they live and evolve (Biesta & Burbules, 2003). In the social and behavioral sciences, this goal of understanding leads to the examination of many different phenomena, including holistic phenomena such as intentions, experiences, attitudes, and culture, as well as more reductive phenomena such as macromolecules, nerve cells, micro-level homunculi, and biochemical computational systems (de Jong, 2003). There is room in ontology for mental and social reality as well as the more micro and more clearly material reality. Although certain methodologies tend to be associated with one particular research tradition, Dzurec and Abraham (1993, p. 75) suggest that "the objectives, scope, and nature of inquiry are consistent across methods and across paradigms." We contend that researchers and research methodologists need to be asking when each research approach is most helpful and when and how they should be mixed or combined in their research studies.

We contend that epistemological and methodological pluralism should be promoted in educational research so that researchers are informed about epistemological and methodological possibilities and, ultimately, so that we are able to conduct more effective research. Today's research world is becoming increasingly interdisciplinary, complex, and dynamic; therefore, many researchers need to complement one method with another, and all researchers need a solid understanding of multiple methods used by other scholars to facilitate communication, to promote collaboration, and to provide superior research. Taking a non-purist or compatibilist or mixed position allows researchers to mix and match design components that offer the best chance of answering their specific research questions. Although many research procedures or methods typically have been linked to certain paradigms, this linkage between research paradigm and research methods is neither sacrosanct nor necessary (Howe, 1988, 1992). For example, qualitative researchers should be free to use quantitative methods, and quantitative researchers should be free to use qualitative methods. Also, research in a content domain that is dominated by one method often can be better informed by the use of multiple methods (e.g., to give a read on methods-induced bias, for corroboration, for complimentarity, for expansion; see Greene et al., 1989). We contend that epistemological and paradigmatic ecumenicalism is within reach in the research paradigm of mixed methods research.

Philosophical Issues Debates

As noted by Onwuegbuzie and Teddlie (2003), some individuals who engage in the qualitative versus quantitative paradigm debate appear to confuse the *logic of justification* with research methods. That is, there is a tendency among some researchers to treat epistemology and method as being synonymous (Bryman, 1984; Howe, 1992). This is far from being the case because the logic of justification (an important aspect of epistemology) does not dictate what specific data collection and data analytical methods researchers must use. There is rarely entailment from epistemology to methodology (Johnson, Meeker, Loomis, & Onwuegbuzie, 2004; Phillips, 2004). For example, differences in epistemological beliefs (such as a difference in beliefs about the appropriate logic of justification) should not prevent a qualitative researcher from utilizing data collection methods more typically associated with quantitative research, and vice versa.

There are several interesting myths that appear to be held by some purists. For example, on the "positivist" side of the fence, the barriers that quantitative educational researchers have built arise from a narrow definition of the concept of "science." [6] As noted by Onwuegbuzie (2002), modern day "positivists" claim that science involves confirmation and falsification, and that these methods and procedures are to be carried out objectively. However, they disregard the fact that many human (i.e., subjective) decisions are made throughout the research process and that researchers are members of various social groups. A few examples of subjectivism and intersubjectivism in quantitative research include deciding what to study (i.e., what are the important problems?), developing instruments that are believed to measure what the researcher views as being the target construct, choosing the

specific tests and items for measurement, making score interpretations, selecting alpha levels (e.g., .05), drawing conclusions and interpretations based on the collected data, deciding what elements of the data to emphasize or publish, and deciding what findings are practically significant. Obviously, the conduct of fully objective and value-free research is a myth, even though the regulatory ideal of objectivity can be a useful one.

Qualitative researchers also are not immune from constructive criticism. Some qualitative purists (e.g., Guba, 1990) openly admit that they adopt an unqualified or strong relativism, which is logically self-refuting and (in its strong form) hinders the development and use of systematic standards for judging research quality (when it comes to research quality, it is not the case that anyone's opinion about quality is just as good as the next person's, because some people have no training or expertise or even interest in research). We suspect that most researchers are *soft* relativists (e.g., respecting the opinions and views of different people and different groups). When dealing with human research, soft relativism simply refers to a respect and interest in understanding and depicting individual and social group differences (i.e., their different perspectives) and a respect for democratic approaches to group opinion and value selection. Again, however, a strong relativism or strong constructivism runs into problems; for example, it is not a matter of opinion (or individual reality) that one should or can drive on the left-hand side of the road in Great Britain—if one chooses to drive on the right side, he or she will likely have a head-on collision, at some point, and end up in the hospital intensive care unit, or worse (this is a case where subjective and objective realities directly meet and clash). The strong ontological relativistic or constructivist claim in qualitative research that multiple, contradictory, but equally valid accounts of the same phenomenon are multiple *realities* also poses some potential problems. Generally speaking, subjective states (i.e., created and experienced realities) that vary from person to person and that are sometimes called "realities" should probably be called (for the purposes of clarity and greater precision) multiple *perspectives or opinions or beliefs* (depending on the specific phenomenon being described) rather than multiple realities (Phillips & Burbules, 2000). If a qualitative researcher insists on using the word reality for subjective states, then for clarity we would recommend that the word subjective be placed in front of the word reality (i.e., as in subjective reality or in many cases intersubjective reality) to direct the reader to the focus of the statement. We agree with qualitative researchers that value stances are often needed in research; however, it also is important that research is more than simply one researcher's highly idiosyncratic opinions written into a report. Fortunately, many strategies are recognized and regularly used in qualitative research (such as member checking, triangulation, negative case sampling, pattern matching, external audits) to help overcome this potential problem and produce high-quality and rigorous qualitative research. Finally, qualitative researchers sometimes do not pay due attention to providing an adequate rationale for interpretations of their data (Onwuegbuzie, 2000), and qualitative methods of analyses too "often remain private and unavailable for public inspection" (Constas, 1992, p. 254). Without public inspection and adequate standards, how is one to decide whether what is claimed is trustworthy or defensible?

Fortunately, many (or most?) qualitative researchers and quantitative researchers (i.e., postpositivists) have now reached basic agreement on several major points of earlier philosophical disagreement (e.g., Phillips & Burbules, 2000; Reichardt & Cook, 1979; Reichardt & Rallis, 1994). Basic agreement has been reached on each of the following issues: (a) the relativity of the "light of reason" (i.e., what appears reasonable can vary across persons); (b) theory-laden perception or the theory-ladenness of facts (i.e., what we notice and observe is affected by our background knowledge, theories, and experiences; in short, observation is not a perfect and direct window into "reality"); (c) underdetermination of theory by evidence (i.e., it is possible for more than one theory to fit a single set of empirical data); (d) the Duhem-Quine thesis or idea of auxiliary assumptions (i.e., a hypothesis cannot be fully tested in isolation because to make the test we also must make various assumptions; the hypothesis is embedded in a holistic network of beliefs; and alternative explanations will continue to exist); (e) the problem of induction (i.e., the recognition that we only obtain probabilistic evidence, not final proof in empirical research; in short, we agree that the future may not resemble the past); (f) the social nature of the research enterprise (i.e., researchers are embedded in communities and they clearly have and are affected by their attitudes, values, and beliefs); and (g) the value-ladenness of inquiry (this is similar to the last point but specifically points out that human beings can never be completely value free, and that values affect what we choose to investigate, what we see, and how we interpret what we see).

Pragmatism as the Philosophical Partner for Mixed Methods Research

We do not aim to solve the metaphysical, epistemological, axiological (e.g., ethical, normative), and methodological differences between the purist positions. And we do not believe that mixed methods research is currently in a position to provide perfect solutions. Mixed methods research should, instead (at this time), use a method and philosophy that attempt to fit together the insights provided by qualitative and quantitative research into a workable solution. Along these lines, we advocate consideration of the pragmatic method of the classical pragmatists (e.g., Charles Sanders Peirce, William James, and John Dewey) as a way for researchers to think about the traditional dualisms that have been debated by the purists. Taking a pragmatic and balanced or pluralist position will help improve communication among researchers from different paradigms as they attempt to advance knowledge (Maxcy, 2003; Watson, 1990). Pragmatism also helps to shed light on how research approaches can be mixed fruitfully (Hoshmand, 2003); the bottom line is that research approaches should be mixed in ways that offer the best opportunities for answering important research questions.

The *pragmatic rule* or *maxim* or *method* states that the current meaning or instrumental or provisional truth value (which James [1995, 1907 original] would term "cash value") of an expression (e.g., "all reality has a material base" or "qualitative research is superior for uncovering humanistic research findings") is to be determined by the experiences or practical consequences of belief in or use of the expression in the world (Murphy, 1990). One can apply this sensible effects- or outcome-oriented rule through thinking (thinking about what will happen if you do X), practi-

cal experiences (observing what happens in your experience when you do X), or experiments (formally or informally trying a rule and observing the consequences or outcomes).

In the words of Charles Sanders Peirce (1878), the pragmatic method or maxim (which is used to determine the *meaning* of words, concepts, statements, ideas, beliefs) implies that we should "consider what effects, that might conceivably have practical bearings, we conceive the object of our conception to have. Then our conception of these effects is the whole of our conception of the object" (this quote is found at the end of Section II in *How to Make Our Ideas Clear*). Building on Peirce's lead, James (1995, 1907 original) argued that "The pragmatic method is primarily a method of settling metaphysical disputes that otherwise might be interminable. . . . The pragmatic method in such cases is to try to interpret each notion by tracing its respective practical consequences" (p. 18). Extending the works of Peirce and James, Dewey spent his career applying pragmatic principles in developing his philosophy and in the practice of educating children (e.g., the Experimental School of Chicago). Dewey (1948, 1920 original) stated that "in order to discover the meaning of the idea [we must] ask for its consequences" (p. 132). In short, when judging ideas we should consider their empirical and practical consequences. Peirce, James, and Dewey were all interested in examining practical consequences and empirical findings to help in understanding the import of philosophical positions and, importantly, to help in deciding which action to take next as one attempts to better understand real-world phenomena (including psychological, social, and educational phenomena).

If two ontological positions about the mind/body problem (e.g., monism versus dualism), for example, do not make a difference in how we conduct our research then the distinction is, for practical purposes, not very meaningful. We suspect that some philosophical differences may lead to important practical consequences while many others may not.[7] The full sets of beliefs characterizing the qualitative and quantitative approaches or paradigms have resulted in different practices, and, based on our observation and study, we believe it is clear that both qualitative and quantitative research have many benefits and many costs. In some situations the qualitative approach will be more appropriate; in other situations the quantitative approach will be more appropriate. In many situations, researchers can put together insights and procedures from both approaches to produce a superior product (i.e., often mixed methods research provides a more workable solution and produces a superior product). We are advocating a needs-based or contingency approach to research method and concept selection.

Philosophical debates will not end as a result of pragmatism, and certainly they *should not* end. Nonetheless, we agree with others in the mixed methods research movement that consideration and discussion of pragmatism by research methodologists and empirical researchers will be productive because it offers an immediate and useful middle position philosophically and methodologically; it offers a practical and outcome-oriented method of inquiry that is based on action and leads, iteratively, to further action and the elimination of doubt; and it offers a method for selecting methodological mixes that can help researchers better answer many of their research questions. Pragmatically inclined philosophers and researchers also would suggest that we can reach some agreement about the importance of many (culturally derived) values and desired ends, such as, for example, preventing the dropping out of school by adolescents, reducing the use of illicit drugs by children and adolescents, finding effective teaching techniques for different kinds of students, educating children and adults (i.e., increasing their knowledge), helping to reduce discrimination in society, and attempting to eliminate or reduce mental, learning, and other disabilities. In other words, pragmatism takes an explicitly value-oriented approach to research.

We reject an incompatibilist, either/or approach to paradigm selection and we recommend a more pluralistic or compatibilist approach. Beyond the basic pragmatic method or maxim (i.e., translated in mixed methods research as "choose the combination or mixture of methods and procedures that works best for answering your research questions") there also is a full philosophical system of pragmatism which was systematically developed by the classical pragmatists (Peirce, James, Dewey) and has been refined in newer directions by latter-day neo-pragmatists (e.g., Davidson, Rescher, Rorty, Putnam) (see Menand, 1997; Murphy, 1990; Rescher, 2000; Rorty, 2000). To provide the reader with a better understanding of the full philosophy of pragmatism (for consideration), we have outlined, in Table 1, what we believe are classical pragmatism's most general and important characteristics.

Although we endorse pragmatism as a philosophy that can help to build bridges between conflicting philosophies, pragmatism, like all current philosophies, has some shortcomings. In Table 2 we present some of these. Researchers who are interested in applying pragmatism in their works should consider the shortcomings, which also need to be addressed by philosophically inclined methodologists as they work on the project of developing a fully working philosophy for mixed methods research. Practicing researchers should be reflexive and strategic in avoiding the potential consequences of these weaknesses in their works.

Comparing Qualitative, Quantitative, and Mixed Methods Research

Mixed methods research is formally defined here as *the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study.* Philosophically, it is the "third wave" or third research movement, a movement that moves past the paradigm wars by offering a logical and practical alternative. Philosophically, mixed research makes use of the pragmatic method and system of philosophy. Its logic of inquiry includes the use of induction (or discovery of patterns), deduction (testing of theories and hypotheses), and abduction (uncovering and relying on the best of a set of explanations for understanding one's results) (e.g., de Waal, 2001).

Mixed methods research also is an attempt to legitimate the use of multiple approaches in answering research questions, rather than restricting or constraining researchers' choices (i.e., it rejects dogmatism). It is an expansive and creative form of research, not a limiting form of research. It is inclusive, pluralistic, and complementary, and it suggests that researchers take an eclectic approach to method selection and the thinking about and conduct of research. What is most fundamental is the research question—research methods should *follow* research questions in a way that

Table 1
General Characteristics of Pragmatism

- The project of pragmatism has been to find a middle ground between philosophical dogmatisms and skepticism and to find a workable solution (sometimes including outright rejection) to many longstanding philosophical dualisms about which agreement has not been historically forthcoming.
- Rejects traditional dualisms (e.g., rationalism vs. empiricism, realism vs. antirealism, free will vs. determinism, Platonic appearance vs. reality, facts vs. values, subjectivism vs. objectivism) and generally prefers more moderate and commonsense versions of philosophical dualisms based on how well they work in solving problems.
- Recognizes the existence and importance of the natural or physical world as well as the emergent social and psychological world that includes language, culture, human institutions, and subjective thoughts.
- Places high regard for the reality of and influence of the inner world of human experience in action.
- Knowledge is viewed as being both constructed *and* based on the reality of the world we experience and live in.
- Replaces the historically popular epistemic distinction between subject and external object with the naturalistic and process-oriented organism-environment transaction.
- Endorses fallibilism (current beliefs and research conclusions are rarely, if ever, viewed as perfect, certain, or absolute).
- Justification comes in the form of what Dewey called "warranted assertability."
- According to Peirce, "reasoning should not form a chain which is no stronger than its weakest link, but a cable whose fibers may be ever so slender, provided they are sufficiently numerous and intimately connected" (1868, in Menand, 1997, pp. 5–6).
- Theories are viewed instrumentally (they become true and they are true to different degrees based on how well they currently work; workability is judged especially on the criteria of predictability and applicability).
- Endorses eclecticism and pluralism (e.g., different, even conflicting, theories and perspectives can be useful; observation, experience, and experiments are all useful ways to gain an understanding of people and the world).
- Human inquiry (i.e., what we do in our day-to-day lives as we interact with our environments) is viewed as being analogous to experimental and scientific inquiry. We all try out things to see what works, what solves problems, and what helps us to survive. We obtain warranted evidence that provides us with answers that are ultimately tentative (i.e., inquiry provides the best answers we can currently muster), but, in the long run, use of this "scientific" or evolutionary or practical epistemology moves us toward larger Truths.
- Endorses a strong and practical empiricism as the path to determine what works.
- Views current truth, meaning, and knowledge as tentative and as changing over time. What we obtain on a daily basis in research should be viewed as provisional truths.
- Capital "T" Truth (i.e., absolute Truth) is what will be the "final opinion" perhaps at the end of history. Lowercase "t" truths (i.e., the instrumental and provisional truths that we obtain and live by in the meantime) are given through experience and experimenting.
- Instrumental truths are a matter of degree (i.e., some estimates are more true than others). Instrumental truth is not "stagnant," and, therefore, James (1995: 1907) states that we must "be ready tomorrow to call it falsehood."
- Prefers action to philosophizing (pragmatism is, in a sense, an anti-philosophy).
- Takes an explicitly value-oriented approach to research that is derived from cultural values; specifically endorses shared values such as democracy, freedom, equality, and progress.
- Endorses practical theory (theory that informs effective practice; praxis).
- Organisms are constantly adapting to new situations and environments. Our thinking follows a dynamic homeostatic process of belief, doubt, inquiry, modified belief, new doubt, new inquiry, . . . , in an infinite loop, where the person or researcher (and research community) constantly tries to improve upon past understandings in a way that fits and works in the world in which he or she operates. The present is always a new starting point.
- Generally rejects reductionism (e.g., reducing culture, thoughts, and beliefs to nothing more than neurobiological processes).
- Offers the "pragmatic method" for solving traditional philosophical dualisms as well as for making methodological choices.

offers the best chance to obtain useful answers. Many research questions and combinations of questions are best and most fully answered through mixed research solutions.

In order to mix research in an effective manner, researchers first need to consider all of the relevant characteristics of quantitative and qualitative research. For example, the major characteristics of traditional *quantitative* research are a focus on deduction, confirmation, theory/hypothesis testing, explanation, prediction, standardized data collection, and statistical analysis (see Table 3 for a more complete list). The major characteristics of traditional *qualitative* research are induction, discovery, exploration, theory/hypothesis generation, the researcher as the primary "instrument" of data collection, and qualitative analysis (see Table 4 for a more complete list).

Gaining an understanding of the strengths and weaknesses of quantitative and qualitative research puts a researcher in a position to mix or combine strategies and to use what Johnson and Turner (2003) call the *fundamental principle of mixed research.* According to this principle, researchers should collect multiple data using different strategies, approaches, and methods in such a way that the resulting mixture or combination is likely to result in complementary strengths and nonoverlapping weaknesses (also see Brewer & Hunter, 1989). Effective use of this principle is a major source of justification for mixed methods research because the product will be superior to monomethod studies. For example, adding qualitative interviews to experiments as a manipulation check and perhaps as a way to discuss directly the issues under investigation and tap into participants' perspectives

Table 2
Some Weaknesses of Pragmatism

- Basic research may receive less attention than applied research because applied research may appear to produce more immediate and practical results.
- Pragmatism may promote incremental change rather than more fundamental, structural, or revolutionary change in society.
- Researchers from a transformative-emancipatory framework have suggested that pragmatic researchers sometimes fail to provide a satisfactory answer to the question "For whom is a pragmatic solution useful?" (Mertens, 2003).
- What is meant by usefulness or workability can be vague unless explicitly addressed by a researcher.
- Pragmatic theories of truth have difficulty dealing with the cases of *useful but non-true* beliefs or propositions and *non-useful but true* beliefs or propositions.
- Many come to pragmatism looking for a way to get around many traditional philosophical and ethical disputes (this includes the developers of pragmatism). Although pragmatism has worked moderately well, when put under the microscope, many current philosophers have rejected pragmatism because of its logical (as contrasted with practical) failing as a solution to many philosophical disputes.
- Some neo-pragmatists such as Rorty (and postmodernists) completely reject correspondence truth in any form, which troubles many philosophers.

Table 3
Strengths and Weaknesses of Quantitative Research

Strengths

- Testing and validating already constructed theories about how (and to a lesser degree, why) phenomena occur.
- Testing hypotheses that are constructed before the data are collected. Can generalize research findings when the data are based on random samples of sufficient size.
- Can generalize a research finding when it has been replicated on many different populations and subpopulations.
- Useful for obtaining data that allow quantitative predictions to be made.
- The researcher may construct a situation that eliminates the confounding influence of many variables, allowing one to more credibly assess *cause-and-effect* relationships.
- Data collection using some quantitative methods is relatively quick (e.g., telephone interviews).
- Provides precise, quantitative, numerical data.
- Data analysis is relatively less time consuming (using statistical software).
- The research results are relatively independent of the researcher (e.g., effect size, statistical significance).
- It may have higher credibility with many people in power (e.g., administrators, politicians, people who fund programs).
- It is useful for studying large numbers of people.

Weaknesses

- The researcher's categories that are used may not reflect local constituencies' understandings.
- The researcher's theories that are used may not reflect local constituencies' understandings.
- The researcher may miss out on phenomena occurring because of the focus on theory or hypothesis *testing* rather than on theory or hypothesis *generation* (called the *confirmation bias*).
- Knowledge produced may be too abstract and general for direct application to specific local situations, contexts, and individuals.

and meanings will help avoid some potential problems with the experimental method. As another example, in a qualitative research study the researcher might want to qualitatively observe and interview, but supplement this with a closed-ended instrument to systematically measure certain factors considered important in the relevant research literature. Both of these examples could be improved (if the research questions can be studied this way) by adding a component that surveys a randomly selected sample from the population of interest to improve generalizability. If findings are corroborated across different approaches then greater confidence can be held in the singular conclusion; if the findings conflict then the researcher has greater knowledge and can modify interpretations and conclusions accordingly. In many cases the goal of mixing is not to search for corroboration but rather to expand one's understanding (Onwuegbuzie & Leech, 2004b).

Tables 3 and 4 are specifically designed to aid in the construction of a combination of qualitative and quantitative research. After determining one's research question(s), one can decide whether mixed research offers the best potential for an answer; if this is the case, then one can use the tables as an aid to help in deciding on the combination of complementary strengths and nonoverlapping weaknesses that is appropriate for a particular study. Table 5 shows some of the strengths and weaknesses of mixed methods research, which should aid in the decision to use or not use a mixed methods research approach for a given research study.

Development of a Mixed Methods Research Typology

Our mixed methods research typologies (*mixed-model* designs and *mixed-method* designs) resulted from our consideration of many other typologies (especially Creswell, 1994; Morgan, 1998; Morse, 1991; Patton, 1990; and Tashakkori & Teddlie, 1998), as well as several dimensions which one should consider when planning to conduct a mixed research study. For example, it has been noted that one can construct mixed-model designs by mixing qualitative and quantitative approaches within and across the stages of research (in a simplified view, one can consider a single study as having three *stages*: stating the research objective, collecting the data, and analyzing/interpreting the data; see mixed-model designs in Johnson & Christensen, 2004; Tashakkori & Teddlie, 1998). According to Morgan (1998) and Morse (1991), one also may consider the dimension of paradigm emphasis (deciding whether to give the quantitative and qualitative components of a mixed study equal status or to give one paradigm the dominant status). Time ordering of the qualitative and quantitative phases is another important dimension, and the phases can be carried out sequentially or concurrently. Our mixed-method designs (discussed below) are based on the crossing of paradigm emphasis and time ordering of the quantitative and qualitative phases. Another dimension for viewing mixed methods re-

Table 4
Strengths and Weaknesses of Qualitative Research

Strengths

- The data are based on the participants' own categories of meaning.
- It is useful for studying a limited number of cases in depth.
- It is useful for describing complex phenomena.
- Provides individual case information.
- Can conduct cross-case comparisons and analysis.
- Provides understanding and description of people's personal experiences of phenomena (i.e., the "emic" or insider's viewpoint).
- Can describe, in rich detail, phenomena as they are situated and embedded in local contexts.
- The researcher identifies contextual and setting factors as they relate to the phenomenon of interest.
- The researcher can study dynamic processes (i.e., documenting sequential patterns and change).
- The researcher can use the primarily qualitative method of "grounded theory" to generate inductively a tentative but explanatory theory about a phenomenon.
- Can determine how participants interpret "constructs" (e.g., self-esteem, IQ).
- Data are usually collected in naturalistic settings in qualitative research.
- Qualitative approaches are responsive to local situations, conditions, and stakeholders' needs.
- Qualitative researchers are responsive to changes that occur during the conduct of a study (especially during extended fieldwork) and may shift the focus of their studies as a result.
- Qualitative data in the words and categories of participants lend themselves to exploring how and why phenomena occur.
- One can use an important case to demonstrate vividly a phenomenon to the readers of a report.
- Determine *idiographic* causation (i.e., determination of causes of a particular event).

Weaknesses

- Knowledge produced may not generalize to other people or other settings (i.e., findings may be unique to the relatively few people included in the research study).
- It is difficult to make quantitative predictions.
- It is more difficult to test hypotheses and theories.
- It may have lower credibility with some administrators and commissioners of programs.
- It generally takes more time to collect the data when compared to quantitative research.
- Data analysis is often time consuming.
- The results are more easily influenced by the researcher's personal biases and idiosyncrasies.

search is the degree of mixture, which would form a continuum from monomethod to fully mixed methods. Another dimension pertains to where mixing should occur (e.g., in the objective[s], methods of data collection, research methods, during data analysis, data interpretation). Yet another important dimension is whether one wants to take a critical theory/transformative-emancipatory (Mertens, 2003) approach or a less explicitly ideological approach to a study. Ultimately, the possible number of ways that studies can involve mixing is very large because of the many potential classification dimensions. It is a key point that mixed methods research truly opens up an exciting and almost unlimited potential for future research.

Toward a Parsimonious Typology of Mixed Research Methods

The majority of mixed methods research designs can be developed from the two major types of mixed methods research: *mixed-model* (mixing qualitative and quantitative approaches within or across the *stages* of the research process) and *mixed-method* (the inclusion of a quantitative *phase* and a qualitative *phase* in an overall research study). Six mixed-model designs are shown in Figure 1 (see Designs 2 through 7). These six designs are called *across-stage mixed-model designs* because the mixing takes place across the stages of the research process. An example of a *within-stage mixed-model design* would be the use of a questionnaire that includes a summated rating scale (quantitative data collection) and one or more open-ended questions (qualitative data collection).

Nine mixed-method designs are provided in Figure 2. The notation used (based on Morse, 1991) is explained at the bottom of the table. To construct a mixed-method design, the researcher must make two primary decisions: (a) whether one wants to operate largely within one dominant paradigm or not, and (b) whether one wants to conduct the phases concurrently or sequentially. In contrast to mixed-model designs, mixed-method designs are similar to conducting a quantitative mini-study and a qualitative mini-study in one overall research study. Nonetheless, to be considered a mixed-method design, the findings must be mixed or integrated at some point (e.g., a qualitative phase might be conducted to inform a quantitative phase, sequentially, or if the quantitative and qualitative phases are undertaken concurrently the findings must, at a minimum, be integrated during the interpretation of the findings).

It is important to understand that *one can easily create more user specific and more complex designs* than the ones shown in Figures 1 and 2. For example, one can develop a mixed-method design that has more stages (e.g., Qual → QUAN → Qual); one also can design a study that includes both mixed-model and mixed-method design features. The point is for the researcher to be creative and not be limited by the designs listed in this article. Furthermore, sometimes a design may emerge during a study in new ways, depending on the conditions and information that is obtained. A tenet of mixed methods research is that researchers should mindfully create designs that effectively answer their research questions; this stands in contrast to the common approach in traditional quantitative research where students are given a menu of designs from which to select.[8, 9] It also stands in stark contrast to the approach where one completely follows either the qualitative paradigm or the quantitative paradigm.

Table 5
Strengths and Weaknesses of Mixed Research

Strengths

- Words, pictures, and narrative can be used to add meaning to numbers.
- Numbers can be used to add precision to words, pictures, and narrative.
- Can provide quantitative and qualitative research strengths (i.e., see strengths listed in Tables 3 and 4).
- Researcher can generate and test a grounded theory.
- Can answer a broader and more complete range of research questions because the researcher is not confined to a single method or approach.
- The specific mixed *research designs* discussed in this article have specific strengths and weaknesses that should be considered (e.g., in a two-stage sequential design, the Stage 1 results can be used to develop and inform the purpose and design of the Stage 2 component).
- A researcher can use the strengths of an additional method to overcome the weaknesses in another method by using both in a research study.
- Can provide stronger evidence for a conclusion through convergence and corroboration of findings.
- Can add insights and understanding that might be missed when only a single method is used.
- Can be used to increase the generalizability of the results.
- Qualitative and quantitative research used together produce more complete knowledge necessary to inform theory and practice.

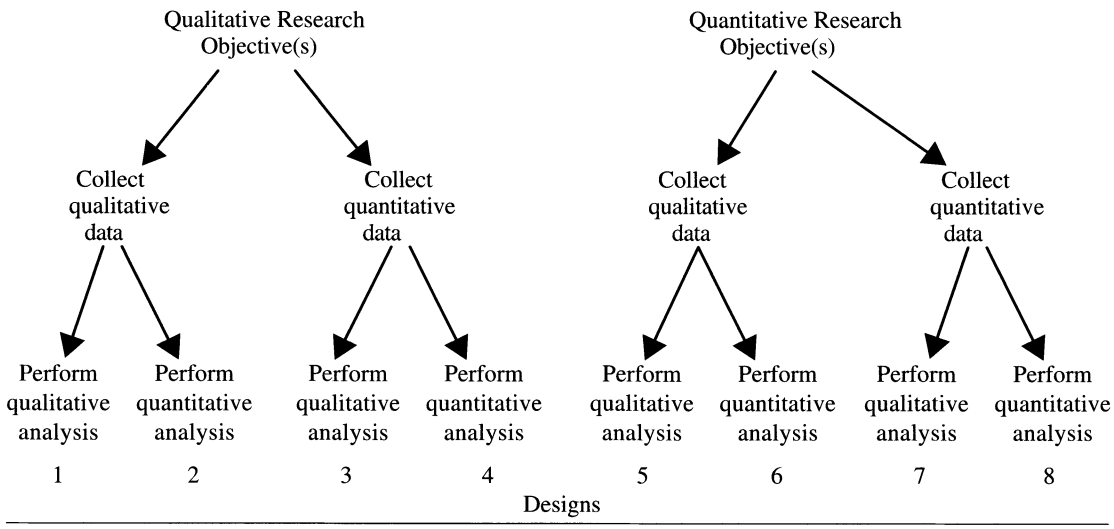
Weaknesses

- Can be difficult for a single researcher to carry out both qualitative and quantitative research, especially if two or more approaches are expected to be used concurrently; it may require a research team.
- Researcher has to learn about multiple methods and approaches and understand how to mix them appropriately.
- Methodological purists contend that one should always work within either a qualitative or a quantitative paradigm.
- More expensive.
- More time consuming.
- Some of the details of mixed research remain to be worked out fully by research methodologists (e.g., problems of paradigm mixing, how to qualitatively analyze quantitative data, how to interpret conflicting results).

A Mixed Methods Research Process Model

Our mixed methods research process model comprises eight distinct steps: (1) determine the research question; (2) determine whether a mixed design is appropriate; (3) select the mixed-method or mixed-model research design; (4) collect the data; (5) analyze the data; (6) interpret the data; (7) legitimate the data; and (8) draw conclusions (if warranted) and write the final report. These steps are displayed in Figure 3. Although mixed research starts with a purpose and one or more research questions, the rest of the steps can vary in order (i.e., they are not necessarily linear or unidirectional), and even the question and/or purpose can be revised when needed. Figure 3 shows several arrows leading from later steps to earlier steps indicating that mixed research involves a cyclical, recursive, and interactional process. Recursion can take place within a single study (especially an extended study); recursion can also take place across related studies by informing future research and leading to new or reformulated research purposes and questions.

Three steps in the mixed methods research process warrant some further discussion, especially purpose (Step 2), data analysis (Step 5), and legitimation (Step 7). As noted by Greene et al. (1989), there are five major purposes or rationales for conducting



Note. Designs 1 and 8 on the outer edges are the monomethod designs. The mixed-model designs are Designs 2, 3, 4, 5, 6, and 7.[10]

FIGURE 1. *Monomethod and mixed-model designs.*

Paradigm Emphasis Decision	Time Order Decision: Concurrent	Time Order Decision: Sequential
Equal Status	QUAL + QUAN	QUAL → QUAN QUAN → QUAL
Dominant Status	QUAL + quan QUAN + qual	QUAL → quan qual → QUAN QUAN → qual quan → QUAL

Note. "qual" stands for qualitative, "quan" stands for quantitative, "+" stands for concurrent, "→" stands for sequential, capital letters denote high priority or weight, and lower case letters denote lower priority or weight.[11]

FIGURE 2. *Mixed-method design matrix with mixed-method research designs shown in the four cells.*

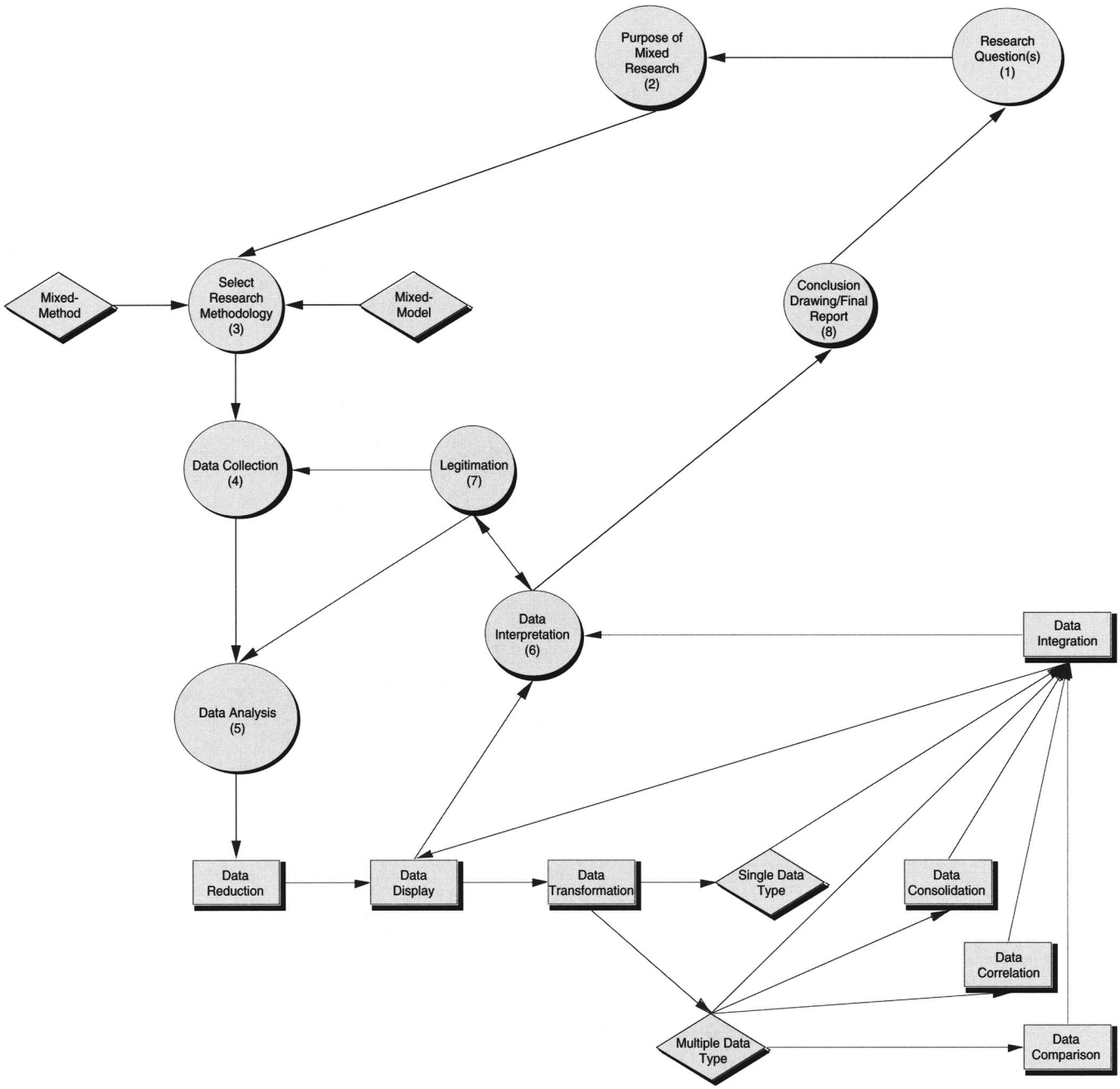
mixed methods research: (a) triangulation (i.e., seeking convergence and corroboration of results from different methods and designs studying the same phenomenon); (b) complementarity (i.e., seeking elaboration, enhancement, illustration, and clarification of the results from one method with results from the other method); (c) initiation (i.e., discovering paradoxes and contradictions that lead to a re-framing of the research question); (d) development (i.e., using the findings from one method to help inform the other method); and (e) expansion (i.e., seeking to expand the breadth and range of research by using different methods for different inquiry components).

The mixed methods research process model incorporates Onwuegbuzie and Teddlie's (2003) seven-stage conceptualization of the mixed methods data analysis process. According to these authors, the seven data analysis stages are as follows: (a) data reduction, (b) data display, (c) data transformation, (d) data correlation, (e) data consolidation, (f) data comparison, and (g) data integration. *Data reduction* involves reducing the dimensionality of the qualitative data (e.g., via exploratory thematic analysis, memoing) and quantitative data (e.g., via descriptive statistics, exploratory factor analysis, cluster analysis). *Data display*, involves describing pictorially the qualitative data (e.g., matrices, charts, graphs, networks, lists, rubrics, and Venn diagrams) and quantitative data (e.g., tables, graphs). This is followed (optionally) by the *data transformation* stage, wherein quantitative data are converted into narrative data that can be analyzed qualitatively (i.e., *qualitized*; Tashakkori & Teddlie, 1998) and/or qualitative data are converted into numerical codes that can be represented statistically (i.e., *quantitized*; Tashakkori & Teddlie, 1998). *Data correlation* involves the quantitative data being correlated with the qualitized data or the qualitative data being correlated with the quantitized data. This is followed by *data consolidation*, wherein both quantitative and qualitative data are combined to create new or consolidated variables or data sets. The next stage, *data comparison* involves comparing data from the qualitative and quantitative data sources. *Data integration* characterizes the final stage, whereby both quantitative and qualitative data are integrated into either a coherent whole or two separate sets (i.e., qualitative and quantitative) of coherent wholes.

The *legitimation* step involves assessing the trustworthiness of both the qualitative and quantitative data and subsequent interpretations. Frameworks such as the Quantitative Legitimation Model (Onwuegbuzie, 2003; which contains 50 sources of invalidity for the quantitative component of the mixed methods research at the data collection, data analysis, and data interpretation stages of the study) and the Qualitative Legitimation Model (Onwuegbuzie, 2000; Onwuegbuzie, Jiao, & Bostick, 2004; which contains 29 elements of legitimation for the qualitative component of the mixed methods research at the data collection, data analysis, and data interpretation stages of the study) can be used to assess the legitimacy of the qualitative and quantitative phases of the study, respectively. We have begun working on a validity or legitimation typology specifically for mixed research in Onwuegbuzie and Johnson (2004). It is important to note that the legitimation process might include additional data collection, data analysis, and/or data interpretation until as many rival explanations as possible have been reduced or eliminated.

The Future of Mixed Methods Research in Education

Mixed research actually has a long history in research practice because practicing researchers frequently ignore what is written by methodologists when they feel a mixed approach will best help them to answer their research questions. It is time that methodologists catch up with practicing researchers! It is now time that all researchers and research methodologists formally recognize the third research paradigm and begin systematically writing about it and using it. In general we recommend *contingency theory* for research approach selection, which accepts that quantitative, qualitative, and mixed research *are all superior under different cir-*



Note. Circles represent steps (1–8) in the mixed research process; rectangles represent steps in the mixed data analysis process; diamonds represent components.

FIGURE 3. *Mixed research process model.*

cumstances and it is the researcher's task to examine the specific contingencies and make the decision about which research approach, or which combination of approaches, should be used in a specific study. In this article we have outlined the philosophy of pragmatism, we have described mixed research and provided specific mixed-model and mixed-method designs, and we have discussed the fundamental principle of mixed research and provided tables of quantitative and qualitative research strengths and weaknesses to help apply the principle. Also, we have provided a mixed methods process model to help readers visualize the process. We hope we have made the case that mixed methods research is here to stay and that it should be widely recognized in education, as well as in our sister disciplines in the social and behavioral sciences, as the third major research paradigm.

As noted by Sechrest and Sidana (1995), growth in the mixed methods (i.e., pragmatist) movement has the potential to reduce some of the problems associated with singular methods. By utilizing quantitative and qualitative techniques within the same framework, mixed methods research can incorporate the strengths of both methodologies. Most importantly, investigators who conduct mixed methods research are more likely to select methods and approaches with respect to their underlying research questions, rather than with regard to some preconceived biases about which research paradigm should have hegemony in

social science research. By narrowing the divide between quantitative and qualitative researchers, mixed methods research has a great potential to promote a shared responsibility in the quest for attaining accountability for educational quality. The time has come for mixed methods research.

NOTES

[1] Thomas Kuhn (1962) popularized the idea of a paradigm. Later, when he was asked to explain more precisely what he meant by the term, he pointed out that it was a general concept and that it included a group of researchers having a common education and an agreement on "exemplars" of high quality research or thinking (Kuhn, 1977). In this article, by *research paradigm* we mean a set of beliefs, values, and assumptions that a community of researchers has in common regarding the nature and conduct of research. The beliefs include, but are not limited to, ontological beliefs, epistemological beliefs, axiological beliefs, aesthetic beliefs, and methodological beliefs. In short, as we use the term, a research paradigm refers to a research culture. We will be arguing that there is now a trilogy of major research paradigms: qualitative research, quantitative research, and mixed methods research.

[2] Campbell modified his view of qualitative research over time. For example, based on criticisms by qualitative and case study researchers of his term "one-shot case study" (which, unfortunately, is still used in several educational research books), Campbell changed this design name to the one-group posttest-only design; he made this change as part of his endorsement of case study research as an important research approach (e.g., see Campbell's introduction to Yin's case study research book: Yin, 1984).

[3] We do not mean to imply that there is anything inherently wrong with taking an extreme intellectual position. Most of the great thinkers in the history of philosophy and science (including social and behavioral science) were "extreme" for their times. Also, both qualitative and quantitative philosophies continue to be highly useful (i.e., both have many advantages when used in their pure forms).

[4] *Positivism* is a poor choice for labeling quantitative researchers today because positivism has long been replaced by newer philosophies of science (Yu, 2003). The term is more of a straw man (easily knocked down) for attack than standing for any actual practicing researchers. A term that better represents today's practicing quantitative researchers is *post-positivism* (Phillips & Burbules, 2000).

[5] Both of the authors of the current article prefer the label *mixed research* or *integrative research* rather than *mixed methods research*. The alternative labels are broader, more inclusive, and more clearly paradigmatic. We chose to use the term *mixed methods* in this article because of its current popularity.

[6] Here is a practical definition of science from an educational research textbook (Johnson & Christensen, 2004) that should be inclusive of quantitative and qualitative research: ". . . the root of the word science is the Latin *scientia*, which simply means 'knowledge.' *We define* science *in this book in a way that is inclusive of the different approaches to educational research.* We define science as an approach for the generation of knowledge that places high regard for empirical data and follows certain norms and practices that develop over time because of their usefulness. . . . The ultimate objective of most social, behavioral, and educational research is improvement of the world or social betterment."

[7] This is a very interesting empirical question that deserves more attention in the literature.

[8] Note that Shadish, Cook, and Campbell (2002) have attempted to move quantitative research away from this traditional "menu" approach. In this latest edition of Campbell and Stanley (1963), there is increased focus on understanding how to construct or create a research design that fits a particular situation.

[9] For additional mixed-method designs, see Creswell, Plano, Clark, Guttmann, and Hanson, 2003; Maxwell and Loomis, 2003.

[10] Here is the etiology of Figure 1: As far as we know, Patton (1990) first listed 6 of the mixed model designs (Designs 1, 2, 3, 5, 6, and 8). Then Tashakkori and Teddlie (1998) built on this by adding two designs (Designs 4 and 7) that were left out by Patton and they changed some labels to better fit their thinking (e.g., they introduced the term *mixed model*). Finally, in its present form, we first used (in an AERA conference paper) the full set of eight designs identified by Tashakkori and Teddlie (1998) while changing some labels to better fit our conceptualization. The term monomethods probably originated in Campbell and Fiske (1959).

[11] In developing Figure 2, we were probably most influenced by Morgan (1998), Morse (1991), and Tashakkori and Teddlie (1998). Several of the designs shown in the figure were introduced by Morse (1991).

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