

Research dilemmas: Paradigms, methods and methodology

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In this article the authors discuss issues faced by early career researchers, including the dichotomy, which many research textbooks and journal articles create and perpetuate between qualitative and quantitative research methodology despite considerable literature to support the use of mixed methods. The authors review current research literature and discuss some of the language, which can prove confusing to the early career researcher and problematic for post-graduate supervisors and teachers of research. The authors argue that discussions of research methods in research texts and university courses should include mixed methods and should address the perceived dichotomy between qualitative and quantitative research methodology.

Introduction

Social scientists have come to abandon the spurious choice between qualitative and quantitative data; they are concerned rather with that combination of both which makes use of the most valuable features of each. The problem becomes one of determining at which points he [sic] should adopt the one, and at which the other, approach (Merton & Kendall, 1946, pp.556-557).

Given that the qualitative/quantitative debate has been discussed for half a century you could be forgiven for questioning the need for another article, which includes this topic. However, many university courses and research texts continue to discuss research in terms of 'qualitative' or 'quantitative' methods. When research is described in such terms, confusion may be created for the undergraduate student, first time or early career researcher. The research process is already a daunting prospect to the inexperienced researcher and the ongoing debate and contradictory information adds to the confusion. This is further exacerbated by laypeople that continually ask researchers whether their research is qualitative or quantitative. By writing this article, the authors aim to assist first time and early career researchers make considered decisions about the type of study they may undertake, the process involved in undertaking a research project and the debates in the literature surrounding theoretical frameworks underpinning research. Associated definitions and constructs will also be discussed.

This article begins with a discussion of research paradigms, providing definitions and discussion of the role of paradigms in educational research. Paradigms receive varied attention in research texts. The role of the paradigm can, therefore, appear somewhat mysterious. It is, therefore, a priority of this article to 'demystify' the role of paradigms in research. The article then moves to a discussion of methodology as it relates to the research paradigm. In some research discussions methodology appears to be central and may even be seen to replace what is in effect the pre-ordinate role of the paradigm. In this article the authors discuss how the research paradigm and methodology work together to form a research study. The qualitative, quantitative and mixed methods debate is then discussed as it pertains to the decisions that need to be made by the researcher. A diagram is provided to show the 'research journey' although the authors acknowledge that the research process

is more cyclical than linear. More than 40 widely available research texts were reviewed during the preparation of this article, with particular attention given to the treatment of paradigms, methods and methodology.

Research paradigms

Research has been described as a systematic investigation (Burns, 1997) or inquiry whereby data are collected, analysed and interpreted in some way in an effort to "understand, describe, predict or control an educational or psychological phenomenon or to empower individuals in such contexts" (Mertens, 2005, p.2). O'Leary (2004) puts forward the argument that what was relatively simple to define thirty or forty years ago has become far more complex in recent times with the number of research methods increasing dramatically, "particularly in the social/applied sciences" (p.8). It has been suggested, however, that the "exact nature of the definition of research is influenced by the researcher's theoretical framework" (Mertens, 2005, p.2) with theory being used

to establish relationships between or among constructs that describe or explain a phenomenon by going beyond the local event and trying to connect it with similar events (Mertens, 2005, p.2).

The theoretical framework, as distinct from a theory, is sometimes referred to as the paradigm (Mertens, 2005; Bogdan & Biklen, 1998) and influences the way knowledge is studied and interpreted. It is the choice of paradigm that sets down the intent, motivation and expectations for the research. Without nominating a paradigm as the first step, there is no basis for subsequent choices regarding methodology, methods, literature or research design. Paradigms are not discussed in all research texts and are given varied emphasis and sometimes conflicting definitions. In some research texts, paradigms are discussed at the beginning of the text along-side research design, while others may make only passing reference to paradigms at a much later stage or make no reference to paradigms at all. This may lead the first time or early career researcher to wonder where the notion of paradigm fits into the research course of action and to question its relevance. The term 'paradigm' may be defined as "a loose collection of logically related assumptions, concepts, or propositions that orient thinking and research" (Bogdan & Biklen 1998, p.22) or the philosophical intent or motivation for undertaking a study (Cohen & Manion 1994, p.38). Alternatively, Mac Naughton, Rolfe and Siraj-Blatchford (2001) provide a definition of paradigm, which includes three elements: a belief about the nature of knowledge, a methodology and criteria for validity (p.32). Some authors prefer to discuss the interpretive framework in terms of 'knowledge claims' (Creswell, 2003); epistemology or ontology; or even research methodologies (Neuman, 2000) rather than referring to paradigms. A number of theoretical paradigms are discussed in the literature such as: positivist (and postpositivist), constructivist, interpretivist, transformative, emancipatory, critical, pragmatism and deconstructivist. The use of different terms in different texts and the varied claims regarding how many research paradigms there are, sometimes leads to confusion for the first time or early career researcher. Definitions of some of the more common paradigms referred to in research texts follow.

Postpositivist (and positivist) paradigm

Positivism is sometimes referred to as 'scientific method' or 'science research', is "based on the rationalistic, empiricist philosophy that originated with Aristotle, Francis Bacon, John Locke, August Comte, and Emmanuel Kant" (Mertens, 2005, p.8) and "reflects a deterministic philosophy in which causes probably determine effects or outcomes" (Creswell, 2003, p.7). Positivism may be applied to the social world on the assumption that "the social world can be studied in the same way as the natural world, that there is a method for studying the social world that is value free, and that explanations of a causal nature can be provided" (Mertens, 2005, p.8). Positivists aim to test a theory or describe an experience "through observation and measurement in order to predict and control forces that surround us" (O'Leary, 2004, p.5). Positivism was replaced after World War II (Mertens, 2005) by postpositivism. Postpositivists work from the assumption that any piece of research is

influenced by a number of well-developed theories apart from, and as well as, the one which is being tested (Cook & Campbell, 1979, p.24). Also, since Thomas Khun, (1962) theories are held to be provisional and new understandings may challenge the whole theoretical framework. In contrast, O'Leary (2004), provides a definition of postpositivism which aligns in some sense with the constructivist paradigm claiming that postpositivists see the world as ambiguous, variable and multiple in its realities - "what might be the truth for one person or cultural group may not be the "truth" for another" (p.6). O'Leary (2004) suggests that postpositivism is intuitive and holistic, inductive and exploratory with findings that are qualitative in nature (pp.6-7). This definition of postpositivism seems to be in conflict with the more widely used definition provided by Mertens (2005). Positivists and postpositivist research is most commonly aligned with quantitative methods of data collection and analysis.

Interpretivist/constructivist paradigm

The interpretivist/constructivist paradigm grew out of the philosophy of Edmund Husserl's phenomenology and Wilhelm Dilthey's and other German philosophers' study of interpretive understanding called hermeneutics (Mertens, 2005, p.12 citing Eichelberger, 1989). Interpretivist/constructivist approaches to research have the intention of understanding "the world of human experience" (Cohen & Manion, 1994, p.36), suggesting that "reality is socially constructed" (Mertens, 2005, p.12). The interpretivist/constructivist researcher tends to rely upon the "participants' views of the situation being studied" (Creswell, 2003, p.8) and recognises the impact on the research of their own background and experiences. Constructivists do not generally begin with a theory (as with postpositivists) rather they "generate or inductively develop a theory or pattern of meanings" (Creswell, 2003, p.9) throughout the research process. The constructivist researcher is most likely to rely on qualitative data collection methods and analysis or a combination of both qualitative and quantitative methods (mixed methods). Quantitative data may be utilised in a way, which supports or expands upon qualitative data and effectively deepens the description.

Transformative paradigm

According to Mertens (2005) the transformative paradigm arose during the 1980s and 1990s partially due to dissatisfaction with the existing and dominant research paradigms and practices but also because of a realisation that much sociological and psychological theory which lay behind the dominant paradigms "had been developed from the white, able-bodied male perspective and was based on the study of male subjects" (Mertens, 2005 p.17). Transformative researchers felt that the interpretivist/constructivist approach to research did not adequately address issues of social justice and marginalised peoples (Creswell, 2003, p.9). Transformative researchers "believe that inquiry needs to be intertwined with politics and a political agenda" (Creswell, 2003, p.9) and contain an action agenda for reform "that may change the lives of the participants, the institutions in which individuals work or live, and the researcher's life" (Creswell, 2003, pp.9-10). Transformative researchers may utilise qualitative and quantitative data collection and analysis methods in much the same way as the interpretivist/constructivists. However, a mixed methods approach provides the transformative researcher structure for the development of "more complete and full portraits of our social world through the use of multiple perspectives and lenses" (Somekh & Lewin, 2005, p.275), allowing for an understanding of "greater diversity of values, stances and positions" (Somekh & Lewin, 2005, p.275).

Pragmatic paradigm

Pragmatism is not committed to any one system of philosophy or reality. Pragmatist researchers focus on the 'what' and 'how' of the research problem (Creswell, 2003, p.11). Early pragmatists "rejected the scientific notion that social inquiry was able to access the 'truth' about the real world solely by virtue of a single scientific method" (Mertens, 2005, p.26). While pragmatism is seen as the paradigm that provides the underlying philosophical framework for mixed-methods research

(Tashakkori & Teddlie, 2003; Somekh & Lewin, 2005) some mixed-methods researchers align themselves philosophically with the transformative paradigm (Mertens, 2005). It may be said, however, that mixed methods could be used with any paradigm. The pragmatic paradigm places "the research problem" as central and applies all approaches to understanding the problem (Creswell, 2003, p.11). With the research question 'central', data collection and analysis methods are chosen as those most likely to provide insights into the question with no philosophical loyalty to any alternative paradigm.

Paradigm language

When reading research texts, confusion can be created when authors use different terms to discuss paradigms. Table 1 has been developed using the language identified in a range of research texts and grouped according to their alignment with the broad paradigm groups discussed above. While the major paradigms will have an overall framework consistent with the definitions provided above, specific research paradigms may have particular features, which differentiate them from other paradigms within the same group. For example, while feminist and neo-Marxist research both fall within the transformative paradigm they have unique features, which are specific to their particular approach.

Methodology and paradigms

In reviewing research texts for this article, the authors were surprised to discover that a large number of texts provided no definition for the terms *methodology* or *method*, some texts use the terms interchangeably and others use them as having different meanings. According to the Macquarie Dictionary (3rd Ed) *methodology* is

the science of methods, especially: **a.** a branch of logic dealing with the logical principles underlying the organisation of the various special sciences, and the conduct of scientific inquiry. **b.** *Education* a branch of pedagogics concerned with the analysis and evaluation of subject matter and methods of teaching (p.718).

Table 1: Paradigms: Language commonly associated with major research paradigms

Positivist/ Postpositivist	Interpretivist/ Constructivist	Transformative	Pragmatic
Experimental Quasi-experimental Correlational Reductionism Theory verification Causal comparative Determination Normative	Naturalistic Phenomenological Hermeneutic Interpretivist Ethnographic Multiple participant meanings Social and historical construction Theory generation Symbolic interaction	Critical theory Neo-marxist Feminist Critical Race Theory Freirean Participatory Emancipatory Advocacy Grand Narrative Empowerment is sue oriented Change-oriented Interventionist Queer theory Race specific Political	Consequences of actions Problem-centred Pluralistic Real-world practice oriented Mixed models
Adapted from Mertens (2005) and Creswell (2003)			

This definition is consistent with much of the literature (Leedy & Ormrod, 2005; Schram, 2006) despite it being a generic definition as opposed to one which is discipline or research specific. Somekh and Lewin (2005) define methodology as both "the collection of methods or rules by which a particular piece of research is undertaken" and the "principles, theories and values that underpin a particular approach to research" (p.346) while Walter (2006) argues that methodology is the frame of reference for the research which is influenced by the "paradigm in which our theoretical perspective is placed or developed" (p.35). The most common definitions suggest that *methodology* is the overall approach to research linked to the paradigm or theoretical framework while the *method* refers to systematic modes, procedures or tools used for collection and analysis of data.

Matching paradigms and methods

Readers are advised by the literature that research, which applies the positivist or postpositivist paradigm, tends to predominantly use quantitative approaches (methods) to data collection and analysis, though not necessarily exclusively, while the interpretivist/constructivist paradigm generally operates using predominantly qualitative methods (Silverman, 2000; Wiersma, 2000; Bogdan & Biklen 1998; Mertens, 1998; Burns, 1997; Cohen & Manion 1994; Glesne & Peshkin 1992). The pragmatic paradigm provides an opportunity for "multiple methods, different worldviews, and different assumptions, as well as different forms of data collection and analysis in the mixed methods study" (Creswell, 2003, p.12). Likewise the transformative paradigm allows for the application of both qualitative and quantitative research methods. Deconstructivist and in particular poststructuralist research "seeks to understand the dynamics of relationships between the knowledge/meaning, power and identity" (Mac Naughton et al, 2001, p.46) applying data collected and analysed using qualitative methods. Poststructuralists emphasise the local nature of knowledge placing strict limits on the validity of the knowledge gathered and produced (Mac Naughton et al, 2001). Table 2, indicates the ways in which research methods cross paradigm boundaries.

Table 2: Paradigms, methods and tools

Paradigm	Methods (primarily)	Data collection tools (examples)
Positivist/ Postpositivist	Quantitative. "Although qualitative methods can be used within this paradigm, quantitative methods tend to be predominant . . ." (Mertens, 2005, p. 12)	Experiments Quasi-experiments Tests Scales
Interpretivist/ Constructivist	Qualitative methods predominate although quantitative methods may also be utilised.	Interviews Observations Document reviews Visual data analysis
Transformative	Qualitative methods with quantitative and mixed methods. <i>Contextual and historical factors described, especially as they relate to oppression</i> (Mertens, 2005, p. 9)	Diverse range of tools - particular need to avoid discrimination. Eg: sexism, racism, and homophobia.
Pragmatic	Qualitative and/or quantitative methods may be employed. Methods are matched to the specific questions and purpose of the research.	May include tools from both positivist and interpretivist paradigms. Eg Interviews, observations and testing and experiments.

This suggests that it is the paradigm and research question, which should determine which research data collection and analysis methods (qualitative/quantitative or mixed methods) will be most

appropriate for a study. In this way researchers are not quantitative, qualitative or mixed methods researchers, rather a researcher may apply the data collection and analysis methods most appropriate for a particular research study. It may in fact be possible for any and all paradigms to employ mixed methods rather than being restricted to any one method, which may potentially diminish and unnecessarily limit the depth and richness of a research project.

Qualitative or quantitative? Methodology or method?

In the literature the terms *qualitative* and *quantitative* are often used in two distinct discourses, one relating to what is more commonly understood to be the research paradigm and the second referring to research methods. This is illustrated the following definition.

At one level quantitative and qualitative refers to distinctions about the nature of knowledge: how one understands the world and the ultimate purpose of the research. On another level of discourse, the terms refer to research methods - how data are collected and analysed - and the types of generalizations and representations derived from the data (McMillan & Schumacher, 2006, p. 12).

Confusion for the first time researcher or early career researcher is created by informal reference to researchers as qualitative or quantitative researchers and research as qualitative or quantitative research. This is further exacerbated by research texts, which utilise these terms within their titles, suggesting a purity of method, which is potentially impossible in social research. O'Leary (2004) argues another way of thinking about these terms by defining qualitative and quantitative as

adjectives for types of data and their corresponding modes of analysis, i.e. qualitative data - data represented through words, pictures, or icons analyzed using thematic exploration; and quantitative data - data that is represented through numbers and analyzed using statistics (p.99).

This definition suggests that the terms qualitative and quantitative refer to the data collection methods, analysis and reporting modes instead of the theoretical approach to the research. While acknowledging that some research texts refer to quantitative, qualitative and mixed-methods as paradigms (see Table 1) the authors will use the terms quantitative and qualitative to refer to methods of data collection, analysis and reporting.

Can qualitative and quantitative methods be combined?

As discussed earlier, the use of the term 'paradigm' in this article is reserved for the philosophical intent or underlying theoretical framework and motivation of the researcher with regard to the research. While data collection methods can be combined, a researcher usually aligns philosophically with one of the recognised research paradigms, which proceed from different premises, leading to and seeking different outcomes (Wiersma, 2000). According to Mertens (2005, p.7) a "researcher's theoretical orientation has implications for every decision made in the research process, including the choice of method" (pp.3-4).

Educational research traditionally followed the empirical "objective scientific model" (Burns, 1997, p.3) which utilised quantitative methods of data collection, analysis and reporting modes. In the 1960s there was a move towards a more constructivist approach which allowed for methods which were "qualitative, naturalistic and subjective" (p.3) in nature. It would appear that at the time there was considerable debate regarding the introduction of this form of data collection. This philosophical debate "left educational research divided between two competing methods: the scientific empirical tradition, and the naturalistic phenomenological mode" (Burns, 1997, p.3).

More recently, research approaches have become more complex in design and more flexible in their

application of methods with mixed-methods being more acceptable and common. A mixed-methods approach to research is one that involves

gathering both numeric information (e.g., on instruments) as well as text information (e.g., on interviews) so that the final database represents both quantitative and qualitative information (Creswell, 2003, p.20).

According to Gorard (2004) combined or mixed-methods research has been identified as a "key element in the improvement of social science, including education research" (p.7) with research strengthened by the use of a variety of methods. Gorard (2004) argues that mixed method research "requires a greater level of skill" (p.7), "can lead to less waste of potentially useful information" (p.7), "creates researchers with an increased ability to make appropriate criticisms of all types of research" (p. 7) and often has greater impact,

because figures can be very persuasive to policy-makers whereas stories are more easily remembered and repeated by them for illustrative purposes (p.7).

Many researchers including Creswell (2003), Thomas (2003) and Krathwohl, (1993) now view qualitative and quantitative methods as complementary choosing the most appropriate method/s for the investigation. While some paradigms may appear to lead a researcher to favour qualitative or quantitative approaches, in effect no one paradigm actually prescribes or prohibits the use of either methodological approach. However, this may not sit comfortably with researchers who are strongly aligned with a particular approach to research. Almost inevitably in each paradigm, if the research is to be fully effective, both approaches need to be applied. It is unduly impoverished research, which eschews the use of both qualitative and quantitative research approaches. Paradigms, which overtly recommend mixed methods approaches allow the question to determine the data collection and analysis methods applied, collecting both quantitative and qualitative data and integrating the data at different stages of inquiry (Creswell, 2003).

The research process

While this article does not suggest that research projects ever follow a neat linear path, the steps and decisions made by the researcher may look something like Figure 1, which has been used to situate paradigms, methodology and data collection tools within the research process. Although represented in a linear fashion in the diagram, the process is more realistically cyclical with the researcher returning to earlier steps while at the same time moving ahead to later steps. As the research progresses changes may be made that could be subtle or significant.

Discussion

In this article the authors have exposed the various approaches undertaken by many writing in the field through a review of research books. In this review it has been found that many writers fail to adequately define research terminology and sometimes use terminology in a way that is not compatible in its intent, omitting significant concepts and leaving the reader with only part of the picture. Texts are sometimes structured in a way that does not provide a clear path to information terms and major concepts crucial to assist those undertaking the research process especially for the first time. The research process for early career researchers can be a complex task which may be compounded by text books (and university courses) which fail to adequately substantiate the difficulties of the process, fail to explore the role of the research paradigm and perpetuate a perceived and unhelpful dichotomy between qualitative and quantitative methodology despite the plethora of research which is now combining the two. The role of the paradigm is paramount to the choice of methodology and yet this is not addressed effectively in many of the research texts reviewed. Wider acceptance and employment of mixed method research can only enrich and strengthen educational research through the application of qualitative and quantitative methods in

complementary ways and should therefore be clearly described and explored within research texts. Mixed method is itself a statement of what could be, rather than a groundbreaking notion, especially in the instance of educational research. Mixed method, like all research approaches, needs to be viewed through a critical lens while at the same time recognising as valid its contribution to the field of research. Research books are designed to assist students and researchers in understanding the research process but instead many are baffling readers and adding to confusion and misconceptions.

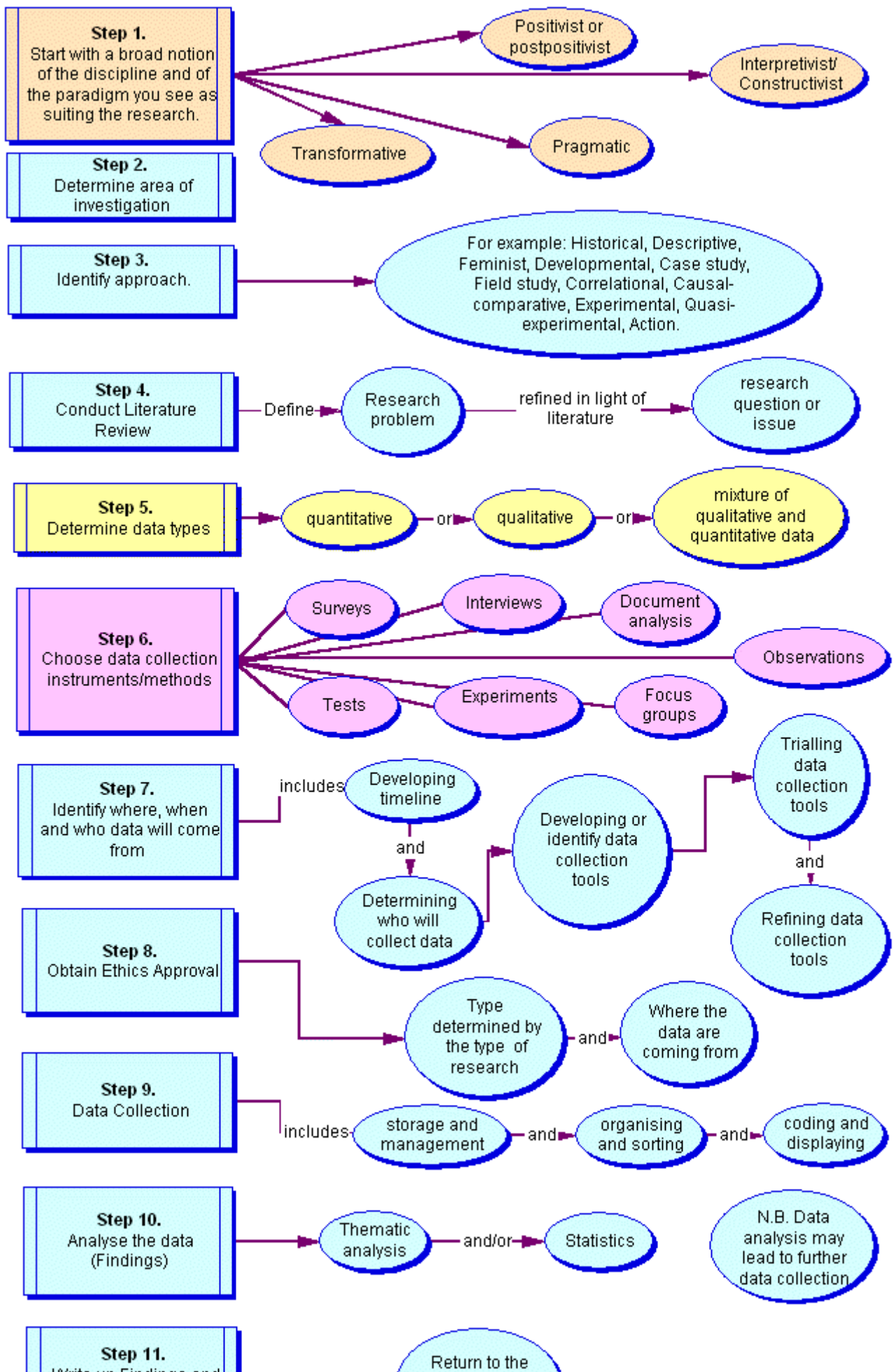


Figure 1: A research journey

Acknowledgement

Dr Noella Mackenzie would like to acknowledge the Writing Up Award, which she received from the Research and Graduate Studies Unit, Charles Sturt University. This award allowed Dr Mackenzie access to the time needed to write this article.

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Please cite as: Mackenzie, N. & Knipe, S. (2006). Research dilemmas: Paradigms, methods and methodology. *Issues In Educational Research*, 16(2), 193-205.
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Created 14 Oct 2006. Last revision: 14 Oct 2006.

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