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DOI:

[10.1080/09500790.2010.483514](https://doi.org/10.1080/09500790.2010.483514)

*Citation for published version (Harvard):*

Symonds, JE & Gorard, S 2010, 'Death of mixed methods? Or the rebirth of research as a craft', *Evaluation and Research in Education*, vol. 23, no. 2, pp. 121-136. <https://doi.org/10.1080/09500790.2010.483514>

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## **Death of mixed methods?: Or the rebirth of research as a craft**

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### **Abstract**

The classification by many scholars of numerical research processes as quantitative and other research techniques as qualitative has prompted the construction of a third category, that of ‘mixed methods’, to describe studies that use elements from both processes. Such labels might be helpful in structuring our understanding of phenomena. But they can also inhibit our activities when they serve as inaccurate or limiting descriptors. Based on the observation that mixed methods is fast becoming a common research approach in the social sciences, this paper questions whether the assumptions that are used and perpetuated by mixed methods are valid. The paper calls for a critical change in how we perceive research, in order to better describe actual research processes. A more ethological taxonomy of the mechanisms underlying research structures and processes is posited to encourage creative thinking around alternatives to the three purported paradigms of quantitative, qualitative and mixed methods. This ‘return to basics’ seeks to encourage new and innovative research designs to emerge, and suggests a rebirth of research from the ashes of mixed methods.

### **Keywords**

Mixed methods, paradigm, qualitative, quantitative, research philosophy, research methods

### **Introduction**

Mixed methods is a social science research approach that encourages integration of two major methodological approaches: ‘quantitative’ and ‘qualitative’. It is described by Johnson and Onwuegbuzie 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” (2004, p.17). Writings on mixed methods vary in their degree of subjectivism – from consideration of alternative philosophies (e.g. Yin 2006) to taking a tripartite view of research. The latter outlook occurs in many texts. “Today, researchers can choose from which perspective to investigate phenomenon: a qualitative perspective (Denzin & Lincoln, 2005), a quantitative perspective (Shadish, Cook, & Campbell, 2002), or a mixed methods combination of the two perspectives (Tashakkori & Teddlie, 1998)” (Dellinger & Leech 2007 p.309). Recent authors, including Teddlie and Tashakkori (2009), have moved towards a more ethological

perspective by describing the design ‘options’ as outlooks of communities of researchers, positing “three major groups that are currently doing research in the social and behavioural sciences” (p.4). Although this latter description does not negate other possible research practices beyond mixed methods and quantitative and qualitative approaches, it does not actively acknowledge their potential.

Conceptualising methodology as a categorical entity is worrying as by nature it defines boundaries which perceptions and activities are encouraged not to cross. We anticipate that those writing about mixed methods will not agree that their publications were intended to inhibit design creativity. However, in the education research community we have observed both student and seasoned researchers thinking that there are either only three ways to do research or that research must align with one of these categories for it to be valid. This ignores the potential blossoming of alternative philosophies and methodologies. For this reason, we argue for a critical change in the way that research is perceived, both in order to better describe actual research processes and to enable new and innovative research designs to emerge. At present, methodological limitations are manifest in research institutions that only teach their students the three basic research approaches or who put forward the idea that mixed methods designs will be most effective. As this occurs, more mixed methods research is generated and funding bodies may begin to show preference to studies which follow these techniques. Single method studies and innovative designs that do not meet prior expectations may become marginalised and room for development may be quashed. “Research paradigms participate in a form of competitive modernism, each overselling itself in the academic marketplace... all this makes the development of knowledge through educational inquiry minimal, at best” (Hammersley 2005, pp.142-143). In light of the growing popularity of mixed methods texts and of mixed methods as a methodological discipline, this paper presents a critical challenge to any complacency amongst researchers, asking them to consider how they can combine techniques in ways that are not specified by the quantitative, qualitative and mixed methods approaches. This we believe is an important issue for the future evolution of education and more general social sciences research.

A critique of mixed methods is timely, especially if, as Tashakkori and Teddlie (2003:x) propose, these designs become “the dominant methodological tools in the social and behavioral sciences during the 21<sup>st</sup> century”. We examine how mixed methods is perceived by briefly reviewing its history, and by drawing on published definitions and descriptions of the field. We then identify the common assumptions that underpin the logical basis of the quantitative and qualitative perspectives and review their ability to accurately predict research practices. Our suggestion is that mixed methods (and the qualitative and quantitative methodologies) are not exhaustive nor particularly viable descriptions of how research can occur. Neither are they necessary. However, it is true that mixed methodologists have made substantial progress in conceptualising how multifaceted research can be constructed effectively. Here we review their advances in data triangulation and research design. These features are then integrated into our alternative proposition of an ethological design typology. This identifies core structural and process elements, common across all research. The typology is given as an example of how to construct designs outside of traditional methods in order to encourage alternative and independent thinking amongst researchers and does not intend to be prescriptive. Finally, a general discussion on the benefits and dangers of philosophical labels and research typologies ensues. This highlights the unintended ill effects of

mixed methods' attempts to be an integrative force, as "the process of mixing requires distinct method elements to mix and so, ironically, the metaphor of mixing actually works to preserve method schisms in part" (Gorard 2007 p.1).

### **The perspectives of mixed methods**

A division between researchers emerged in the 20<sup>th</sup> century in the form of the quantitative/qualitative debate. There were (and still are) those who supported numerically based, representative and experimental designs as being the most objective and hence accurate form of research. One fundamental basis of this notion is that "measurement enables us to transcend our subjectivity" (Bradley and Schaefer 1998, p.108). This perspective might be traced to the age of enlightenment in the 17<sup>th</sup> and 18<sup>th</sup> centuries, during which social science research began fighting for legitimacy alongside the natural sciences which were by then well established. Also during these centuries, qualitative research emerged primarily from anthropological ethnographic studies of the foreign 'Other' (Denzin & Lincoln, 2005), its methods including observation, interview and in-depth investigations. Its methods are held by some to be "more faithful to the social world than quantitative ones" (Gergen and Gergen 2000, p.1027) in that they allow for data to emerge more freely from context. Since the 1960s, social science researchers have been engaged in open debate over which of these two methodologies is the most appropriate representation of reality. Their arguments rest on what Maxwell and Loomis (2003, p.342) describe as "two fundamentally different ways of thinking about explanation". When posited as competing epistemological frameworks, qualitative and quantitative can be said to acquire the mantle of paradigms, or 'world views'.

A notion of particular importance during the 1970s and 1980s was that the epistemological differences between the qualitative and quantitative paradigms made them fundamentally incompatible. This 'incommensurability thesis' suggested that the division was not just about methods (Gorard 2004). It further promoted separatism within the social sciences and created a dilemma for researchers who used methods of both qualitative and quantitative orientation in their studies. However, during the 1980s, many researchers accepted that both paradigms were legitimate and useful for providing different perspectives on the same topic (Greene, 2008). Arguments were then made for a "compatibility thesis" (Teddlie and Tashakkori 2009 p.15) where elements of both qualitative and quantitative research methodologies could be combined in a single study. This, and the premise that "the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone" (Creswell and Plano Clark 2007, p.5) brought mixed methods to the fore as a methodological champion of peace, perhaps lessening the pre-existing paradigm war.

Mixed methods thus became described by some as "the third methodological movement" (Tashakkori and Teddlie 2003) alongside qualitative and quantitative research. It can be thought of as emancipatory, for its activity towards "welcoming all legitimate methodological traditions" (Greene 2005, p.207) and its attempts at facilitating methodological diversity. Johnson and Onwuegbuzie (2004) state that mixed methods "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".

(pp.17). These authors have proposed that pragmatism is the most appropriate epistemology for mixed methods, and that with this epistemological basis, mixed methods should be seen as a paradigm in its own right. It is, according to these authors, , now a third paradigm.

Johnson et al. (2007) sought to formalise a definition of mixed methods by synthesising the perspectives from 31 researchers in the field. They concluded that:

“Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purpose of breadth and depth of understanding and corroboration” (p.118).

This definition is almost identical to that given in the Handbook of Mixed Methods Research (Creswell & Plano Clark, 2007, p. 5):

“Mixed methods is a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and 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”.

These overarching definitions are not strictly adhered to by every mixed methods researcher. Indeed, several perspectives on mixed methods research have been identified by Creswell and Tashakkori in an editorial for the ‘Journal of Mixed Methods Research’ (2007), and by Greene in her book ‘Mixed Methods in Social Inquiry’ (2007). These are summarised in the table below. Despite the variation in these perspectives, each still intrinsically tie mixed methods to qualitative and quantitative approaches. This is subjectively demonstrated in right hand side column of the table.

Table 1 - Perspectives on Mixed Methods

Perspective	Relationship to Qualitative & Quantitative (QQ) Approaches
<p><u>Method Perspective</u> Mixed methods is the mixing of quantitative and qualitative ‘types’ of data (referring here to numbers, and words respectively). This approach is seen to be “untangled with philosophy and paradigms” (Creswell &amp; Tashakkori, 2007 p.304).</p>	<p>On the surface, rejects QQ approaches as worldviews but ties them with specific types of data thus mixed methods endorses them.</p>
<p><u>Methodological Perspective</u> Each step of the research design is intrinsically tied to paradigms as “one cannot separate methods from the larger process of research of which it is a part” (Creswell &amp; Tashakkori, 2007 p.304).</p>	<p>Endorses QQ approaches.</p>

<p><u>Paradigm Perspective</u> Mixed methods is the mixing of quantitative and qualitative worldviews. (Creswell &amp; Tashakkori, 2007)</p>	<p>Endorses QQ approaches.</p>
<p><u>Practice Perspective</u> The use of mixed methods is determined by the research question/s, i.e. an ethnography that uses mixed methods inquiry to answer a qualitative research question. (Greene, 2007)</p>	<p>Categorises whole methods as belonging to QQ approaches thus endorses them.</p>
<p><u>Non-Paradigmatic Stance</u> Each of the QQ approaches has elements that are conceptually independent, allowing therefore for elements from both approaches to be mixed in a single study (Greene, 2007).</p>	<p>Endorses QQ approaches.</p>
<p><u>Substantive Theory Stance</u> Paradigms are philosophical assumptions and can therefore easily blended with empirical research (Greene, 2007).</p>	<p>Does not reject a tie between mixed methods and QQ approaches.</p>
<p><u>Complementary Strengths</u> The assumptions that guide QQ approaches are separate thus methods associated with each approach should be kept separate even if used in a single study, to allow for complementary strengths to emerge (Greene, 2007).</p>	<p>Endorses QQ approaches.</p>
<p><u>Dialectic Stance</u> Respects the guidance of QQ approaches but does not see this as sacrosanct as paradigms are social constructions and are open to change (Greene, 2007) .</p>	<p>Relates mixed methods designs to QQ approaches, even if it does not fully endorse them.</p>
<p><u>Alternative Paradigms Stance</u> Traditional paradigms as emerged historically are no longer applicable to current methodologies and that a new paradigm, one that embraces mixed methods, should emerge.</p>	<p>Mixed methods, although it rejects QQ approaches, is still seen as the mixing of data/methods that are categorised as quantitative or qualitative in relation to paradigms.</p>

Both the descriptions and perspectives outlined above are contingent on the categorisation of research questions, data gathering methods, types of data and methods of analysis into the overarching research approaches of quantitative and qualitative. Mixed methods as it is commonly posited across all identified perspectives thus endorses the categorical nature of these approaches and is logically restricted by their definitions.

### **The Validity of Mixed Methods' Assumptions**

The following section questions whether the main elements of the research process (method, data, analysis) are by nature tied to one of the quantitative/qualitative paradigms. There is no universally agreed definition of the quantitative and qualitative paradigms. This means that any critique can at best operate only on assumptions of what the paradigms entail. However, this must also be true of mixed methods – without a formal definition of these paradigms how can we conclusively describe how they can be mixed? Therefore, we locate our critique in commonly observed definitions of qualitative and quantitative, as any mixed methods researcher must do. These are displayed in Table 2. We then consider each of these elements in turn.

Table 2 - Perceptions of Qualitative and Quantitative Approaches

QUANTITATIVE	QUALITATIVE
Data Collection Tools	Data Collection Tools
Closed-Ended/Structured: Questionnaire Interview Systematic Observation Document Analysis Official Statistics	Open-Ended/Semi-Structured: Questionnaire Interview Observation Document Analysis Image Analysis (any image type) Video Recording
Type of Data Produced	Type of Data Produced
Numerical Categorical	Word Image Audio
Analytical Techniques	Analytical Techniques
Counting Comparing Statistical Analysis	Thematic Analysis Narrative Analysis Image Analysis
Type of Information Produced	Type of Information Produced
Quantitative (amount)	Qualitative (type)

*Data collection tools are not necessarily paradigmatic*

The traditional categorisation of the many different ‘tools’, ‘techniques’ or ‘methods’ for collecting data seems to be largely based on whether they create closed or open-ended data. However, the idea of ‘closed’ data should not be confined to the quantitative paradigm. There are limits on how truly ‘open’ data can be depending on the restrictions imposed, for example when the interviewer confines the participants’ responses to a certain topic, or when observations are made only in consideration of a thematic framework. Equally, multiple choice surveys could defy their current placement in the quantitative paradigm if, hypothetically, a computer program could be designed to generate a bank of almost unlimited potential answers that the participant navigates to give an unrestricted ‘real life’ response. Here, if the survey gives options greater than the potential response of the participant to a particular question, then it is ‘open-ended’. It is more realistic to see open- and closed-ended as a continuum with data gathering methods placed on this according to the freedoms that they award – in the context of

individual studies and their specific instruments, and in the responses of individual participants. Therefore, the current assignment of close- and open-ended data gathering methods into separate paradigms is based on their most common use, and not on their potential, or in some cases their actual, uses.

*Types of data are not necessarily paradigmatic*

Next we examine the categorisation of types of data produced by individual methods. One paradigm is concerned wholly with numbers, whilst all other types of data are lumped into the qualitative paradigm, whether they be word based, visual, auditory or indeed any other kind of sensory data. However, it is arguable that in all cases, numerical data (as gathered by close ended methods) began as word, visual, audio or kinaesthetic data. Take for example a researcher counting the cars belonging to a single family (visual, physical data), adding up the observations made of a particular activity in systematic observation (visual data), forcing the words used to describe an activity or concept into a Likert scale representation of that phenomenon (word data) or measuring the sound waves created by two classical musicians in a performance (audio data). Therefore, when using a hermeneutical perspective, numerical data is representative of both open-ended and close-ended states. Of course this logic extends to the transformation of traditionally 'qualitative' data into quantitative data when it is categorised into numbers (a strategy referred to by Tashakkori and Teddlie (1998) as 'quantitizing'). This categorisation can occur at successively narrower/broader levels, for example by classifying interview data into wide themes and counting these (broad), by counting the responses in each theme (narrower) and by counting the amount of 'target' words given in each participants' response to a particular question (even narrower). Therefore any type of data can be construed as numerical with varying degrees of 'enclosure', whilst retaining some element of its original 'qualitative' qualities. Data can be fluid and shift in form as determined by the researcher and is not restricted by paradigms.

*Analytic techniques are not necessarily paradigmatic*

Furthermore, certain types of data are not exclusive to particular methods of analysis. It may be true that, currently, data from close-ended methods are most often quantified, whereas data from open-ended measures are usually grouped inductively into themes or codes. However, numerical data do not need to be quantified to be used in a study. The answers to a questionnaire for a single case can be examined in narrative analysis to create a portrait of an individual – either in one wave or across time – without the reporting of any numbers. Numerical data can be analysed by inductive coding - of the types of responses given across measures by individual cases - just as it can be for interview responses. Numerical data can show qualitative change, for example by applying factor analysis to a measure given at different time points to the same sample of participants. When different factors emerge at each time, the responses to the measure (and indeed the supposed phenomenon being measured) have changed in type. Survey results can be displayed in matrices and conceptual maps, just like any other thematic data. Numbers can be, and indeed mostly should be, presented without any use of statistical techniques or sampling theory (Gorard 2010a), and research involving numbers is as interpretivist, and about meaning and judgement as much, as research without numbers (Gorard 2006). Interview data can be counted, and are anyway traditionally presented in terms of (disguised) numeric patterns such as 'most', 'many',



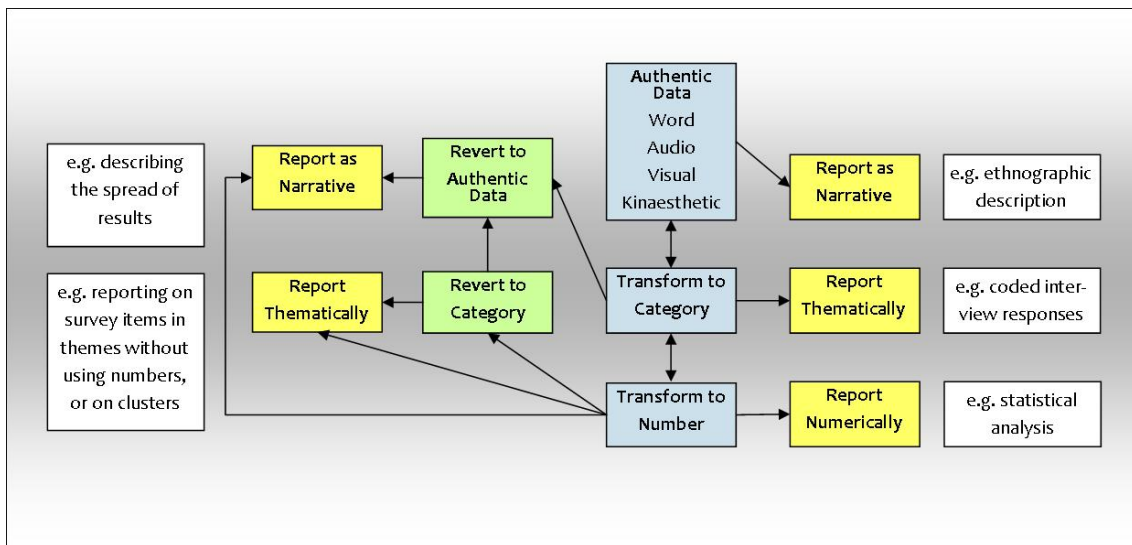
‘few’, ‘none’ and so on, while surveys routinely generate rich comments (Gorard with Taylor 2004). Statistical analysis can be performed on the amount and types of words used in a single interview transcript, or on the geometric properties of items in a single image. Qualitative evidence can be usefully modelled. Word-based data can reveal quantitative change as in when the interviewee says that they are ‘much’ or ‘a little’ happier than they were in yesterday’s interview. Given these examples, we can see that no generic method of analysis is fixed to any one paradigm.

Some researchers may argue that fundamental differences still exist between numbers and other types of data (perhaps as these are ultimately ‘transformed’ data). However, is this difference enough to award numbers a paradigm all of their own? Is this the kind of ‘paradigm’ as puzzle that Kuhn (1962) would understand? There is currently no proof that the differences or ‘distance’ between two particular types of authentic or transformed data are of lesser or greater value in comparison. For example, words and images are quite different forms, just as are numbers and words. Considering this, there is nothing to stop theorists from claiming separate paradigms for any one or more types of data, whether these are word, numerical, visual or audio. Perhaps the real difference lies in the formality of systems that are generally used to sort and categorise units of data such as numbers, words and visual observations. Numerical research tends to use a highly developed formal system such as the application of mathematical logic, whilst thematic analysis of word based data generally takes a looser, more inductive approach. However this is not always the case as interview data can be subject to formal systems such as discourse analysis which makes use of particular semantic structures. Again, there is no need for data to be restrained within the world of research by its containment within a single methodological paradigm. But one consequence of the current paradigmatic classification is that mixed methods work *must* involve quantitative elements. This is both limiting and unimaginative. This potential bias towards numbers is noted by Giddings and Grant (2006) who warn that “in spurring on such effacement, mixed methods research is a Trojan Horse for positivism, reinstalling it as the most respected form of social research, while at the same time — through inclusion — neutralizing the oppositional potential of other paradigms and methodologies that more commonly use qualitative methods” (p.59).

#### *Data formation and analysis is an integrated process*

Figure 1 illustrates how all types of ‘authentic’ data (the basic form of the information being gathered) can become numerical data. This process of transformation enables us to analyse data in increasingly categorical ways, to the point where we can conduct statistical analysis. The inverse occurs when we ‘revert’ numerical data to categorical data that can be analysed thematically (i.e. searching for nuances within iterative factors that reveal a new type of construct), or as narrative (depending on its original form). Indeed the diagram should really display links between all types of data and narrative analysis. Ultimately it serves to illustrate how types of data and analysis are not fixed to any one ‘paradigm’, and how instead these are all parts of a process that can be determined by individual researchers, independently of the ideas of the self-dubbed “future stewards of the social behavioral research enterprise” (Tashakkori & Creswell, 2008, p. 291).

Figure 1 - Research holism



By unsettling each major step of the argument for dividing elements of research into one of either the quantitative or qualitative paradigms, this critique proposes that mixed methods (the combination of the two) is also little more than a historical construct. Mixed methods can be seen only as a label for how we might do research – one that is neither exhaustive nor based on valid ethological assumptions.

### Acknowledging the strengths of traditional mixed methods

Despite the limitations of the current form of mixed methods, it must be noted that throughout its development, mixed methods has acquired and also independently defined several key techniques important to good practice in integrating types of data. These include a focus on triangulation and taxonomy for creating and understanding mixed method designs. We now present a review of these techniques and encourage researchers to apply them, when needed, to any aspect of the research process. These include an extensive focus on triangulation and innovative research designs for promoting integration and data synthesis.

The very beginning of mixed methods is cited by some (Creswell and Plano Clark 2007, p.5, Johnson et al. 2007) to Campbell and Fiske (1959) who used multiple ‘quantitative’ measures in a single study and referred to this as *multitrait* or *multimethod* research. These numerical beginnings served to demonstrate how by juxtaposing the results of multiple methods, different facets of a phenomenon can be identified – a concept later formalised by Webb et al. (1966) as ‘triangulation’. Triangulation is seen to increase validity when multiple findings either confirm or confound each other (thus reducing the chances of inappropriate generalisations). A second argument for triangulation is that “all methods have inherent biases and limitations, so use of only one method to assess a given phenomenon will inevitably yield biased and limited results” (Greene et al. 1989, p.256). In accord, triangulation is often cited as having methodological superiority over single methods. By focusing on the benefits of juxtaposing data and viewpoints to get closer to the truth, mixed methods studies have brought to our attention how one can design an entire research process to capitalise on the benefits of triangulation.

A second major advance coming from traditional mixed methods is that of helpful design typologies. We overview a handful of popular concepts, then illustrate how these can be used to clarify and improve any type of mixed research design (Table 3).

Table 3 - Mixed methods design features

Design Aspect	Description
<u>Research Questions</u>	<i>Multilevel mixed method designs:</i> Research is conducted at different <u>contextual levels</u> to answer different aspects of the same research question (Tashakkori & Teddlie 1998) <i>Multi-methods design:</i> Research questions are answered separately by different research methods
<u>Timing</u>	<i>Simultaneous:</i> One or more research methods are conducted simultaneously (Morse 1991) <i>Sequential:</i> One or more research methods are conducted either before or after each other (Morse 1991)
<u>Weight</u>	One research method takes dominance over another (Morse 1991)
<u>Design</u>	<i>Fully integrated mixed method design:</i> Methods are combined consistently throughout the research, each informing the other (Tashakkori & Teddlie 2003) <i>Concurrent Nested design:</i> One method is ‘embedded’ in another (Creswell 2003)
<u>Conversion</u>	<i>Qualitising/Quantitising:</i> One type of data (qual/quant) is transformed into the other (Tashakkori & Teddlie 2003)
<u>Triangulation</u>	<i>Triangulation:</i> Inferences from each type of method are used to confirm/corroborate/confound each other (Greene, Caracelli, & Graham, 1989) <i>Concurrent mixed method design:</i> Inferences from each method are drawn together at the end of the study (Creswell 2003) <i>Fully integrated mixed method design:</i> Inferences from both methods are combined consistently throughout the research (Tashakkori & Teddlie 2003)

In any type of mixed research, one can plan the design to answer multiple or single research questions with a variety of methods. This could involve using surveys and systematic observation, or interviews, surveys and photography, to tap into different aspects of behaviour. The idea of *contextual levels* (Tashakkori & Teddlie 1998) is perhaps a good cover term for the multiplicity of this process. Moving on to *timing*, it is essential that designs consider when each research method will occur in order to inform the subsequent method and to transform types of data. This can include aspects of research following one another, operating in parallel or being ‘nested’ within each other. The *weight* given to different research methods is also important as this influences their inferential power. However, it seems that the mixed methods typology has overlooked the extent to which weight can vary throughout the entire design process. Variations in

weight can occur not only with one *entire* method having dominance over another, but with the *internal aspects* of one or more methods having dominance over others. An example of this could be when interview data is transformed into categories which are then used as a deductive framework for survey analysis. These categories therefore carry a lot of weight in the research design. Following this, the survey results could be reported as the main finding. Thus the statistical analysis also has a considerable weight and perhaps the most immediate impact. The next three categories of design, conversion and triangulation appear to be contingent on timing, weight and contextual level. In considering all of these design features, what is important is that researchers have consideration for them when planning and executing their research, no matter what types of data are involved. It is suggested that these types of design features are taught by education faculties and departments, instead of the stereotypical procedures of quantitative/qualitative and mixed methods (Ercikan and Wolff-Michael, 2006).

### **Mixing without the label**

When the label of mixed methods is removed, we can better examine the propensity for mixes in research construction. As Yin (2006) states, “once freed from the quantitative-qualitative dichotomy, the relevance and reality of a broad variety of ‘mixes’ emerges. The broad variety recognizes the true diversity of the research methods used in education” (p.42). He advises that studies should not just mix numbers with other data types, but should also be free to mix ‘quantitative’ methods without any qualitative method present and vice versa.

#### *Common core research design structures*

To advance Yin’s suggestion, we recommend that researchers first attempt to observe the ethological elements of a typical research process without reference to the quantitative and qualitative paradigms. Research design per se is largely ignored in methodological texts and training courses, yet its elements are crucial to high quality research and almost entirely independent of methods of data collection and analysis, paradigms and other schismic constructs (Gorard 2010b). The basic structural aspects might include the research question(s), the unit of analysis, timing, an intervention, allocation of cases to groups, the material for observation, the data gathering method, tools and instruments, the type of data, the analytic method(s) and inferential or descriptive material involved. The word ethological is used to create a focus on the structures that emerge from the full display of research design processes – as opposed to those supposedly philosophical constructions that describe only how some people choose to do research. When philosophical ties are removed, it is possible to recognise some conceptual errors made by mixed methodologists. If creating an artificial split within each of the research elements (as in separating numbers from other types of data, or in labeling interviews as ‘qualitative’ i.e. they do not gather data on any type of magnitude), researchers who use aspects from both sides of the split may feel obliged to make a song and dance about how they are purposefully mixing paradigms. This can result in researchers biasing their ‘mixing’ efforts towards the two factors (in one or more element) which they conceive of as belonging to opposite paradigms. This occurred in Russek and Weinberg’s (1993) ethnographic ‘mixed methods’ study where data from interviews, classroom observations, analysis of school documents and open-ended questionnaires were termed as qualitative, and data from classroom observation

checklists, lesson evaluation forms, workshop evaluation forms and two close-ended questionnaires of teacher perceptions were termed as quantitative. Around a quarter of their article is spent discussing the ‘mixing’ of the quantitative/qualitative data without any justification of why they chose to analyse particular types of data thematically or statistically, or of why they did not triangulate different combinations of data within these categories. Surely there would have been much to gain by examining the interview findings in comparison to the classroom observation findings, or by transforming the observation data into numbers so that it could be compared to the results of the survey? Why should the triangulation of interview and observation data not qualify as ‘mixed’? Clearly here, paradigmatic categorisation inhibits our progress in identifying and developing the mechanisms underlying all types of mixed research designs.

### *Core research design processes*

Tentatively, we now distinguish several process factors that are common to all types of research. As processes these are perhaps harder to identify than the structural ‘elements’ of research, being the instances of the collection, and analysis, of data, within a research study. Although in this paper we critique the creation of artificial philosophical boundaries, we also realise that without form, things are insubstantial and a common knowledge is near impossible to construct. This common knowledge is what allows us to understand and build on past attempts, thus advancing the field of research. However, assumptions can be distorted by history, some rising only through speculation without proper critique (as in the case of mixed methods). What we propose is an epistemological framework that includes the fundamental units of the research process that are already in use by people administering quantitative/qualitative and mixed methods designs – one which will not be liable to change no matter how many future paradigms are constructed to guide us. The notions of conceptual levels, weight and timing are brought forward from traditional mixed methods research and are listed alongside three other categories of construction, transformation and influence. This typology is displayed in Table 4.

Table 4 - Core elements of research processes

Process Element	Description
Construction	How elements of the research process are constructed and can be used to construct further elements.
Transformation	When data becomes transformed between elements of the process (e.g. words into numbers).
Influence	How elements of the research process inform and influence each other – this includes triangulation.
Conceptual Level	The ways in which different methods are used to answer the research question/s.
Weight	The degree of influence given to elements of the research process.
Timing	How the elements of the research process are conducted in time, in relation to each other.

When elements of the research process are used to construct, transform, and influence each other, this is where mixing truly occurs. This process should not be entirely focused on the moment when numbers meet other types of data. For example in the following diagram, the mixing is perhaps at its most important when document analysis is used to inform the development (timing) of semi-structured observation foci, in order to answer the research question of ‘how does multicultural policy affect pupil behaviour’. The design uses only the traditionally ‘qualitative’ techniques of document analysis and semi-structured observation (conceptual levels) yet produces both numerical data and word data. As the observations and document analysis proceed (timing) they inform each other until both are complete. The observation data is coded into themes which are then checked against the document analysis. However this has little effect as by now the observation focus has narrowed to a single, important dimension (an example of weight). The observations in each theme within this dimension are counted and summed (transformation) and the numerical results are used to inform a further analysis which categorises the themes into broader groups with respect to their quantity (construction). These ‘weighted’ groups are used to address the research question. However, the question is mainly answered by the initial thematic categories and not by the broader constructs (i.e. the numerical data has little weight in the process). Plenty of mixing occurs in this design – from the initial influence of the document analysis on the observation focus, to the combination of quantity and quality in the eventuating themes of opinions. Each mix contributes substantially to the design and the overall outcome, although some are more important than others.

#### *Moving towards a new ecology of research design*

The tentative concepts suggested in this section, and demonstrated in Figure 1, are apparent across the enormous range of research designs operating in current education research, and in this are more exhaustive, flexible and ethological than the stricter definitions of quantitative, qualitative and mixed methods. Again, it is suggested that more thought be given to these basic structural and process related elements and that these become a focus of teaching within research institutions. By illustrating these more basic elements, we hope to have moved a little closer towards the “universal underlying logic to all research” that leaves “little or no place for paradigms” (Gorard, 2007, p. 3). Unfortunately, this reversion to an ethological typology, away from broader philosophical structures, gives us little firm guidance on how to construct our research. Some may find it easier to instead follow traditional approaches such as quantitative/qualitative and now mixed methods. However, what the proposed typology should encourage us to do is to be individual in our research designs and to mix strategies and activities on a wider variety of levels than traditional philosophical approaches allow. In consideration of the ‘easy draw’ of research paradigms, we exhibit Hammersley’s reminder that:

“Many of the purported divisions are artificial, involving spurious claims to novelty, and are based on cavalier use of philosophical and methodological arguments. I also think that we need to be rather more sociologically sophisticated in seeking to understand why educational research displays this character at the present time” (2005, p.142).

Ironically, a rejection of the three common research paradigms as absolute descriptors, and the proposed ‘return to research’ may be more authentic to mixed methods’

commonly cited pragmatic philosophical basis than are current definitions of mixed methods (see for example the discussion on pragmatism by Greene 2007).

### **Conclusion – The death of mixed methods?**

“Mixing methods is wrong, not because methods should be kept separate but because they should not have been divided at the outset” (Gorard, 2007, p. 1).

Our examination of mixed methods shows that far from freeing researchers from the restrictions of paradigms and the strife of paradigmatic struggle, mixed methods can actually reinforce such categorical differences. Normative descriptors reinforce their binary positioning, effectively marginalising the methodological diversity within them” (Giddings and Grant 2006, p.195). The “attempt at building a new mixed methods paradigm could obscure the growing points for what might be a more fundamental *reintegration* of qualitative and quantitative methods” (Hammersley (2004, p. 201). Despite recent movement to see itself as a ‘community as researchers’ (Teddlie & Tashakkori, 2009) instead of one of only three viable options for doing research (Dellinger & Leech, 2007), mixed methods is still in danger of becoming a prescriptive force. For example, Greene (2008, p. 17) recommends that researchers should develop guidelines for how to “choose particular methods for a given inquiry purpose and mixed methods purpose and design”. By this she would strip power from the individual researcher and give it to methodological theorists. Johnson, Onwuegbuzie and Turner (2007, p. 127) also argue for “a “contingency theory for the conduct of human research” where conditions for the selection of qualitative, quantitative or mixed methods research should be met by all researchers. These types of suggestions may have merit for those who commit themselves to paradigmatic research practices. However, any all-encompassing predetermined design strategy for mixed methods would surely inhibit future creative efforts that might fall outside of these perspectives. Instead, we suggest that in research, “progress could be seen as an evolutionary process with no specific ‘life-form’ destined to emerge from its pressures” (Gorard, 2004, p. 12). Here, “individual researchers should be free to identify the most productive areas of inquiry and to determine the most effective means for investigating them” (Hammersley, 2005, p. 144). Without this freedom, we are unlikely to step beyond the benefits of what the paradigmatic boundaries have offered us so far, and towards an exponential growth of new and innovative research techniques.

As stated by Johnson and Onwuegbuzie in support of mixed methods, “It is time that methodologists catch up with practicing researchers!” (2004, p. 22). Considering the limitations of the quantitative and qualitative paradigms and current definitions of mixed methods, we advocate the development of a research community where “all methods have a role, and a key place in the *full* research cycle from the generation of ideas to the rigorous testing of theories for amelioration” (Gorard, 2005, p. 162, see also Gorard and Cook 2007). Furthermore, the basic structural and process elements of research should be discussed, taught and popularised so that we have more methodological independence, away from the crutch of established paradigms and the designs that go along with them. In order to achieve this we ask researchers to consider moving away from design approaches that are more historical than empirical and towards the rebirth of plain ‘research’ as a craft.

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