Lang. Teach. (2014), **47.2**, 135–173 © Cambridge University Press 2014
doi:10.1017/S0261444813000505

State-of-the-Art Article

Mixed-methods research in language teaching and learning: Opportunities, issues and challenges

A. Mehdi Riazi Macquarie University, Australia
mehdi.riazi@mq.edu.au

Christopher N. Candlin Macquarie University, Australia
christophercandlin@gmail.com

This state-of-the-art paper foregrounds mixed-methods research (MMR) in language teaching and learning by discussing and critically reviewing issues related to this newly developed research paradigm. The paper has six sections. The first provides a context for the discussion of MMR through an introductory review of quantitative and qualitative paradigms. In the second section we discuss the nature and scope of MMR, its underlying principles, and its techniques and procedures. In the third section we discuss trends in MMR in language teaching and learning, and review 40 published papers in 30 journals related to this field, covering one decade (2002–2011). Issues and challenges facing MMR and its researchers are discussed in the fourth section, while in the fifth we discuss the significance of replicating MMR studies in language teaching and learning. Finally, we conclude by presenting prospects and avenues for further developing mixed-methods research.

1. Introduction

Language teaching and learning as an interdisciplinary – better, a multidisciplinary – enterprise employs a diverse array of research methods derived from both (post)positivist and constructivist paradigms to investigate its subject matter and provide useful knowledge to its various stakeholders. Some very useful reviews on research methods in applied linguistics, including language teaching and learning, have appeared over the years (e.g. Davis 1995; Lazaraton 1995, 2000, 2005; Ortega & Iberri-Shea 2005; Benson et al. 2009; Richards 2009), together with discussions of research methods in applied linguistics more generally (e.g. Cumming 1994; Yihong, Lichun & Jun 2001). This paper seeks to corroborate and extend the existing body of knowledge on research methodology in language teaching and learning by focusing on mixed-methods research (MMR) as an evolving research paradigm. We begin with a quotation from Sayer (1992), who justifies social research in general as follows:

> The point of all science, indeed all learning and reflection, is to change and develop our understandings and reduce illusion … Learning, as the reduction of illusion and ignorance, can

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

> help to free us from domination by hitherto unacknowledged constraints, dogmas and falsehoods. (p. 252)

Despite some common ground among scholars and researchers concerning Sayer's views on the mandate of research, Bachman (2006) argues that 'there are considerable differences in what counts as "knowledge" and hence understanding, in how we go about creating it, and in the values and assumptions that underlie our different approaches to conducting empirical research' (p. 166). In this context, it has been common practice to differentiate between deductive (top-down) and inductive (bottom-up) approaches to research in language teaching and learning. In a deductive or theory-driven approach, we begin from a theory or theoretical framework and derive a hypothesis from it; we may then be able to provide evidence for or against the hypothesis by observing the phenomena under review and by collecting and analysing appropriate data. The outcome of such deductive research will either strengthen the theory by verifying the hypothesis or weaken its explanatory power if the evidence and analysis do not support the hypothesis. In contrast, inductive or data-driven approaches to research begin from inspection of the data, seeking meaningful patterns and generating hypotheses which may then, in the case of well designed large-scale research projects, generate further theory. In this context, Grotjahn (1987) provides a nuanced discussion, distinguishing between hypothesis-testing vs. hypothesis-generating approaches to data collection and analysis. As far as research methods are concerned, deductive approaches typically draw upon correlational and experimental designs, whereas inductive approaches are characterised by qualitative methods such as case studies and ethnographies. Our position in this paper is that a mix of these two research methodologies provides a more comprehensive understanding of the object of study. In what follows, we review the nature and scope of MMR in the light of a brief review of the two dominant (post)positivist and constructivist paradigms. We begin by drawing distinctions between the three underlying concepts of paradigm, methodology and method – distinctions that we draw on throughout. Following other researchers (e.g. Guba & Lincoln 1998), we use the term 'paradigm' to refer to a general worldview or a set of beliefs and principles that gives rise to research designs. We do so in relation to each of three schools of thought, namely (post)positivism, constructivism and pragmatism, in terms of which studies may be designed. Conceptualising the object of study and what can be known about it is thus a worldview issue, which depends on the researcher's explicit or implicit reference to the principles of a particular paradigm. 'Methodology', in our view, is the conceptual framework that helps researchers to design their study. In such a framework, responses to the question of the nature of reality and what can be known about it as informed by a particular paradigm will be framed at different levels and stages of the research process, from formulating research questions to using appropriate data and conducting analyses from which to draw relevant inferences. Accordingly, quantitative, qualitative and MMR approaches have distinct methodological perspectives. Finally, the term 'methods' refers to the use of specific techniques and tools and/or particular procedures in undertaking the research study in question. Thus, we refer to particular techniques and procedures, such as a correlational study, an experimental design or a case study, as 'methods', while those affiliated to the same 'methodology' are informed by the same paradigmatic principles. In some parts of this paper we use the term 'approach' to convey the idea of conceptual coverage, representing different perspectives and orientations.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

1.1 A brief review of quantitative and qualitative paradigms

Fishman (2010: 11) draws on two German terms, ERKLÄRUNG (explanation) and VERSTEHEN (understanding), to differentiate two broad approaches to research in social sciences, and in educational studies in particular. Explanatory or ERKLÄRENDE research, Fishman argues, addresses variation and variability in human behaviour between individuals and groups of individuals. In such research, quantification of behaviour seeks to explain degrees of variation between dependent variables resulting from variation between the independent variables in a given study (whether studied *a priori*, as in experimental designs, or *post hoc*, as encountered in the field). In our context of language teaching and learning, explanatory study concerned with accounting for variation and variability between language learners in the process of language learning remains a dominant approach. Such studies typically draw on quantitative methodology and related methods, measuring defined variables in order to explain relationships and to advance generalisable inferences. Notwithstanding the contribution of such explanatory research, critics believe that 'the complexity of human behavior is so great and so manifold that Erklärung in neutral and precise measurement terms is essentially impossible with respect to it" (Fishman 2010: 13). Instead of formulating abstract explanations, then, human and social sciences should pursue a more appropriate model of Verstehen, even though this might prove more limited in its scope. Cultural understanding, with culture conceived at all possible levels, is defined as the primary goal of Verstehen-focused research. These two general perspectives on research and knowledge production have been translated into quantitative and qualitative methodologies, each subject to its own principles and criteria.

Advocates of quantitative Erklärende research have frequently criticised qualitative research, considering its results to be imprecise, likely to be affected by the researcher's subjectivity and, as such, inappropriate for the purposes of making predictive generalisations. In rebuttal, proponents of Verstehen-focused qualitative research contend that the emphasis of quantitative research on objectivity is both naïve and unwarranted, in that such research cannot hope to describe the complexity of reality and the full nature of the social phenomena under study, not least because such research ignores the possibility of understanding agents' motives and efforts to create meaning (Danermark et al. 2002). Fishman's view (2010: 10) is that the significant findings from quantitative approaches do not 'convince ethnographers that these "other" methodologies have studied "the real thing" to any degree similar to that attained by their own studies. Similarly, the quantitative analysts are never convinced by the qualitative findings of ethnographic research'. Creswell et al. (2006) also present an additional line of response from each of these two perspectives, responding to those who have criticised MMR for relegating qualitative research to a secondary position. Their main argument, which they exemplify, is that qualitative research can serve to enhance MMR. This mutual contestation has been extensive, resulting in frequent and sometimes unconstructive disputes, especially during the 1990s.

We adopt a less adversarial position in this paper. We argue that any research, whether purely quantitative, purely qualitative or involving a mixture of approaches and methods, seeks to contribute to our overall knowledge of the field in terms of the evaluative framework and scope afforded by each paradigm. What constitutes knowledge and the prerequisite procedures of its production are conceptualised differently in each research paradigm in

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

terms of a tripartite framework of ONTOLOGY (the nature of reality and the object of study: objective vs. subjective), EPISTEMOLOGY (the relation between the knower and the known: outsider vs. insider) and METHODOLOGY (the translation of ontological and epistemological perspectives into tangible conceptual frameworks, including both methods and techniques of data collection and analysis). To achieve harmony in the theory and practice of research, the specific methods selected need to fit the general purposes and specific objectives of the investigation. Accordingly, the object, purpose and method of the study in question need to be commensurate so as to inform all other aspects of the research design, including more specific steps of data collection and analysis.

2. The nature and scope of the mixed-methods paradigm

These twin research methodologies, one informed by a (post)positivist paradigm with an explanatory mandate, the other constructivist with a mission of seeking understanding, have often been regarded as incompatible. One way to avoid such adversarial incompatibility is to argue the case for a third methodology, that of MMR, which has come to be regarded in the literature as an emerging research design of considerable scope and value (Doyle, Brady & Bryne 2009). In summary, MMR aims to bridge the poles of positivism and constructivism (Johnson & Onwuegbuzie 2004; Hanson et al. 2005). Notwithstanding this rapprochement, we should acknowledge that some researchers and scholars doubt, and even argue against, the possibility of mixing the two methodologies, subscribing to what some call the 'incompatibility thesis' (Howe 1988). Others argue, more generally, that competition between methodologies and paradigms is not helpful to the advancement of knowledge, but that we should turn to ways in which qualitative and quantitative research can be mixed. Accordingly, they urge researchers to focus on the relative strengths of quantitative and qualitative research, identifying how they can be incorporated in a single research design so as to maximise the strengths and minimise the weaknesses of each (Johnson & Onwuegbuzie 2004) and, in so doing, advance a more complementary understanding of the object of the study. In support, King (2010) goes so far as to argue that divisive debate and the polarisation between quantitative and qualitative researchers is now much less prominent than in the 1990s, referring to Melzi & Caspe's (2010) assertion that 'there is growing recognition of the need to draw on, and in some cases, integrate both quantitative and qualitative approaches in order to gain a more complete understanding' (p. xiii). It appears that Fishman's view (2010) is gaining traction, and that 'the total research enterprise of SLE [second language education] must be inclusive enough and supportive enough to provide room and recognition for both Erklärende and Verstehende approaches to its subject matter' (p. 14).

More specifically, Tashakkori & Teddlie (2003) are among those who promote MMR by referring to it as 'the third methodological movement' (p. 4) in the social and behavioural sciences. In making this claim, they recognise three categories into which research practices can be roughly assigned: (a) quantitatively-oriented research practices rooted in positivist and postpositivist traditions and mainly interested in numbers; (b) qualitatively-oriented research practices, working within constructivist and naturalist traditions and primarily interested in

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

words; and (c) mixed methods research practices, working within multiple research paradigms and interested in both quantitative and qualitative data. We may note here, as a caveat, Giddings' opposition to calling MMR a 'methodological movement'; he suggests, rather, that 'mixed methods as it is currently promoted is not a methodological movement, but a pragmatic research approach' (Giddings 2006: 195).

In sum, the current thrust in research principles and methodologies favours a synergistic and more pragmatic MIXED-METHODS APPROACH to research and knowledge production. Its key focus is on what is appropriate and 'what works' in relation to specific research questions (Tashakkori & Teddlie 2003) and the contexts in which they are being asked. Indeed, many researchers in academic disciplines, including those engaged in language teaching and learning, now seek to explore precisely those research questions which lend themselves more to such an inclusive research methodology, drawing appropriately on a range of quantitative and qualitative methods. What is clear is that the appeal of MMR is growing and proving valuable for a wide range of researchers in a variety of academic disciplines. As partial evidence of this appeal, there are now two key academic journals which address issues of MMR in general and as applied across a range of academic disciplines: the *Journal of Mixed Methods Research* (http://mmr.sagepub.com) and the *International Journal of Multiple Research Approaches* (http://mra.e-contentmanagement.com).

Some studies in this new framework have addressed the prevalence of MMR in different disciplines. Niglas (2004) investigated the use of quantitative, qualitative and mixed-methods designs in 15 education journals: 19% of the empirical articles examined by Niglas had an MMR design, the percentage ranging widely across the journals, from 0% to 38%. Alise & Teddlie (2010) also investigated the prevalence of research methods in pure vs. applied disciplines. Their results showed that there were significant differences in the methods used in 'pure' disciplines (psychology, sociology) and those in 'applied' (education, nursing) disciplines. They found that the prevalence of MMR was higher in applied (16%) than in pure disciplines (6%).

Concerning the use of MMR in applied linguistics journals specifically, Hashemi (2012) reports a project in progress, in which 273 articles published over 14 years (1995–2008) in seven international peer-reviewed journals including *Applied Linguistics*, *English for Specific Purposes*, *Language Learning*, *Language Teaching Research*, *Language Testing*, *The Modern Language Journal* and *TESOL Quarterly* were examined to discover how they integrated quantitative and qualitative approaches. The articles were selected using key terms such as mixed-methods, multi-method, qualitative, quantitative, triangulation, integrating methods and combining methods. Initial analysis of the journal article methodologies indicated that 68 articles (about 25%) of the articles had one dominant approach, either quantitative or qualitative, without combining the two in systematic ways. The remaining 205 articles (about 75%) were found to have used both quantitative and qualitative methods at different stages of research, including data collection and analysis. Based on this evidence, it would appear that MMR is being used in all strands of applied linguistics, including language teaching and learning.

Notwithstanding this growth of interest and engagement, there has been as yet no systematic review[1] attempting specifically to address how the MMR methodology is used

[1] We were informed by one of the reviewers that a book entitled *Mixed methods research for TESOL* by James Dean Brown is to be published by Edinburgh University Press.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

in language teaching and learning, and how such a methodology might work in practice; hence the timeliness and relevance of this paper. We note, however, that there have been helpful reviews of MMR in other disciplines, such as sociology (e.g. Brannen 2005; Small 2011), but not in applied linguistics. What does exist in applied linguistics and/or language teaching and learning is published review papers on qualitative and quantitative research methods (e.g. Davis 1995; Lazaraton 1995, 2005; Ortega & Iberri-Shea 2005; Benson et al. 2009; Richards 2009), papers specifically discussing research methods in applied linguistics (e.g. Cumming 1994; Yihong et al. 2001), and those providing guidelines and criteria for undertaking quantitative and qualitative research more generally (Chapelle & Duff 2003; Lazaraton 2003; Bachman 2004; Shohamy 2004). In terms of book-length studies, besides conventional titles on quantitative and qualitative research methods in applied linguistics and language teaching and learning (e.g. Hatch & Farhady 1982; Hatch & Lazaraton 1991; Nunan 1992; McDonough & McDonough 1997; Brown & Rodgers 2002; Holliday 2002; Richards 2003; Hinkel 2005; McKay 2006; Dörnyei 2007), there are a number of titles which do address MMR in general terms (e.g. Brewer & Hunter 2005; Creswell & Plano Clark 2007; Green 2007; Bergman 2008). Titles addressing applied linguistically oriented research methods, such as Hatch & Lazaraton (1991), Brown & Rodgers (2002), Dörnyei (2007), Paltridge & Phakiti (2010) and Richards, Ross & Seedhouse (2012), also briefly address issues related to MMR within the constraints of their scope.

It is also the case that while the development and use of MMR in language teaching and learning has grown considerably, it has been subject to a substantial amount of misinterpretation and unsystematic reference, partly a result of its own recent development. Accordingly, it is not surprising that there exists a degree of confusion among language teaching and learning researchers as to what precisely constitutes MMR. Our intention in this state-of-the-art article is to address this issue and thereby fill an important methodological gap in the current literature. To do so, we will review and elaborate on some of the complexity attendant on MMR, philosophically and conceptually, focusing also on the perceived purposes of MMR and its practical procedural aspects.

2.1 The philosophical underpinnings of MMR

To conceptualise MMR we need to take account of its informing paradigms and their related worldviews. Advocates of MMR methodology have recognised three paradigms, namely critical realism, critical theory or transformative learning, and pragmatism as potential foundations for MMR research. Accordingly, we discuss each of these three paradigms so as to discern and explore the worldviews or philosophical underpinnings of MMR as perceived by the proponents of each. At the outset, however, we should note that although the term 'critical' is commonly used in both 'critical realism' and 'critical theory or transformative learning', the term does not necessarily denote the same concept. We will return to this point later.

The first potential informing paradigm for MMR we identify is that of critical realism. An immediate point to make is that critical realism is represented differently across the social sciences. The critical realism we refer to is that which focuses on ontology – the conceptualisation of reality – and on epistemology – how knowledge of this reality can be

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

produced. That is, how the object of study can be perceived, and what the implication of this perception is for research leading to a 'critical methodological pluralism' (Danermark et al. 2002) in knowledge production. Other versions of critical realism (e.g. Hammersley 2009)[2] are more akin to a transformative position. The perspective on critical realism that we discuss shifts the researcher's attention from events to underlying mechanisms, contending that understanding and explaining social phenomena requires digging deeper and exploring the underlying mechanisms which bring about the observed phenomenon, not just focusing on the events themselves. Reality here is conceptualised as structured, multidimensional and multi-layered, requiring researchers to deploy appropriate research methodologies to investigate and understand each dimension and layer of the object of study. In other words, MMR with critical realism as its underpinning worldview is more concerned with the conceptualisation of reality at different levels and with multiple dimensions and how knowledge of the object of study can be produced using both quantitative and qualitative methodologies. Danermark et al. (2002), for example, hold that it is stronger to place MMR within a philosophy of 'critical realism' on the grounds that it adopts a critical attitude towards:

1. the claim that it is possible to understand and explain phenomena using methods from the natural sciences, which presuppose more or less closed systems;
2. methods based on a purely subjectivist assumption, i.e. that social reality is nothing but a social construction and not an interpreted objective reality; and
3. approaches based on the objectivist assumption that subjective intentions should be excluded from a scientific study of [social phenomena] (pp. 150–151).

The implication of such a critical realist perspective is that it is possible to embrace both quantitative and qualitative methodologies in a systematic way in line with ontological formulations of the object of the study, so that different layers or dimensions of the object may be investigated through appropriate methods.

Critical theory or the transformative paradigm provides, so some researchers believe, a worldview for the use of MMR. This position is chiefly advanced by Mertens (2003, 2005, 2007). Drawing on her extensive work as an educator and evaluator, Mertens (2007) insightfully illustrates how what she terms a transformative-emancipatory perspective, rooted in critical theory, can provide a coherent underlying philosophical framework for MMR. Mertens explores ways of relating the results of social inquiry (including MMR) to practical action, and asks whether MMR can be used to link the results of such inquiries to wider questions of social justice and social inequality.

In doing so, she highlights the contrast between the notions of value-free science and 'value recognition in social science research by raising the questions of values in terms of whose values, which values, and the role of the researcher within the context of values' (Mertens 2007: 70). She cites House & Howe's (1999) criticism of practicality (pragmatism) as the value basis for conducting MMR by asking the key question 'Practical for what?' (p. 70). Using practicality as the primary criterion, Mertens' position is that evaluators or researchers may be directed, to some extent, by whatever goals their clients or policy-makers endorse.

[2] We are thankful to one of the reviewers who brought Hammersley's perspective on critical realism to our attention.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

Again, in support of House & Howe, Mertens agrees that research and evaluation should not only be grounded in social contexts and particular sites of engagement but should also seek higher social goals than simply being useful to those in power. Taking one key arena as an example, she argues that in investigating power relationships as they relate to the lives and experiences of marginalised groups such as women's advocacy groups, diverse ethnic and racial communities, and people with disabilities, researchers taking a transformative perspective would find it valuable to use quantitative or qualitative methods, or mixture of both to collect and analyse data more fully. Such more comprehensive methods might then address more extensively issues of social inequality and social justice. In short, transformative scholars would support the use of any research methodology that can produce results which guarantee and promote greater social justice, be it quantitative, qualitative or a combination of both. Thus while it is clearly possible to draw on outcomes of any type of research to argue for and promote social change, transformative researchers consider the latter as their prime purpose in undertaking research.

Researchers like Creswell (1995), Tashakkori & Teddlie (1998), Johnson & Onwuegbuzie (2004) and Teddlie & Tashakkori (2009) represent those MMR theorists who consider 'pragmatism' as the underlying and the informing paradigm for MMR. Johnson & Onwuegbuzie (2004), for example, argue:

> The project of pragmatism has been to find a middle ground between philosophical dogmatism and skepticism and to find a workable solution ... to many longstanding philosophical dualisms about which argument has not been historically forthcoming. (p. 18)

In the same vein, Teddlie & Tashakkori (2009: 86) assert that the two major characteristics of pragmatism are:

1. the rejection of the dogmatic either–or choice between constructivist and positivist paradigms, and
2. the search for practical answers to questions that intrigue the researcher.

Their view is that 'pragmatism offers a third choice that embraces superordinate ideas gleaned through consideration of perspectives from both sides of the paradigms debate in interaction with research question and real-world circumstances' (p. 73). Accordingly, a pragmatic perspective as the underlying framework for MMR focuses on 'what works' and believes in the 'centrality of the research questions'. Pragmatically-oriented MMR researchers use research questions as a springboard to determining the choice of research approach and methods, enabling the investigation of important questions through mixing methods in ways that cannot be adequately addressed with a single approach.

In addition to MMR theorists like Tashakkori & Teddlie (2009), sociologists such as Morgan (2007) have also advocated pragmatism as the legitimate underlying philosophy for MMR, although he assigns more prominence to epistemology than to ontology in his discussion of the topic: 'The pragmatic approach that I am advocating would concentrate on methodology as an area that connects issues at the abstract level of epistemology and the mechanical level of actual methods' (p. 55). This is perhaps a reaction to the constructivist movement which, Morgan believes, emphasised ontological issues above all others. He further contends that

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

'we need to devote equal attention to studying both the connection between methodology and epistemology and the connection between methodology and methods' (p. 55).

Both critical realists and transformativists have been critical of building MMR on a pragmatist paradigm and particularly of using research questions and practicality as the prime concerns in designing MMR studies. Critical realists oppose a pragmatist perspective on MMR because, from such a point of view, 'the practical and the empirical take precedence over the ontological and the epistemological' aspects of research (Danermark et al. 2002: 152). They advocate positioning MMR within critical realism on the grounds that such a perspective not only allows for mixing methods from different paradigms in one study, but also because this can be accomplished by locating research question(s) within an ontological-methodological link: in other words, which dimension or layer of the conceived object of study will be investigated, with which methodology, and how the conclusions will complement each other. While Danermark et al. highlight the differences between pragmatism and critical realism as underlying paradigms for MMR, they are careful not to exaggerate the differences when it comes to the actual research process. Accordingly, they term their approach to MMR 'critical methodological pluralism', maintaining that, like researchers of a pragmatic perspective, they are also open to mixing methods, but that 'this mix must be governed not only by the research question but, more fundamentally, also by the ontological perspective from which you proceed' (p. 153).

For us, then, in this article and more generally, one of the key challenges confronting MMR is the choice of its underlying paradigm and worldview. As we have indicated, MMR lends itself to being seen from three philosophical perspectives, all of which language teaching and learning researchers need to be aware of in positioning the design of their MMR study in terms of its purposes and execution. Choosing a perspective provides boundaries, which will clearly help researchers to interpret their findings, but in making such a choice they need to be aware of how MMR itself can be defined in terms of the purposes of the studies in question. As Greene, Caracelli & Graham (1989) state, there is a need for 'a clear differentiation of alternative purposes for mixing qualitative and quantitative methods' (p. 255) and, as Tashakkori & Teddlie (2003) argue, an understanding of why we use mixed methods will help researchers conceptualise and design their MMR studies.

2.2 The purposes of MMR

Researchers have proposed five purposes of MMR with respect to its contribution to research design and execution: TRIANGULATION, COMPLEMENTARITY, DEVELOPMENT, INITIATION and EXPANSION. This set arises from an evaluation of 57 MMR studies conducted by Greene et al. (1989). They considered the five purposes as 'a common parlance for conceptualizing and describing mixed-method rationales' (p. 260). Each of the five purposes for mixing quantitative and qualitative data and analysis is, in essence, based on a logic for integrating the two methodologies.

MMR studies also differ according to whether the two phases are conducted concurrently or sequentially (Onwuegbuzie & Collins 2007). Taking this temporal perspective as a base, we discuss each of the five purposes of MMR studies.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

Denzin (1978) and Greene et al. (1989) define TRIANGULATION as intentionally using more than one method of data collection and analysis when studying a social phenomenon so as to seek convergence and corroboration between the results obtained from different methods, thereby eliminating the bias inherent in the use of a single method. However, Denzin (2012: 82) argues that 'In its original forms (Denzin 1970), triangulation referred only to the use of multiple forms of qualitative research methods, not the combination of quantitative and qualitative methods'. Denzin quotes Flick (2007), who argued that rather than a tool or a strategy for validation, triangulation is an alternative to validation, reflecting, in his words, 'an attempt to secure an in-depth understanding of the phenomenon in question' (p. 82). Apparently, this presents a challenge to MMR researchers, including those in the field of language teaching and learning: when, how, and to what extent, should triangulation be used in MMR with the objective of achieving more comprehensive understanding of the construct under study? Despite such criticisms, triangulation remains a dominant desideratum in MMR studies and a purpose that can be pragmatically defined and achieved.

Qualitative and quantitative phases of research can be mixed to achieve COMPLEMENTARITY. This expands the explanatory power of any MMR study, because different data types and analysis are appropriate for different research questions and processes. Greene et al. (1989) quote Mark & Shotland (1987), who considered one variation related to complementarity, in which different methods are used to examine different levels of a phenomenon; they liken this to peeling the layers of an onion. In this way, quantitative and qualitative results may be drawn upon to interpret different aspects of the phenomenon. The underlying logic for complementarity rests on viewing social phenomena as multi-layered. The two components (quantitative and qualitative) of an MMR study are thus used to address different research questions relating to different aspects or layers of social phenomena. Complementarity is best achieved by carrying out each method interactively/interdependently and concurrently, to cast as much light as possible on the complexity of the research at issue.

When the results from one method or phase of a study are used to help develop or inform another, such as when results from interviews with teachers about their professional lives are used to develop a questionnaire to collect data from a broader and larger sample of teachers, the purpose of MMR is DEVELOPMENT. Here the two methods or phases of the MMR study are implemented sequentially, because the patterns observed in one phase are used to develop the second. Another example of a development purpose would be when significant findings from participants' responses to a language learning attitude questionnaire feed into the design of a case study designed to explore in depth why such an attitudinal pattern is formed and developed. Thus, an MMR study with a development purpose in mind might be best structured with the quantitative and qualitative phases conducted independently and sequentially and, preferably, given equal status. Like triangulation, development as a motivation for MMR fits within a pragmatic perspective.

MMR undertaken for INITIATION purposes seeks to uncover contradiction and paradox, with consequent recasting of questions or results from one method in the light of those obtained from another (Green et al. 1989). Any observed contradiction encourages the researcher to initiate further data collection and analysis from the other method so as to gain

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

new perspectives on the nature and origin of such contradictory results. Initiation thus requires an iterative approach to the research process which, as Greene et al. (1989) argue, might not have been planned at the outset. As they point out, however, 'mixing paradigms in this design is acceptable and even encouraged' (p. 269) to maximise the possibility of revealing unlikely findings. Greene et al. (1989: 268) quote Rossman & Wilson (1985) who 'demonstrated that iterative use of both method types can intentionally seek areas of noncongruence in order to initiate interpretations and conclusions, suggest areas for further analysis, or recast the entire research question'. In our view, MMR with the purpose of initiation is perhaps best understood in terms of a multidimensional 'reality' requiring the researcher to investigate different dimensions using a range of methods and perspectives (see, for example, Candlin & Crichton 2013 on taking a multiperspectival approach). MMR studies with an initiation orientation can employ concurrent or sequential implementation of the two phases, giving each equal priority. In other words, an MMR initially designed with a triangulation purpose may lead to initiation if the results from the two methodologies are found to be contradictory rather than corroborative.

Finally, EXPANSION seeks to extend the breadth and depth of inquiry by using different methods to study different components of a programme, such as its outcome and process. Greene et al. (1989) claim that expansion is the most flexible of the five purposes of MMR: hence its frequency of use. MMR aimed at expansion uses the two methods side by side, with less integration than research with other purposes. Greene et al. observe that empirical studies typically use quantitative methods to assess programme outcomes and qualitative methods to appraise the implementation process. The two phases of the MMR study can be conducted sequentially or concurrently, but taking an approach 'in which the different elements are kept separate, thus allowing each element to be true to its own paradigmatic and design requirements' (Bazeley 2004: 3). Bazeley goes on to ask how such a design can be categorised as MMR if the two components of the study are not genuinely integrated. Greene et al. (1989: 269) address the same issue, remarking that 'Even in the stronger expansion studies reviewed, the qualitative and quantitative methods were kept separate throughout most phases of the inquiry'.

As we mentioned earlier, these five purposes derive from an analysis of MMR studies related to educational programmes. Hashemi (2012) reports that, of 205 articles published in the journals of applied linguistics, some 66.34% used concurrent studies for the purpose of triangulation; other MMR purposes appear rarely. In addition, based on a preliminary analysis of the methodology employed in the articles considered, Hashemi comments that in most cases mixing was performed only in the phases of data collection and analysis; where inferences were being drawn from the results, the methods used were not systematically integrated, thus, in his view (and ours), reducing the integration quality of the MMR articles considered.

Greene et al.'s (1989) categorisation of MMR purposes emerged from a *post facto* analysis and review of published papers concerned with educational programmes. While they provide a useful frame of reference for identifying the purposes of MMR studies, they do not attempt to link such purposes with the underlying and potentially informing paradigms. This absence, we believe, makes conceptualising and differentiating between the proposed purposes for MMR studies difficult for readers and researchers. As we indicate, considerable controversy

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

surrounds potential underlying paradigms for MMR. We can shed some light here. Drawing on the three philosophical perspectives we discussed earlier, one can make a link between the proposed purposes and each of the three potential paradigms, at least speculatively. Of the five proposed purposes for MMR, triangulation, development and expansion seem to be nurtured by a 'pragmatic' perspective. Any of the five purposes aiming at addressing social justice with a critical orientation may be rooted in the 'transformative' perspective. MMR studies with a complementarity and initiation purpose are best conceptualised within 'critical realism', where 'reality' is perceived to be multilayered, each layer to be addressed by different research questions, data and analysis. We believe connecting purpose and philosophical perspective, however arbitrarily, enables language teaching and learning researchers to conceptualise their MMR study more precisely, and, as a result, to communicate their research aspirations to their readers more effectively.

2.3 Techniques and procedures in MMR

Two criteria for MMR designs are those of time order in data collection and paradigmatic emphasis and dominance. As we have noted, Creswell et al. (2003) classify MMR designs as either sequential or concurrent. In sequentially designed MMR studies, either quantitative or qualitative data are collected first, followed by the collection of the other type of data at a later second stage, with the two seen as mutually dependent. An example would be collecting interview data from a group of TESOL teachers about their attitudes towards how to assess students' oral proficiency in English language programmes, followed by the administration of a Likert-scale survey questionnaire, drawing on the interview data, so as to address a larger sample of teachers. Concurrent designs, on the other hand, as the label suggests, involve collecting both quantitative AND qualitative data concurrently and independently. For example, participants might take a test of reading comprehension (with scores to form the quantitative data), with the same cohort (or a subgroup) participating in individual face-to-face or focus group interviews (qualitative data) independently from the test, so as to explore the reading comprehension strategies they use when reading and comprehending a text. To differentiate between sequential and concurrent approaches, one can ask whether the quantitative or the qualitative phase of the study informs or drives the other phase (Onwuegbuzie & Johnson 2006). In the first example above, the interview data would be collected to enable the construction of the survey questionnaire for the second phase, whereas in the second example, data from performance on the reading test would not be used to define the interview-based data collection in the second phase, although in some situations this might be possible.

In either the sequential or concurrent approach, the emphasis in MMR may be placed on one of the two strands of research (quantitative or qualitative), on both equally, or more focused on the data collection and analysis phases. Upper and lower case letters are usually used to label this aspect of MMR design, with capital letters (QUAL or QUAN) indicating prime emphasis and lower case (qual or quan) indicating a secondary level. Dörnyei (2007) provides for different combinations of MMR by combining the two features of time order and emphasis. Hence, when designing MMR studies, language teaching and learning researchers

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

need to consider these features along with questions of research purpose and the motivation of the researchers themselves (Sarangi & Candlin 2001).

Sequential and concurrent MMR designs with different methodological emphases may also be used for both exploratory and explanatory purposes. For example, in a sequential explanatory design, researchers may collect qualitative interview data from a sub-sample of survey respondents, to provide more explanation for some of the response patterns revealed by the survey data and analysis.

Apart from broad issues of research design, formulating appropriate research questions is crucial in MMR because together with the design and purpose of the study, they provide a roadmap for the other elements of the methodology. As Onwuegbuzie (2006: 477) indicates '. . . forming research questions is much more difficult in mixed methods studies than in mono-method (i.e., quantitative or qualitative) investigations because it involves the formation of both quantitative and qualitative research questions within the same inquiry'. Tashakkori & Creswell (2007) provide some helpful criteria to consider when formulating research questions.

We propose, then, that the formulation of research questions should follow the design (time order and emphasis) and the purpose(s) of the MMR study. For example, for a sequential QUAN → QUAL study, three generic research questions are likely, addressing:

RQ1: the quantitative phase of the study (such questions could be accompanied by related research hypotheses)
RQ2: the qualitative phase of the study
RQ3: how the responses to RQ1 and RQ2 fulfil the purpose(s) of the study.

Note that RQ3 is, in effect, the MMR question that addresses mixing the quantitative and qualitative strands of the research (Creswell & Plano Clark 2007). Compared to purely quantitative or qualitative research questions, this is a new form of question in research methods, which Tashakkori & Creswell (2007: 208) refer to as a HYBRID or INTEGRATED question.

Note also that the order of research questions could be reversed: the overarching integrative or hybrid MMR question (RQ3) could be formulated first and then substantiated with RQ1 and RQ2. The same procedure can be employed when formulating research questions for other combinations of MMR presented in Table 1 (see section 3) and when addressing any of the five purposes of MMR described above.

Closely related to the issue of formulating research questions in MMR are those inferences or conclusions derived from the analysis of quantitative and qualitative data that could be used to respond to the research questions formulated in relation to the purpose(s) of the study. The three basic inferences in MMR can be defined as (1) deductive inference (for the quantitative phase), (2) inductive inference (for the qualitative phase) and (3) meta-inference or integrated mixed-inference (for the final stage of mixing the two strands according to one of the defined purposes of the MMR). In this manner, the quality of inferences drawn in MMR studies addresses issues of internal and external validity in relation to quantitative methods, and issues of trustworthiness and credibility of interpretations in relation to qualitative methods

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

(Tashakkori & Teddlie 2003). We formulate this quality criterion in respect of inferences drawn in terms of the degree to which interpretations and conclusions on the basis of results meet professional standards of rigour, trustworthiness and acceptability, as well as the degree to which alternative plausible explanations for the results obtained may be excluded. In essence, the criterion is that of the plausibility of the conclusions drawn from the outcomes of the analysis. For MMR, these should provide clear evidence for any inferences made, and how such inferences respond to the initial research questions. Here, two method-oriented inferences and one mixed-method inference would be the minimum one might expect in a MMR study. For example, in a MMR study with a complementarity purpose, the three general research questions will be concerned with the quantitative, qualitative and mixed phases of the study. The complementarity inference will, we assume, provide the results of two strands which offer two different but non-conflicting conclusions or interpretations (Tashakkori & Teddlie 2003). If quantitative and qualitative analyses are not embedded appropriately, this will occasion what Collins, Onwuegbuzie & Jiao (2006, cited in Onwuegbuzie et al. 2009) refer to as 'interpretive inconsistency', or what Tashakkori & Teddlie (2006) describe as a lack of 'analytic adequacy'. Accordingly, the expectation is that in a MMR study, inferences 'gleaned from the two strands are integrated to provide a fuller understanding of the phenomenon under study. Integration might be in the form of comparing, contrasting, building on, or embedding one type of conclusion with the other' (Creswell & Tashakkori 2007: 108).

Concerning methodological issues and, in particular, sampling procedure, Collins et al. (2007: 269) believe that 'selecting the sampling design, which comprises making decisions about the sampling scheme(s) and sample size(s), is a pivotal step for addressing' challenging issues in MMR. The former denotes explicit strategies the researcher uses to select units of people, groups, settings or events, and the latter indicates the number of units selected for the study. The clarification of sampling scheme and sample size applies to both quantitative and qualitative phases of the MMR. In quantitative methods, probabilistic large samples (simple random, stratified or cluster, for example) are common, while in qualitative methods non-probabilistic small samples (purposive, snowball or theoretical, for example) are more common, in keeping with the objectives of each research strand. The size of sample for the quantitative and qualitative phases of the MMR depends on a variety of factors and the type of inferences the researcher seeks to draw from the data and analysis (see Onwuegbuzie & Collins 2007, who suggest sample sizes for quantitative and qualitative methods). Given the option of concurrent and sequential designs in MMR, we must make clear which we are using: in other words, (1) choosing the samples for the two phases of the study at the same time, or (2) choosing one sample first, and only when that study is complete choosing the sample for the next phase of the MMR study.

According to Onwuegbuzie & Collins (2007: 292), the relationship between quantitative and qualitative samples in a MMR study can be 'identical', 'parallel', 'nested' or 'multilevel'. When samples in the two phases of the study are exactly the same, the sampling procedure is identical. When the two samples are not exactly the same, but are selected from the same population (e.g. university students) the sampling is parallel. In nested sampling, the qualitative sample is usually a sub-sample of the quantitative sample; finally, multilevel sampling requires the recruiting of different groups of participants for each phase of the

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

research. As Onwuegbuzie & Collins suggest, both samples in multilevel sampling could be probabilistic or non-probabilistic. While these guidelines for sampling procedures are useful, they imply an over-strictly structured sampling procedure, especially in regard to the qualitative phase, given that the latter's main concern is on meaning and insights generated. Accordingly, we recommend that MMR researchers in language teaching and learning justify their own sampling procedure using appropriate and contextually relevant criteria.

Collins et al. (2007) analysed 121 studies representing nine fields in the social or health sciences and found that more studies (66.1%) used a concurrent sampling design than a sequential (33.9%) design. They also found that identical sampling designs were the most prevalent, followed by nested sampling, multilevel sampling and parallel sampling.

A final issue in MMR methodology is that of data collection and analysis. The mixed-methods researcher needs to collect adequate data for each phase of the study, using reliable and valid instruments. In a quantitative phase, data collection instruments such as tests, measures of personality, attitude scales and questionnaires are very common, while direct observations (through audio and video recording, and field notes), introspective and retrospective interviews (structured, semi-structured, open, ethnographic and focus group), narratives and text, discourse and genre analysis are more common in qualitative studies. The researcher might have access to, and be willing to use, data collection instruments already available (developed and validated by other researchers), or might need to develop specific instruments for the two phases of the study. Constructing appropriate instruments for data collection is a complex procedure requiring operationalisation of the constructs of the study into reliable and valid instruments for the quantitative phase and the collection of rich and valid data for the qualitative phase. Researchers need to provide an account of their procedures for operationalising such constructs and the manner in which any instruments have been validated, in other words, checked for reliability and validity.

Data analysis in MMR should be appropriate to the design, purpose, research questions and sampling of the study. Onwuegbuzie et al. (2009: 15) comment that 'a significant proportion of mixed research articles submitted [to journals which publish MMR studies] lack the level of integration at the data analysis and interpretation stages necessary to justify their being deemed as pure mixed research studies' and that 'the more interactive and embedded the quantitative and qualitative analyses are, the more integrated and coherent the inferences will be' (p. 14).

To illustrate data analysis in MMR, consider a hypothetical MMR study following a sequential design with the quantitative phase dominant and with the purpose of triangulation, as represented by QUAN → qual. Three research questions could be formulated corresponding to the purpose of such a study. The first addresses the 'what' (quantitative part) of the study with quantitative data and analysis to determine which findings to enhance in the subsequent phase. The second question addresses the 'how and why' (qualitative part) related to the quantitative findings, and the third (overarching) research question addresses the integration of the quantitative and qualitative inferences to provide the researcher with a meta-inference, creating the ground necessary for the triangulation of the findings.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

3. Trends in MMR in language teaching and learning

Our review in this section includes 40 published papers from 30 journals covering one decade (2002–2011). These 40 articles were selected through searches in databases such as SCOPUS using the key terms MIXED-METHODS, QUANTITATIVE and QUALITATIVE and using YEAR (published after 2000) and LANGUAGE TEACHING AND LEARNING as filters. Articles whose authors used 'mixed-methods' either in the title, abstract or methods section of the paper were categorised as mixed-methods studies. Articles whose authors had not used mixed methods, but had used 'quantitative and qualitative' to describe their data collection and/or data analysis, were categorised as such. Table 1 presents details of the 40 articles included in our review. Of these, 18 (45%) belong to the mixed-method category and were published in 13 journals, and 22 (55%) belong to the category of quantitative and qualitative and were published in 17 journals. Although our sampling might not represent a true random sample of relevant papers and journals, it can serve to provide an account of the status of MMR studies in journals with a language learning and teaching orientation.

3.1 Review of mixed-methods studies

Here we review those 18 papers explicitly using the term 'mixed-methods approach/method' either in their titles or in the description of their methodology. In doing so, we address the following features of MMR discussed earlier:

- Use of mixed-method as a collocation
- Overall purpose (triangulation, complementarity, development, initiation, expansion) and design of the MMR (temporal order and paradigm emphasis)
- Data analysis, and inferences based on the analysis of data.

3.1.1 'Mixed-methods' as a collocation

The authors of the 18 MMR studies indicated used the collocation 'mixed-methods' either in the title of their paper or in the abstract, and subsequently in other sections of their paper, indicating awareness of MMR and that their research is characterised by its core features. Of these 18, the authors of one study (Christ & Makarani 2009) described their methodology as an embedded mixed-methods study; another (Lee & Greene 2007) used the term 'complementarity mixed-method' and five (Lamb 2007; Chen 2008; Fox 2009; Kim 2009; O'Bryan & Hegelheimer 2009) used the term 'concurrent mixed-method approach'. Three articles (Colby-Kelly & Turner 2007; Barkaoui 2010; Meraji 2011) used the term 'mixed-method approach'; six (Derwing, Munro & Thomson 2007; Isaacs 2008; Mazdayasna & Tahririan 2008; Lim 2010; Wesely 2010; Hu & Lei 2011) used the term 'mixed-method study', and two (Polat 2009, 2011), used 'mixed-method design'. Accordingly, we can say that 'mixed-method study' and 'mixed-method approach', with six and five occurrences respectively, were the terms predominantly used for describing MMR studies by their authors.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

Table 1 Details of the 40 journal articles included in the review

Author	Date	Journal	Topic
Mixed-methods studies			
Colby-Kelly & Turner	2007	*Canadian Modern Language Review*	Formative assessment
Derwing, Munro & Thomson	2007	*Applied Linguistics*	ESL learners' fluency and comprehensibility development
Lamb	2007	*TESOL Quarterly*	Impact of schooling on EFL learning motivation
Lee & Greene	2007	*Journal of Mixed Methods Research*	Predictive validity of an ESL placement test
Chen	2008	*Teaching & Teacher Education*	EFL teachers' internet use in language instruction
Isaacs	2008	*Canadian Modern Language Review*	Assessment criteria of pronunciation proficiency
Mazdayasna & Tahririan	2008	*English for Academic Purposes*	ESP needs assessment
Christ & Makarani	2009	*International Journal of Multiple Research Approaches*	Teachers' attitudes about teaching English in India
Fox	2009	*English for Academic Purposes*	Role of diagnostic assessment in moderating policy impact and supporting EAP curricular renewal
Kim	2009	*Language Testing*	Native and non-native judgements of oral English performance
O'Bryan & Hegelheimer	2009	*Canadian Journal of Applied Linguistics*	Metacognitive awareness and the effect of task design on listening development
Polat	2009	*Foreign Language Annals*	Teachers' and learners' beliefs about students' language learning success
Barkaoui	2010	*TESOL Quarterly*	ESL raters' evaluation criteria of test performance
Lim	2010	*English for Academic Purposes*	Genre analysis
Wesely	2010	*Journal of Mixed Methods Research*	Language learning motivation in early adolescents
Hu & Lei	2011	*Language Learning*	Chinese university students' knowledge of, and attitudes towards, plagiarism
Meraji	2011	*Journal of Language Teaching & Research*	Written task production in a pedagogic vs. a testing context

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

Table 1 continued

Author	Date	Journal	Topic
Polat	2011	*Language Learning Journal*	Gender differences in motivation and L2 accent attainment
Quantitative-qualitative studies			
Burgess & Etherington	2002	*System*	Teachers' attitudes to teaching grammar in EAP courses
Anderws	2003	*Teachers & Teaching*	L2 teachers' beliefs concerning grammar pedagogy
Vandergrift	2003	*Language Learning*	Listening strategy applications by learners of French
Yoon & Hirvela	2004	*Journal of Second Language Writing*	Students' attitudes towards corpus use in L2 writing
Min	2005	*System*	Training students to become peer reviewers
Hawkey	2006	*ELT Journal*	Teacher and learner perceptions of language learning activity
Brown & Bailey	2008	*Language Testing*	Survey of language testing courses
Cabaroglu & Yurdaisik	2008	*Reading Matrix*	University instructors' views concerning, and approaches to, reading instruction and reading strategies
Hempel & Degand	2008	*Journal of Pragmatics*	Descriptive analysis of discourse structuring devices in written texts
Leow, Hsieh & Moreno	2008	*Language Learning*	Attention to form and meaning in reading comprehension in Spanish
Abdel-Latif	2009	*Canadian Modern Language Review*	Measuring writing fluency
Brook	2009	*Language Testing*	Testing oral proficiency
de Morgado	2009	*Reading Matrix*	Extensive reading practices
Kang	2009	*Discourse Processes*	Korean EFL learners' cohesive use of references in written narrative discourse
Loewen, Li, Fei, Thompson, Nakatsukasa, Ahan & Chen	2009	*Language Learning*	L2 language learners' beliefs concerning grammar instruction and error correction
Martinez, Beck & Panza	2009	*English for Specific Purposes*	Corpus study of academic vocabulary

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

Table 1 continued

Author	Date	Journal	Topic
Dekeyser	2010	*Foreign Language Annals*	Monitoring processes in speaking in Spanish as a second language
Ogilvie & Dunn	2010	*Language Teaching Research*	Role of teacher education in task-based instruction
Park	2010	*The Journal of Asia TEFL*	Learners' preferences for corrective feedback
Chou	2011	*English for Specific Purposes*	Influence of learner strategy on oral presentations
Li & Walsh	2011	*Language Teaching Research*	Technology uptake in Chinese EFL classes

3.1.2 Purposes and design of the MMR studies

Six (33%) of the 18 studies explicitly stated that their purpose in mixing quantitative and qualitative data and analysis was that of triangulation – validating results from one dataset and analysis with those from another. These included the studies reported by Chen (2008), Christ & Makarani (2009), Colby-Kelly & Turner (2007), O'Bryan & Hegelheimer (2009) and Polat (2009, 2011). The authors of one study (Hu & Lei 2011) did not state this purpose explicitly, but we may infer from their description that triangulation motivated their mixing of methods, and the author of another (Lamb 2007) mentioned both triangulation and expansion as its purposes. Thus, eight (44%) reported MMR studies out of 18 considered triangulation as the chief purpose of mixing the two principal methodologies. Concerning the sequence design (i.e. concurrent vs. sequential, and paradigm emphasis) of these eight studies, five (Colby-Kelly & Turner 2007; Lamb 2007; Chen 2008; O'Bryan & Hegelheimer 2009; Polat 2009) used concurrent (implying collecting both quantitative and qualitative data simultaneously/independently) with an equal weights design, thus producing a (QUAN + QUAL) design. Christ & Makarani (2009) used sequential (first collecting quantitative data, then qualitative) with main emphasis on the qualitative component, thus producing a (quan → QUAL) design, while Hu & Lei (2011) and Polat (2011) used a sequential design (first collecting quantitative, then qualitative), giving more emphasis to the quantitative component, resulting in a (QUAN → qual) design. With the exception of O'Bryan & Hegelheimer's (2009) study, which used questionnaire and think-aloud protocols, the remaining seven MMR studies with a triangulation purpose combined survey questionnaires and interviews. In addition to such a pairing, classroom observations (Colby-Kelly & Turner 2007; Christ & Makarani 2009; Polat 2009), analysis of curriculum documents (Colby-Kelly & Turner 2007; Polat 2009) and discussion of field notes (Polat 2011) were also used. The chief purpose, then, of these MMR studies, as set out by the authors, was to cross-validate findings from one dataset and analysis (quantitative or qualitative) with other datasets and analyses (quantitative or qualitative).

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

One challenge confronting MMR studies with a triangulation purpose is ONTOLOGICAL: how the object of the study is itself defined. In order to cross-validate findings from one methodological approach against findings from another, we need to be dealing with the same construct. Otherwise, the use of different constructs will produce different data, yielding different inferences which may at times be incompatible. Taken as a whole, it appears that the object of the study (the construct) in these MMR studies was not clearly discussed, making it difficult for the reader to tell whether the researchers were addressing a unitary construct incorporating the two methodologies and their related data and analyses. Since the logic and purpose underpinning triangulation is to allow for the corroboration of research results (Mason 2006) as a way of promoting validity, the use of heterogeneous constructs and data might pose a serious problem. One example, as represented in questionnaire and interview data, can be found in the Lee & Greene (2007) and Wesely (2010) studies.

One MMR study (6%) of the 18 considered, that of Lee & Greene (2007), was designed with complementarity in mind, seeking a more complete and elaborated understanding of the different layers or segments of the phenomenon under study (in this case 'academic success'), using a sequential equal weight design (QUAN → QUAL). In many ways, this study is exemplary, in that it mixes the two methodologies (quantitative and qualitative) at all stages, from the conceptualisation of the problem, through the formulation of research questions, to the drawing of integrative inferences. The authors display full awareness of the principles and techniques of MMR; indeed, they include an independent section in their paper discussing aspects of MMR as well as rationalising their use of it. In effect, MMR with a complementarity purpose seeks to investigate a social phenomenon conceived as multi-layered, or with more than one segment, requiring the researcher to use multiple methodologies to present a fuller picture. However, at a theoretical and conceptual level, researchers still need to show clearly how these parts or layers represent an integrated whole. In Lee & Greene (2007), the authors' underlying assumption is that 'academic success' implies different layers of conceptualisation, requiring different methods for their investigation. Accordingly, the authors draw on an integrative (rather than corroborative) logic to address different layers of their construct (academic success). We may conclude that theorising and conceptualising a problem as an integrated but multi-layered whole is of central importance to MMR studies with a complementarity purpose. This is clearly not an easy task, and is likely to present challenges for researchers.

Fox (2009) and Wesely (2009) used MMR for what they term an initiation purpose. As discussed earlier, 'initiation' refers to the stage of MMR in which any paradoxes arising from one component are followed up with further, iterative explorations using another methodology. Fox (2009) used a concurrent nested design (Creswell et al. 2003) in which qualitative and quantitative data were collected simultaneously in relation to each of the research questions, while according priority to the qualitative data and analysis (QUAL + quan). Wesely (2009) used sequential equal weights (QUAN → QUAL) in an attempt, as he puts it, to 'seek new perspectives and frameworks, possibly through the identification of paradox and contradiction in the two types of data' (p. 300). MMR studies with a complementarity purpose attempt to investigate different segments or layers of a social phenomenon; initiation studies, in contrast, view the object of study as multi-dimensional and multi-faceted, addressing what is in effect a more complex reality. The initiation purpose

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

attempts to investigate the social phenomenon in 'a collective (in contrast to an integrated) manner' (Mason 2006: 9). Initiation is selected to reveal that the object of study is multi-dimensional, and to indicate that there might well be tensions at the points where different dimensions intersect. A contradiction observed in the results might not 'necessarily be a bad thing, because it can aid the construction of "dialogic" explanation that captures the dynamic relation between more than one way of seeing' (May 2010: 3). As discussed in relation to MMR studies with a complementarity purpose, the role of theory is also significant in those with an initiation purpose, to reveal the complexity of the social phenomenon. We discuss this in the next section, addressing the challenges and issues facing MMR researchers.

Mazdayasna & Tahririan (2008) mixed these two methodologies with a development purpose. The study involved, first, a small-scale interview, with the resulting data used to design a large-scale questionnaire survey. The study was designed sequentially, with the main emphasis on the quantitative data and analysis, using questionnaire responses (qual → QUAN). This seems a plausible MMR approach, as one methodology is used to provide materials for designing another. The MMR study with development purpose is meaningful and understandable, although (and this is a point of more general significance) it might lack the rigour of fully-fledged MMR studies such as those aiming at complementarity or initiation.

Meraji (2011) did not identify any particular purpose for MMR; however, reading his study we observe that he used a sequential explanatory design (QUAN → qual): sequential because quantitative data were first collected from both control and subject groups in an experimental design in which the participants performed writing tasks in pedagogical vs. testing situations, using pre-task planning and no planning procedures. The 41 participants who performed in planning situations were then interviewed using stimulated recall interviews to report on the strategies they used while completing the writing tasks. Interview data were transcribed and coded using *a priori* categories for the reported strategy use. The reported strategies were then tallied and quantified for subsequent statistical analysis.

While the studies reviewed above accord with some principles and characteristics of MMR, there were two groups of studies which we found to be weaker. The first group we review here is recognised in the MMR paradigm as expansion, and the second group as 'embellishment', to use Mason's (2006: 4) term. MMR studies with an expansion orientation consist of two separate mini-studies with almost no attempt to integrate or consolidate the findings. MMR studies with an embellishment purpose are, as Mason indicates, 'often done by researchers who have primarily either a quantitative or qualitative orientation, but also sense that their methods and data are partial in some respect' (Mason 2006: 3). Further discussion of these two groups of MMR studies follows.

Two (11%) of the 18 MMR papers, those by Kim (2009) and Derwing et al. (2007), mixed the two methodologies with the purpose of expansion, and both with equal weights, but Kim's study was concurrent (QUAN + QUAL) while that of Derwing et al. was sequential (QUAN → QUAL). Kim investigated how native English-speaking and non-native English-speaking teachers assess students' oral English performance. The quantitative data included test scores, while the qualitative data comprised the teachers' comments explaining the criteria they used in evaluation. As Kim states, 'Since the nature of the component designs to which this study belongs does not permit enough room to combine the two approaches

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

(Caracelli & Greene 1997), the different methods tended to remain distinct throughout the study' (p. 196). Derwing et al. compared the oral comprehensibility and fluency of well-educated adult immigrants from Mandarin and Slavic language backgrounds in Canada. The quantitative data comprised evaluation of speech samples (using comprehensibility and fluency as criteria) from the two groups over a two-year period, and qualitative data were collected through interviews at the last data collection session, exploring participants' English learning experiences. The results of the two datasets and analyses are presented in the paper. As in MMR studies with an expansion purpose, the results of the two components (quantitative and qualitative) are presented in parallel in the papers, thus placing such studies at the borderline of the MMR paradigm. Each study is composed of two mini-studies with 'its own logic of design, data generation, analysis and explanation, and these run in parallel' (Mason 2006: 5). The idea here, then, is not to integrate the two methodologies, but rather to co-present them to provide depth and breadth for each of the two components. For example, since Derwing et al. found Mandarin speakers did not show any progress in their oral speech over two years while Slavic speakers did, the interview data provided some context to help explain why this happened. Compared to single-method studies (using only quantitative or qualitative data and analysis), these MMR studies appear to offer greater rigour, in that there is some potential for mixing the two methodologies.

Three (17%) of our set of MMR studies, those by Barkaoui (2010), Isaacs (2008) and Lim (2010), despite the use of mixed methods by their authors in their description of their methodology, nevertheless fall short of showing the key characteristics of MMR. Their authors did not identify any particular purpose for their use of MMR, and presented studies which were predominantly quantitative in nature, although with some qualitative component. However, the latter consisted of a limited amount of qualitative data which were subsequently quantified and presented along with the quantitative results. The mixing was, accordingly, limited to data, and did not explore the use of MMR principles throughout the whole research process. For example, the only qualitative component in Barkaoui's study is the participants' explanation of the overall scores they assigned to student writers' essays. The explanations are thematically coded, but quantified and presented as frequencies, which were then used to perform further quantitative analysis (correlations), which led the author to infer that findings from the qualitative data both support and contradict findings from the score analyses. In fact, the mixing in Barkaoui's study was limited to data collection (quantitative and qualitative), but the qualitative data were then quantified to provide further quantitative data and analysis. This same trend occurs in the studies by Isaacs and Lim. Isaacs collected data from eight graduate students on a Test of Spoken English, coding their performance for 'intelligibility' and 'unintelligibility'. Frequencies of the coded data were used as quantitative data along with ratings of the participants' oral performance. The raters also provided responses to open-ended questions (with a maximum of 24 words) in a rating instrument. Almost all the data were quantified and statistical analyses were performed on the quantified data. Once more, the observation is that mixing of the two methodologies is restricted to the data collection stage. In a similar fashion, Lim made use of genre analysis of the 'results' section of published papers in two disciplines (applied linguistics and education). The results sections of the papers were analysed using steps and moves within Swales' genre analysis framework (Swales 1990). However, the results were then quantified and presented as

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

frequencies so that different steps and moves in the papers from the two disciplines could be compared.

Finally, we turn to MMR studies carried out with the purpose of triangulation, that is, to cross-check or cross-validate the results of one methodology with results from another. As we argued above, this may pose an ontological problem for researchers, because unless they can show how they have conceptualised the object of the study, it is difficult to confirm the results of one methodology using the results from another, perhaps opposing, methodology. One alternative to using triangulation to confirm results from different data sets might be to put the data and analysis into a more comprehensive 'explanatory framework' (Howe 2012) rather than looking for inter-methodological agreement. We observe also that three of the papers claiming to use an MMR design were predominantly quantitative in nature, their qualitative component being restricted to the collection of some qualitative data, which were then quantified with predominantly statistical analysis, no attempt being made to integrate the two methodologies more fully and at all levels. The purposes expansion and initiation, each featuring in two articles, were less frequent than triangulation. However, the least frequent purposes observed in this pool of papers were those signalling complementarity, representing full-fledged and unequivocal MMR studies, and development.

In the next part of the paper, we review 'quantitative and qualitative' studies and, in section 4, raise some issues arising from our analysis and discuss the challenges and issues confronting MMR researchers.

3.2 Review of the quantitative and qualitative studies

The second category of papers we review here comprises those described by their authors as quantitative and qualitative (or vice versa), not mixed-methods. We assume the authors implicitly recognised the value of MMR, so we are interested in what they see as its rationale and objective.

Of these 22 articles, 12 (54%) used survey questionnaire methodology to elicit quantitative data from participants. In addition, qualitative data were gathered by including some open-ended questions in the questionnaires or from think-aloud protocols, interviews, classroom observations and participants' written reflections. Apart from the dominance of survey studies in this category of articles, other methods reported included experimental design (Leow, Hsieh & Moreno 2008; de Morgado 2009), text and corpus analysis (Vandergrift 2003; Min 2005; Hempel & Degand 2008; Kang 2009; Martinez, Beck & Panza 2009), classroom-based research for measuring L2 writing fluency (Abdel Latif 2009; Chou 2011) and test-performance study (Brook 2009).

None of the authors of the 22 papers explicitly stated why, in terms of the five purposes of MMR, they mixed the two components. The only exceptions were three studies which indirectly indicated triangulation as their goal. Hawkey rationalised the mixing of the two methodologies as follows: 'to cross-check (or triangulate) related data from different sources and of different kinds' (2006: 244), DeKeyser argued that 'These various data collection techniques allowed for both method and person triangulation' (2010: 83) and Vandergrift stated that 'quantitative and qualitative analyses point to some interesting convergent

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

data' (2003: 483). DeKeyser and Hawkey both used a range of data sources, including questionnaires, interviews and classroom observations. Vandergrift, however, collected think-aloud protocols, which were then analysed both quantitatively and qualitatively. As we mentioned earlier, MMR studies with a triangulation purpose need to provide evidence that the construct of the problem is the same in the two methodologies. Otherwise, searching for agreement between the data and analysis from two opposing methodologies will be both ontologically and epistemologically flawed.

Our review of the other 19 papers reveals that the researchers felt they needed to aggregate other data sources and analysis so as to shed more light on the findings achieved through one method. Expressions such as 'to shed light on the quantitative data', 'additional information to support the conclusions made by quantitative data' and 'to obtain more detailed information' were used by the authors to explain their use of another data source and/or analysis. However, the two methodologies were not systematically applied or coherently integrated at different stages in the research process. The researchers simply seemed to feel that one method and dataset (quantitative in this case) was inadequate and partial in providing a full picture and that, as a consequence, they needed to supplement this with a qualitative component. In doing so, and as we argued earlier, such studies do not represent genuine MMR with a strong and integrated conceptual and implementation design. Rather, what they do is to employ the two datasets so as to embellish their studies. This somewhat *ad hoc* linkage is a challenge for language teaching and learning researchers who might be tempted to cherry-pick for their research designs to gain the benefit of the perceived strengths of the two methodologies.

4. Issues and challenges facing MMR and researchers

4.1 Issues and uncertainties in MMR studies

Explanation and understanding are two of the main goals of any research programme, so, as we discussed in section 1, a major issue for MMR and a challenge facing MMR researchers remains how specific MMR research designs contribute to these goals. Traditionally, seeking explanation (Erklären) of different research phenomena has been approached through quantitative research, while understanding (Verstehen) has been the main goal of qualitative research. Quantitative research is essentially normative and is tasked with explaining the issue with respect to certain criteria; qualitative research, in contrast, is essentially interpretive, aiming to understand the contextual factors of the issue. The purpose (and claim) of MMR is to combine these two perspectives to present a more comprehensive picture. Such an endeavour is clearly both worthwhile and promising; the issue for MMR and the challenge for researchers remains how this is to be accomplished in a coherent and theoretically sound way.

As we discussed earlier, MMR studies with triangulation purpose have been controversial. In almost all such studies, including those reviewed in section 3 above, the results from one dataset are cross-validated with results from the other. The question immediately arises as to

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

what MMR researchers can do when faced with contradictory results from the two datasets. Naturally, in such cases, the solution will be to call on a supplementary initiation purpose by investigating the facets of the object of study that have produced such contradictory results, thereby preparing the ground for creatively conceiving new, perhaps more accommodating, theories.

The philosopher Popper (1970: 56) argues the case for such creativity as follows:

> . . . at any moment we are prisoners caught in the framework of our theories; our expectations; our past experiences; our language. But we are prisoners in a Pickwickian sense; if we try, we can break out of our framework at any time. Admittedly, we shall find ourselves again in a framework, but it will be a better and a roomier one, and we can at any moment break out of it again.

However, taking such a position may impose considerable demands on the knowledge and skill base of researchers. Accordingly, MMR researchers pursuing a triangulation purpose usually take the route of a pragmatic approach, verifying the results from one dataset with those from another, without, however, engaging closely with the theoretical basis for such actions, or indeed calling on higher level research skills.

The second issue concerning the triangulation purpose is ontological. Validating the results of one dataset with those of another with different underlying assumptions causes some uncertainty and may be considered problematic. As we saw earlier, Denzin (2012: 82) argues that 'in its original forms, triangulation referred only to the use of multiple forms of qualitative research methods, not the combination of quantitative and qualitative methods'. How mixed-methods researchers conceptualise the constructs of the study in question and the validity of the inferences they draw from ontologically distinct datasets raises challenging questions. Accordingly, one of the main issues facing MMR studies remains the viability of naively bringing together different kinds of data and analysis in an additive way, without any sound or coherent conceptualisation of the object of the study. Denzin (2012: 81) quotes Morse & Niehaus (2009) who 'warn that ad hoc mixing of methods can be a serious threat to validity'. Howe (2012: 90), however, proposes a counter-argument, referring to Mathison (1988), who 'proffers an alternative "holistic" conception of triangulation that does not constrain triangulation to the idea of convergence or divergence in the way presupposed' by researchers like Denzin. Howe argues that 'triangulation need not aim to either confirm or disconfirm a given claim, depending on whether data from different methods converge or diverge, respectively. Rather, the researcher can seek to accommodate ostensibly discordant data by bringing it under a more comprehensive explanatory framework' (2012: 90). Howe advances two examples to illustrate this position. The first is drawn from Moses et al. (2010), where a quantitative survey instrument is used to ascertain the reasons people give for voting for or against given policies, in order to flag the relationship between their beliefs and their voting behaviour. The survey data may then be compared with, and may indeed converge with or diverge from, data collected via face-to-face interviews with voters. The other example Howe advances is when physicians interview patients about their symptoms, so to diagnose their condition. Such interview-generated data may then be compared with, and may converge with or diverge from, data obtained from biomedical tests. These are typical examples MMR experts use to explain how it is possible to mix quantitative and qualitative data and analysis.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

The issue remains, however, how such integration is conceptualised and operationalised in an integrative way so as to enhance the researcher's explanatory and interpretive standpoints. It seems to us that, in advancing such an argument, Howe departs from the concept of 'triangulation' and extrapolates to other purposes, such as complementarity and initiation, both of which require MMR researchers to explore the dynamic relationship between different layers and facets of the issue under study. The uncertainty surrounding what triangulation entails and how it can be conceptualised and operationalised in MMR studies is both an issue and a challenge which await further discussion and clarification.

Another challenge then arises. Whether the logic behind the purpose for mixing methods is corroborative (as in triangulation), integrative (as in complementarity) or collective (as in initiation), MMR researchers need to be able to conceptualise and operationalise the research problem, drawing on appropriate theories or models related to the phenomenon and its constituent elements. Merely stating, for example, that the purpose is to triangulate, and then showing some sort of convergence in the datasets, does not in our view constitute sound MMR. Rather, such claims need to be substantiated by showing how the researcher moves between the dataset and the theoretical framework underpinning the study to draw plausible and, above all, warrantable inferences. To achieve this requires MMR researchers to conceptualise the issue as multi-layered and multi-dimensional. Failure to do so 'can lead to fractured and disjointed explanations, or even an unintended recourse to a parallel logic' (Mason 2006: 7). Ultimately, what we want of MMR studies is a better and fuller understanding of an issue. As May (2010: 3) argues, 'This requires one overarching theory or set of questions, and a coherent world view of how the picture can be conceptualised, or the pieces assembled'. To achieve this coherence between conceptualisation and action is not, however, an easy task for novices and researchers early in their careers, requiring as it does that they enhance considerably their theoretical understanding and research skills. This may sometimes involve going beyond the boundaries of their own disciplines to find different ways of asking questions and providing adequate evidence in response. Not that this is at all undesirable, if it can be managed, since, as Mason (2006: 10) points out, 'Such an approach . . . can facilitate the researcher in asking new kinds of questions, "thinking outside the box", developing multi-dimensional ways of understanding, and deploying a creative range of methods in the process'.

4.2 Challenges for mixed-methods researchers in language teaching and learning

In the light of the above, and now turning specifically to researchers in the fields of language teaching and learning, our review of the papers which have drawn on qualitative and quantitative paradigms and their associated methodologies clearly indicates that their authors have indeed been confronted by the issues and challenges we outline above. The first challenge is represented by researchers' frequent lack of familiarity with MMR, its concepts and principles. As we indicated in section 3, 55% of the papers using both quantitative and qualitative methodologies in a single study did not refer to that study as characteristically MMR in nature. The researchers failed to identify one of the five defining MMR purposes

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

for their studies. Such studies adopted a predominantly quantitative approach, but perhaps feeling that one method and dataset was inadequate and partial in providing a full picture, the authors added a qualitative component to supplement the partiality of a single dataset. From such practices, we deduce that the primary issue and challenge for language teaching and learning researchers wishing to 'mix' two methodologies is to familiarise themselves fully with the concepts and principles of MMR. That doing so may be difficult is partly due to the shortage of available informative resources and the dearth of extensive critical discussion on MMR in language teaching and learning. We hope that this state-of-the-art paper will go some way towards clarifying different aspects of MMR and highlighting some of the ambiguities of this new integrated and multi-perspective methodology.

Such issues and challenges present themselves even in some of the papers whose authors claimed they followed an MMR orientation. As we showed earlier, there were four MMR studies, which, despite claims by their authors to be using mixed methods in their description of their methodology, fell short of fulfilling the key requirements of an integrated MMR approach. Their authors did not identify any particular purpose for their use of MMR, and presented studies which were predominantly quantitative, although with some addition of a qualitative component, which, however, was ultimately presented using quantitative techniques. Such examples sharply highlight the need for language teaching and learning researchers inclined to use MMR to begin by familiarising themselves with its concepts, principles and techniques.

Even though expansion is recognised as a legitimate purpose by MMR researchers, studies claiming to follow this purpose fall short of representing fully-fledged MMR. Such studies present the two components (quan and qual) in parallel without systematically integrating them at all levels. In consequence, unless there is a particular reason for undertaking an expansion-focused study (such as providing depth to a predominantly quantitative study, or providing breadth to a predominantly qualitative study), language teaching and learning researchers might find it more advantageous to invest time in conducting types of MMR study more likely to yield promising outcomes, such as studies with complementarity and initiation purposes.

However, while MMR studies with complementarity and initiation purposes represent, in our terms, true MMR, they certainly pose other challenges to language teaching and learning researchers. One such challenge, as we discussed above, concerns the level of theorising and conceptualising of the research problem so that different layers and various dimensions of the issue in question can be studied and integrated by means of an MMR framework. MMR studies with a complementarity purpose propose the object of the study as multi-layered, and as such requiring a variety and range of data and accompanying analytic tools for the investigation of these layers, seeking a more comprehensive picture of the phenomenon. On the other hand, to follow an initiation purpose requires researchers to address often contradicting and discrepant perspectives emanating from different dimensions of the object of the study.

Whichever of the purposes one follows, carrying out MMR is no easy task for the researcher since it entails clarifying how the three characteristic and axiomatic aspects of research – ontology, epistemology and methodology – inform the conceptualisation and implementation of the research problem within an MMR framework. Ontologically, for

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

example, the research problem needs to be conceptualised so as to represent the multi-layeredness or multi-dimensionality of the phenomenon. Epistemologically, the quantitative and qualitative data and analysis should provide evidence for understanding and interpreting its different layers or aspects. Such conceptualisation requires carefully designed research projects or sub-projects so that the synergy of the two components may be coherently worked out at all levels of the research process, including those of data collection and analysis. The role of theory is thus very important here, as the researcher needs to provide theoretical justification for any suggested conceptualisation of the phenomenon and its methodological implementation, especially the type and range of data required and its appropriate analytical methodologies. In short, the type of data and analysis we bring together 'should be informed by substantive and theoretical engagement with the problem in hand' (Irwin 2006: 3) so that the outcomes contribute more fully to our understanding of the phenomenon. We therefore need to forge a strong link between the inferences drawn from the data and the theoretical stance adhered to at the conceptualisation and implementation levels. To draw an analogy, conceptualisation in social sciences in general and language teaching and learning in particular is similar to experimentation in the natural and experimental sciences. The plausibility of the inferences drawn from the data and analysis will depend on a sound conceptualisation of the phenomenon seen from appropriate theoretical perspectives. This is where language teaching and learning researchers, especially novice researchers, we believe, will find it challenging to discover and draw on suitable theories to help them conceptualise their research problem within a MMR framework, and to draw on such a theoretical framework to interpret their data. This is of the utmost importance where different methods are to be mixed in one study with the aim of explaining different layers (complementarity purpose) or setting out different dimensions or facets (initiation purpose) of the issue under study.

5. Conceptualising replication in MMR studies

Conceptually and methodologically, current discussion on the potential of replicating studies in applied linguistics, and in the domain of language teaching and learning in particular, exercises a powerful resonance with the ontology, epistemology and methodology of MMR, as described in previous sections of this paper. In summary, and following some recent and detailed critical and explanatory accounts of replication in relation to our field (Language Teaching Review Panel 2008; Casanave 2012; Matsuda 2012; Porte 2012; Porte & Richards 2012), we argue here that MMR provides both facilitating and constraining affordances (see Gibson 1977) in the context of replication.

To set out the relevant issues: the concept and practice of replication has proved to be contentious and problematic. This in large measure arises from the particular paradigm allegiance of researchers. For those experimentalists working within a QUAN frame the gold standard must be EXACT replication of one study by subsequent ones. As Porte (2012: 10) warns us in relation to this unequivocal position, however, the extension of an original study is not replication. Such a position may make sense in purely quantitatively-oriented approaches

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

to language teaching and learning research in which (a) constructing knowledge through generalisation of research findings is a prime aim, and (b) the consistency and accuracy of the findings from original studies may require support from replicated studies. Notwithstanding the value of replication from this perspective, however, its practicality has raised concerns among researchers, the detailed discussion of which is beyond the scope of the current paper. There exists, however, an alternative approach to researching applied linguistics in general, and language teaching and learning in particular, along the lines we described in earlier sections of this paper. Such an approach, instead of looking for generalisable, explanatory rules, searches for how such language and language learning related issues could be rendered understandable to interested participants and persons in particular contexts. These two approaches may co-exist and extend across the continuum of research, as we suggested in the introductory sections of this paper, with consequent implications for conceptualising replication. For example, for Matsuda (2012), the argument about these two approaches is as much philosophical and ideological as it is practical. If the construct being studied (in his case, L2 writing) is, as he and others would assert, not a bias-free activity which can be 'objectively' placed under a modernist microscope, then the best one can achieve is as rich a description as possible of all of the significant variables and how they may interact with each other. From this perspective, conceptualisation of the object of the study is the prime concern of the researcher, with the goal of finding evidence from the data and analysis to support or modify the conceptualisation. Accordingly, from the perspective of the second approach, sound conceptualisation rather than experimentation forms the research procedure. Indeed, that is what such research is about. To reduce any construct to one that can be exactly replicated in a second and subsequent study is, from this perspective, counter-intuitive, impractical and, for some, even undesirable.

For those aligned with QUAN research, replication may also include internal replication (reassessment by the original researchers of their first study) or, more weakly, external replication (in which new subjects are introduced into 'old' frameworks, or in which a sequence of parallel studies is undertaken). Accordingly, moving – under the pressure of circumstance and the exigencies of the research question – further away from exact replication, we now find reference in the replication literature to APPROXIMATE replication, where what have been referred to as 'non-major' variables may be altered by, for example, the introduction of new and different populations, types of research tasks, even different research study purposes, while maintaining the same research instrument. A yet further movement away from the exact replication model is so-called CONCEPTUAL replication, in which, stimulated by the original study, the same problem is deliberately explored using a different set of data collection and analysis procedures, which may even be QUAL in nature, thus enriching our understanding of the problem in question. It is this position that we will be advocating in this paper in respect of replication studies in the MMR context. In sum, we will be suggesting in the following discussion of two example case studies, which we reviewed as suffering weak conceptualisation of the object of the study, that they may be replicated with a more robust conceptualisation where drawing on MMR methodologies can lead to a more systematic integration of the two paradigms.

It might be worthwhile remembering at this point, as Porte (2012) reminds us, exactly why one would want to engage in the replication process at all. After all, a good deal of

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

regret is currently being expressed about the lack of interest in replication work, as the Language Teaching Review Panel (2008) document outlines, albeit firmly in the narrow applied linguistic domain of SLA research, with some excursion into L2 writing studies. Indeed, addressing this question might prove a way of cutting through what appears at times to be a Gordian knot. In short, if we want generalisability, if we want proof, if we want validation, if we want predictiveness, then EXACT replication would be our goal, and typically (for some, unequivocally) within a tight QUAN framework. This might also generally be the case, for example, if we wished to challenge the results of some replicable study. If, on the contrary, as Matsuda (2012) and Polio (2012) argue, and as Porte & Richards (2012) show in some detail, our objective (and indeed as the nature of many of our research questions in applied linguistics both requires and makes possible) is less one of precise validation of the warranted claims of previous research and more one of showing 'what might be the case if . . . ' (in Matsuda's words) then a rich QUAL framework might be the way to go in many replications. In short, if the issue is how our understanding may be enriched, our awareness sharpened and, especially, our knowledge extended by considering new hypotheses, a wide range of approximate replications should be on our agenda. We note here that the Language Teaching Research Review Panel paper (2008: 19) offers a list of potential 'new' populations and 'different' 'stimulus domains' that could be explored to underscore what they somewhat enigmatically refer to as the 'establishedness' of results, albeit from an exactness position.

To return to the 'what might be the case if . . . ' question, as Polio avers (Polio 2012: 53), 'ultimately what counts as a replication is less important than determining what type of replication is most beneficial to the field'. The essential question arising in the postmodern condition is not whether we should use QUAN or QUAL, but how we should use both. Indeed, we can go further here with Polio in setting out a broader agenda, quite in keeping with the arguments for a fully integrated MMR stance taken in this paper, when she affirms that expanding the range of approximate replications may bring laboratory research (often decisively QUAN) into collaboration with classroom (or site of engagement-specific) research, often (but not necessarily always) QUAL-focused. This is precisely what Cicourel (1992, 1996, 2007) argues is necessary for any research to be ecologically valid, and what Sarangi & Candlin (2004) refer to as 'focusing on the site and not the model'. More than that, as they argued in an earlier publication (Sarangi & Candlin 2001), it is perhaps the only way we can honour the distinctive motivational relevancies of researcher and participants in some jointly constructed and hermeneutically engineered exercise of explanatory research engaged in discovery rather than search. However, to avoid running ahead of ourselves, some governors must be set on the QUAN/QUAL engine: Porte & Richards (2012) are very clear on this, and rightly so. In research publication all claims demand warrants, so making such warrants robust enough to sustain such claims is a prime objective, whatever the paradigm. For QUAN there is a long experimental research tradition on which to call; for QUAL there is a tradition yet to be made. Nevertheless, Porte & Richards, in their discussion of the arguments for exactness of replication advanced by Le Compte & Goetz (1982) and attributed exclusively by the latter to QUAN, usefully set out some criteria and some current means by which such warrants can be sustained within a QUAL paradigm: for example, by regular and frequent citations from sources, broad accessing of extensive and well described data banks, ensuring clarity about the rigorous application of criteria for analysis and evaluation, triangulating of results

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

from different data sets. After all, and at very least, one might say, some accommodation between QUAL and QUAN seems called for; the arguments by Le Compte & Goetz against the possibility of replicability of QUAL studies are nowadays something of a straw man. We do know, however, what we want in any replication: descriptive, interpretive and explanatory adequacy, however differently conceived and identified these constructs have been over time and from distinctive ideological positions, and we want it done in an explicit, systematic and potentially comparable way.

How, then, in this context of debate and discussion about replication, can MMR make a contribution? MMR in relation to issues of replicability is rather like the Chinese aphorism: it is both a threat and an opportunity. A threat, in the sense that its integrating of otherwise distinctive paradigms and their associated methodologies militates against exact replication. Further, that in so doing, MMR serves to highlight some of the built-in problems of maintaining such exact and narrowly circumscribed replicability – alien to many of the sites and domains of applied linguistics seen as a social rather than an experimental science – that we outlined above. As an opportunity in the context of conceptual replication, on the other hand, MRR affords very considerable scope, which in our view might well serve to unblock some of the jammed gates of replication studies. What is central for this paper is that we present MMR as the integrated approach to research, from design through execution to dissemination and evaluation. MMR is for us a laminated structure, not a Lego construction, and as such can both look backward to and, through approximate replication, build on previous research, while at the same time, and above all, showing how with a forward-focused perspective new knowledge can be gained and new avenues for exploration established. Such a perspective on the potential of MMR in a replication context is beginning to be canvassed with sound and more complex conceptualisations of the object of the study.

In the light of the foregoing, we now identify two studies, referred to earlier in this paper, as candidates for conceptual replication following the terms governing MMR we have set down. The first example (Lim 2010) is one of the studies that claim that they have used mixed methods, while the second (de Morgado 2009) is drawn from those studies that, although not explicitly claiming to use MMR, nonetheless state that they use both QUAN and QUAL data and analysis.

Lim's study is a genre-based study seeking to compare similarities and differences in the manner in which findings are presented in the academic context of the 'Results' section of published papers in the twin disciplines of applied linguistics and education. The research questions are directed at:

a. the effects of disciplinary and methodological differences on the occurrences of comments in the Results sections of the selected papers, and
b. differences in the nature of the linguistic mechanisms employed by the authors of such papers in the twin disciplines when making comments on their findings in the Results sections.

The author indicates that a mixed-methods approach was employed, combining QUAN data and analysis for the first objective and QUAL data and analysis for the second. The data

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

collected includes 15 published papers from the discipline of applied linguistics and 15 from education, with a focus in each case on the Results sections of the selected papers.

On examining the data and methodology of the paper, however, what is presented in the study is mainly a QUAN analysis of the data and its results. The author reports only on what is termed an 'objective description' of the Results sections of the published papers in the two disciplines, while taking disciplinary and methodological differences for granted. To achieve a more integrated MMR outcome in the manner suggested earlier in this paper, it would be important to set out and take into account from the outset of the research project the fact that the Results section of any academic paper is a complex construct affected by a number of conditioning factors of which disciplinary placement is only one. Equally relevant would be, for example, the writer's position and stance vis-à-vis the topic, purpose, methodological orientation and, importantly, the audience(s), of the paper, together with any conventions for the presentation of such statements of Results imposed by the journal in which it is published. In short, an integrated MMR-driven conceptual replication study of the presentation of the Results section in such journals would be better served by a complementarity or initiation approach to better understand why Results are presented in the way they are. To achieve such a goal of investigating the conditions and processes leading to the particular manner of presenting the Results sections in question, and thereby achieving a richer understanding of why they were constructed in the manner they were, one might follow a complementarity purpose, collecting interview-based narrative accounts from writers of papers in the two disciplines, parallel accounts from experts in the discipline, comparative evidence from a larger corpus of published papers from both disciplines, and data drawn from editorial and reviewer commentaries and notes.

Alternatively, the purpose of any replicated study could be defined as initiation, in that the researcher has found contradictory results from an analysis of the moves and steps in the Results section of the published papers in the two disciplines. In this way, further studies could be initiated by collecting further QUAL data (from interviews and focus groups, for example) from the writers of the papers so as to gain further information and an insider's understanding of some of the underlying mechanisms drawn on in writing Results sections.

The second paper we have chosen to discuss for its potential for conceptual replication is that of de Morgado (2009). This questionnaire-based action research study, also employing an experimental design, seeks to investigate:

a. whether, and to what extent, an extensive reading (ER) programme has any effect on the reading comprehension performance of university students, and
b. the nature of the attitudes and assumptions of students in respect of ER in relation to, first, their enjoyment of reading and, second, the usefulness of the programme in improving vocabulary, reading skills, reading comprehension and autonomy.

The study makes use of an experimental design in which there is an experimental group with ER as the treatment, and a control group provided with no ER programme. Pre- and post-tests are used to compare the reading comprehension performance of the experimental and control groups. No significant differences were found between the two groups. As the

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

researcher states, an *ad hoc* questionnaire was used with the experimental group, the results of which indicated that the students in that group had a positive perception of ER.

Again, what we see in this study is a coupling of an objective description of an experiment with the deployment of an *ad hoc* questionnaire, but with no account taken of the possible contextual factors impacting on both the experimental and control groups.

Since the researcher states she has used both QUAN and QUAL data, the study could be reconceptualised as an integrated MMR study. It could have been designed as an embedded explanatory study following a known MMR design in which the experimental QUAN data and analysis would be integrated with QUAL data from the participants' unfolding of the processes in which they have participated. Such qualitative data may include those deriving from introspective or retrospective think-aloud protocols, interviews and focus groups in which the participants describe how the experimental procedures affected their learning (or did not affect it). In this way the results obtained from the experiment (which, as the paper notes, showed no significant difference between the experimental and the control group) could have been explained drawing on the process (QUAL) data, offering explanations of why ER did not affect students' reading comprehension performance.

6. Conclusion: Prospects for and developments of MMR

Broadly speaking, researchers in various fields, including language teaching and learning, have found three ways of mixing QUAN and QUAL approaches. These three implementations do not necessarily cover specific time periods but can be labelled as ECLECTIC[3], PRINCIPLED ECLECTIC and INNOVATIVE. The mixing of the two approaches in the eclectic category does not seem to have been based on the distinctive and underlying principles of MMR, conceptually or methodologically. As a result, researchers seem to have taken the position that adding another component (either qualitative or quantitative) to their study could work to strengthen it, but without effecting any systematic integration. The addition of either a qualitative or quantitative component was not grounded in any sound conceptualisation of the object of the study in which quantitative and qualitative components were combined to best address the research purpose.

We note also that such studies have been predominantly quantitative in nature with the accretion of some quantified qualitative data. Such mixing of methods and paradigms as there has been is thus limited to data and has not drawn upon MMR principles throughout the whole process of the research.

Over the last decade, MMR, as we have noted, has been widely disseminated as a research paradigm through books, journals and other publications; it has the potential to bring together traditionally opposing paradigms. Social and educational researchers have worked to develop MMR concepts and terminology at the levels of ontology, epistemology and methodology, to help investigators to conduct principled MMR studies. This phase of principled eclecticism entails those MMR studies which have conceptualised their design within the principles of MMR, with the overarching aim of integrating the two paradigms. The systematic use of

[3] Our thanks also go to one of the reviewers for suggesting this term.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

MMR to investigate language-related issues can enhance knowledge in our field, but only if we can create a research space in which this can happen. Such a research space can be realised at an institutional level through the dissemination of MMR in research methods courses, and professionally through research publication of fully-fledged MMR studies in language teaching and learning journals. This phase has made useful contributions to the development of an MMR paradigm by advancing its theoretical and conceptual aspects as well as the technicalities of research design. The next phase in the development of MMR, in our view, might be what we can call an innovative phase, which will address the issues and challenges of this new paradigm and which we discussed in section 4 of this paper. Conceptualising the object of a research study from an MMR perspective will continue to be challenging for language teaching and learning researchers, given the complexity involved. We acknowledge that MMR purposes such as triangulation and expansion remain controversial, and in need of substantive clarifications if they are to serve this new paradigm. Engaging researchers in reflective conversation about MMR purposes and what can usefully and creatively be mixed in research project design and execution will contribute to the development and maturity of MMR. Accordingly, while we envisage that there will be increasing numbers of studies with an MMR orientation in language teaching and learning journals, nonetheless, more theoretical discussion of the paradigm and its constituents remains very much on the agenda. It has been one of the chief purposes of this paper to encourage this development.

Acknowledgements

We are grateful to the five anonymous reviewers who provided us with very useful comments and suggestions on an earlier version of this paper. Our thanks are also due to the editor of *Language Teaching*, who provided us with the opportunity to write this state-of-the-art paper on MMR, for his encouragement throughout and the smooth management of the whole process.

References

Abdel Latif, M. (2009). Toward a new process-based indicator for measuring writing fluency: Evidence from L2 writers' think-aloud protocols. *Canadian Modern Language Review* 65.4, 531–558.

Alise, M. A. & C. Teddlie (2010). A continuation of the paradigm wars? Prevalence rates of methodological approaches across the social/behavioral sciences. *Journal of Mixed Methods Research* 4.2, 103–126.

Bachman, L. (2004). Research guidelines in TESOL: Alternative perspectives linking observations to interpretations and uses in TESOL Research. *TESOL Quarterly* 38.4, 723–727.

Bachman, L. (2006). Generalizability: A journey into the nature of empirical research in applied linguistics. In M. Chalhoub-Deville, C. A. Chapelle & P. Duff (eds.), *Inference and generalizability in applied linguistics: Multiple perspectives*. Dordrecht: John Benjamins, 165–207.

Barkaoui, K. (2010). Do ESL essay raters' evaluation criteria change with experience? A mixed-methods, cross-sectional study. *TESOL Quarterly* 44.1, 31–58.

Bazeley, P. (2004). Issues in mixing qualitative and quantitative approaches to research. In R. Buber, J. Gadner & L. Richards (eds.), *Applying qualitative methods to marketing management research*. Basingstoke, UK: Palgrave Macmillan, 141–156.

Benson, P., A. Chik, X. Gao, J. Huang & W. Wang (2009). Qualitative research in language teaching and learning journals, 1997–2006. *The Modern Language Journal* 93.1, 79–90.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

Bergman, M. M. (2008). *Advances in mixed methods research: Theories and applications*. Thousand Oaks, CA: Sage.
Brannen, J. (2005). Mixing methods: The entry of qualitative and quantitative approaches into the research process. *International Journal of Social Research Methodology* 8.3, 173–184.
Brewer, J. & A. Hunter (2005). *Foundations of multimethod research*. Thousand Oaks, CA: Sage.
Brook, L. (2009). Interacting in pairs in a test of oral proficiency: Co-constructing a better performance. *Language Testing* 26.3, 341–366.
Brown, J. D. & T. Rodgers (2002). *Doing second language research*. Oxford: Oxford University Press.
Candlin, C. N. & J. Crichton (2013). From ontology to methodology: Exploring the discursive landscape of trust. In C. N. Candlin & J. Crichton (eds.), *Discourses of trust*. Basingstoke, UK: Palgrave Macmillan, 1–20.
Caracelli, V. J. & J. C. Greene (1997). Crafting mixed-method evaluation designs. In J. C. Greene & V. J. Caracelli (eds), *Advances in mixed-method evaluation: The challenges and benefits of integrating diverse paradigms*. San Francisco, CA: Jossey-Bass, 19–32.
Casanave, C. P. (2012). Heading in the wrong direction? A response to Porte and Richards. *Journal of Second Language Writing* 21.3, 296–297.
Chapelle, C. A. & P. A. Duff (2003). Some guidelines for conducting quantitative and qualitative research in TESOL. *TESOL Quarterly* 37, 157–178.
Chen, Y. L. (2008). A mixed-method study of EFL teachers' Internet use in language instruction. *Teaching and Teacher Education* 24, 1015–1028.
Chou, M. (2011). The influence of learner strategies on oral presentations: A comparison between group and individual performance. *English for Specific Purposes* 30, 272–285.
Christ, T. W. & S. A. Makarani (2009). Teachers' attitudes about teaching English in India: An embedded mixed methods study. *International Journal of Multiple Research Approaches* 3, 73–87.
Cicourel, A. (1992). The interpenetration of communicative contexts: Examples from medical encounters. In A. Duranti & C. Goodwin (eds.), *Rethinking context: Language as an interactive phenomenon*. Cambridge: Cambridge University Press, 291–310.
Cicourel, A. (1996). Ecological validity and 'white room effects': The interaction of cognitive and cultural models in the pragmatic analysis of elicited narratives from children. *Pragmatics and Cognition* 4.2, 221–264.
Cicourel, A. (2007). A personal, retrospective view on ecological validity. *Text & Talk* 27, 235–25.
Colby-Kelly, C. & C. E. Turner (2007). AFL research in the L2 classroom and evidence of usefulness: Taking formative assessment to the next level. *Canadian Modern Language Review* 64.1, 9–38.
Collins, K. M. T., A. J. Onwuegbuzie & Q. G. Jiao (2006). Prevalence of mixed methods sampling designs in social science research. *Evaluation and Research in Education* 19.2, 83–101.
Collins, K. M. T., A. J. Onwuegbuzie & Q. G. Jiao (2007). A mixed methods investigation of mixed methods sampling designs in social and health science research. *Journal of Mixed Methods Research* 3, 267–294.
Creswell, J. W. (1995). *Research design: Qualitative and quantitative approaches*. Thousand Oaks, CA: Sage.
Creswell, J. W. & V. L. Plano Clark (2007). *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage.
Creswell, J. W., R. Shope, V. I. Plano Clark & D. O. Green (2006). How interpretive qualitative research extends mixed methods research. *Research in the Schools* 13.1, 1–11.
Creswell, J. W., V. I. Plano Clark, M. Gutmann & W. Hanson (2003). Advanced mixed methods research designs. In A. Tashakkori & C. Teddlie (eds.), *Handbook of mixed methods in social and behavioural research*. Thousand Oaks, CA: Sage, 209–240.
Creswell, J. W. & A. Tashakkori (2007). Differing perspectives on mixed methods research. *Journal of Mixed Methods Research* 1, 303–308.
Cumming, A. (1994). Alternatives in TESOL research: Descriptive, interpretive, and ideological orientations. *TESOL Quarterly* 28.4, 673–703.
Danermark, B., M. Ekstrom, L. Jakobsen & J. Ch. Karlsson (2002). *Explaining society: Critical realism in the social sciences*. London: Routledge.
Davis, K. A. (1995). Qualitative theory and methods in applied linguistics research. *TESOL Quarterly* 29, 427–453.
DeKeyser, R. (2010). Monitoring processes in Spanish as a second language during a study abroad program. *Foreign Language Annals* 43.1, 80–92.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

de Morgado, M. F. (2009). Extensive reading: Students' performance and perception. *Reading Matrix* 9.1, 31–43.
Denzin, N. K. (1970). *The research act*. Chicago, IL: Aldine.
Denzin, N. K. (1978). *The research act: A theoretical introduction to sociological methods*. New York: McGraw-Hill.
Denzin, N. K. (2012). Triangulation 2.0. *Journal of Mixed Methods Research* 6.2, 80–88.
Derwing, T. M., M. J. Munro & R. I. Thomson (2007). A longitudinal study of ESL learners' fluency and comprehensibility development. *Applied Linguistics* 29.3, 359–380.
Doyle, L., A. M. Brady & G. Bryne (2009). An overview of mixed methods research. *Journal of Research in Nursing* 14.2, 175–185.
Dornyei, Z. (2007). *Research methods in applied linguistics*. Oxford: Oxford University Press.
Fishman, J. A. (2010). Theoretical and historical perspectives on researching the sociology of language and education. In K. A. King & N. H. Hornberger (eds.), *Research methods in language and education: Encyclopedia of language and education 10*. New York: Springer, 3–15.
Flick, U. (2007). *Designing qualitative research*. London: Sage.
Fox, J. D. (2009). Moderating top-down policy impact and supporting EAP curricular renewal: Exploring the potential of diagnostic assessment. *Journal of English for Academic Purposes* 8, 26–42.
Gibson, J. J. (1977). The theory of affordances. In R. Shaw & J. Bransford (eds.), *Perceiving, acting, and knowing: Toward an ecological psychology*. Mahwah, NJ: Erlbaum, 67–82.
Giddings, L. S. (2006). Mixed methods research: Positivism dressed in drag? *Journal of Research in Nursing* 11, 195–203.
Greene, J. C., V. J. Caracelli & W. F. Graham (1989). Toward a conceptual framework for mixed method evaluation designs. *Educational Evaluation and Policy Analysis* 11, 255–274.
Grotjahn, R. (1987). On the methodological basis of introspective methods. In C. Faerch & G. Kasper (eds.), *Introspection in second language research*. Clevedon, UK: Multilingual Matters, 54–81.
Guba, E. & Y. Lincoln (1998). Competing paradigms in qualitative research. In Guba, E. & Y. Lincoln (eds.), *The landscape of qualitative research*. Thousand Oaks, CA: Sage Publications, 195–220.
Hammersley, M. (2009). Why critical realism fails to justify critical social research. *Methodological Innovations Online* 4.2, 1–11.
Hanson, W. E., J. W. Creswell, V. L. Plano Clark, K. S. Petska & K. S. Creswell (2005). Mixed methods research designs in counselling psychology. *Journal of Counselling Psychology* 52.2, 224–235.
Hashemi, M. R. (2012). Forum: Reflections on mixing methods in applied linguistics research. *Applied Linguistics* 33.2, 206–212.
Hatch, E. & H. Farhady (1982). *Research design and statistics for applied linguists*. Rowley, MA: Newbury House.
Hatch, E. & A. Lazaraton (1991). *The research manual: Design and statistics for applied linguistics*. Rowley, MA: Newbury House.
Hawkey, R. (2006). Teacher and learner perceptions of language learning activity. *ELT Journal* 60.3, 242–252.
Hempel, S. & L. Degand (2008). Sequencers in different text genres: Academic writing, journalese and fiction. *Journal of Pragmatics* 40, 676–693.
Hinkel, E. (ed.) (2005). *Handbook of research in second language learning*. Mahwah, NJ: Erlbaum.
Holliday, A. (2002). *Doing and writing qualitative research*. Thousand Oaks, CA: Sage.
House, E. R. & K. R. Howe (1999). *Values in evaluation and social research*. Thousand Oaks, CA: Sage.
Howe, K. R. (1988). Against the quantitative-qualitative incompatibility thesis (or dogmas die hard). *Educational Researcher* 17, 10–16.
Howe, K. R. (2012). Mixed methods, triangulation, and causal explanation. *Journal of Mixed Methods Research* 6.2, 89–96.
Hu, G. & J. Lei (2011). Investigating Chinese university students' knowledge of and attitudes toward plagiarism from an integrated perspective. *Language Learning* 62.3, 813–850.
Irwin, S. (2006). Combining data, enhancing explanation. Real Life Methods working paper, University of Manchester. www.manchester.ac.uk/realities/resources/toolkits
Isaacs, T. (2008). Towards defining a valid assessment criterion of pronunciation proficiency in non-native English-speaking graduate students. *Canadian Modern Language Review* 64.4, 555–580.
Johnson, R. B. & A. J. Onwuegbuzie (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher* 33.7, 14–26.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

Kang, J. Y. (2009). Referencing in a second language: Korean EFL learners' cohesive use of references in written narrative discourse. *Discourse Processes* 46.5, 439–466.
Kim, Y. H. (2009). An investigation into native and non-native teachers' judgments of oral English performance: A mixed methods approach. *Language Testing* 26, 187–217.
King, K. A. (2010). Introduction to Volume 10: Research methods in language and education. In K. A. King & N. H. Hornberger (eds.), *Research methods in language and education: Encyclopedia of language and education (Vol. 10)*. New York: Springer, xiii–xviii.
Lamb, M. (2007). The impact of school on EFL learning motivation: An Indonesian case study. *TESOL Quarterly* 41.4, 757–780.
Language Teaching Review Panel (2008). Replication studies in language learning and teaching: Questions and answers. *Language Teaching* 41.1, 1–14.
Lazaraton, A. (1995). Qualitative research in applied linguistics: A progress report. *TESOL Quarterly* 29, 455–472.
Lazaraton, A. (2000). Current trends in research methodology and statistics in applied linguistics. *TESOL Quarterly* 34.1, 175–181.
Lazaraton, A. (2003). Evaluative criteria for qualitative research in applied linguistics: Whose criteria and whose research? *The Modern Language Journal* 87, 1–12.
Lazaraton, A. (2005). Quantitative research methods. In E. Hinkel (ed.), 209–224.
Le Compte, M. D. & J. P. Goetz (1982). Problems of reliability and validity in ethnographic research. *Review of Educational Research* 52.1, 31–60.
Lee, Y. & J. Greene (2007). The predictive validity of an ESL placement test: A mixed methods approach. *Journal of Mixed Methods Research* 1.4, 366–389.
Leow, R. P., H. C. Hsieh & N. Moreno (2008). Attention to form and meaning revisited. *Language Learning* 58.3, 665–695.
Li, L. & S. Walsh (2010). Technology uptake in Chinese EFL classes. *Language Teaching Research* 15.1, 99–125.
Lim, J. M. (2010). Commenting on research results in applied linguistics and education: A comparative genre-based investigation. *Journal of English for Academic Purposes* 9, 280–294.
Loewen, S., S. Li, F. Fei, A. Thompson, K. Nakatsukasa, S. Ahan & X. Chen (2009). Second language learners' beliefs about grammar instruction and error correction. *The Modern Language Journal* 93, 91–104.
Mark, M. M. & R. L. Shortland (1987). Alternative models for the use of multiple methods. In M. M. Mark & R. L. Shotland (eds.), *Multiple methods in program evaluation*. San Francisco, CA: Jossey-Bass, 95–99.
Martinez, I. A., S. C. Beck & C. B. Panza (2009). Academic vocabulary in agriculture research articles: A corpus-based study. *English for Specific Purposes* 28, 183–198.
Mason, J. (2006). Six strategies for mixing methods and linking data in social science research. Real Life Methods working paper, University of Manchester. www.manchester.ac.uk/realities/resources/toolkits
Mathison, S. (1988). Why triangulate? *Educational Researcher* 17, 13–17.
Matsuda, P. K. (2012). On the nature of second language writing: Replication in a postmodern field. *Journal of Second Language Writing* 21.3, 300–302.
May, V. (2010). Realities Toolkit # 12: What to do with contradictory data? Real Life Methods, University of Manchester. www.manchester.ac.uk/realities/resources/toolkits
Mazdayasna, G. & H. Tahririan (2008). Developing a profile of the ESP needs of Iranian students: The case of students of nursing and midwifery. *Journal of English for Academic Purposes* 7, 277–289.
McDonough, J. & S. McDonough (1997). *Research methods for English language teachers*. London: Arnold.
McKay, S. L. (2006). *Researching second language classrooms*. Mahwah, NJ: Erlbaum.
Melzi, G. & M. Caspe (2010). Research approaches to narrative, literacy, and education. In K. A. King & N. H. Hornberger (eds.), *Research methods in language and education: Encyclopedia of language and education Vol. 10*. New York: Springer,151–165.
Meraji, S. R. (2011). Planning time, strategy use, and written task production in a pedagogic vs. a testing context. *Journal of Language Teaching and Research* 2.2, 338–352.
Mertens, D. M. (2003). Mixed methods and the politics of human research: The transformative-emancipatory perspective. In A. Tashakkori & C. Teddlie (eds.), *Handbook of mixed methods in social and behavioral research*. Thousand Oaks, CA: Sage, 135–164.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

Mertens, D. M. (2005). *Research methods in education and psychology: Integrating diversity with quantitative and qualitative approaches* (2nd ed.) Thousand Oaks, CA: Sage.
Mertens, D. M. (2007). Mixed methods and the politics of human research: The transformative-emancipatory perspective. In V. L. Plano Clark & J. W. Creswell (eds.), *The mixed methods reader*. Thousands Oaks, CA: Sage, 68–104.
Min, H. T. (2005). Training students to become successful peer reviewers. *System* 33, 293–308.
Morgan, D. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research* 1.1, 48–76.
Morse, J. & L. Niehaus (2009). *Mixed method design*. Walnut Creek, CA: Left Coast Press.
Moses, M., A. Farley, M. Gaertner, C. Paguyo, D. Jackson & K Howe (2010). *Investigating the defeat of Colorado's Amendment 46*. New York: Public Interest Projects.
Niglas, K. (2004). *The combined use of qualitative and quantitative methods in educational research*. Unpublished doctoral dissertation, Tallinn Pedagogical University, Tallinn, Estonia.
Nunan, D. (1992). *Research methods in language learning*. Cambridge University Press.
O'Bryan, A. & V. Hegelheimer (2008). Using a mixed methods approach to explore strategies, metacognitive awareness and the effects of task design on listening development. *Canadian Journal of Applied Linguistics*. www.aclacaal.org/Revue/vol-12-1_art-obryan-hegelheimer.pdf
Onwuegbuzie, A. J. & K. T. Collins (2007). A typology of mixed methods sampling designs in social science research. *The Qualitative Report* 12.2, 281–316.
Onwuegbuzie, A. J. & R. B. Johnson (2006). The validity issue in mixed research. *Research in the Schools* 13.1, 48–63.
Onwuegbuzie, A. J., J. R. Slate, N. L. Leech & K. M. T. Collins (2009). Mixed data analysis: Advanced integration techniques. *International Journal of Multiple Research Approaches* 3, 13–33.
Ortega, L. & G. Iberri-Shea (2005). Longitudinal research in second language acquisition: Recent trends and future directions. *Annual Review of Applied Linguistics* 25, 26–45.
Paltridge, B. & A. Phakiti (2010). *Continuum companion to research methods in applied linguistics*. London: Continuum International Publishing Group.
Park, G. (2010). Preference of corrective feedback approaches perceived by native English teachers and students. *The Journal of Asia TEFL* 7.4, 29–52.
Polat, N. (2009). Matches in beliefs between teachers and students, and success in L2 attainment: The Georgian example. *Foreign Language Annals* 42.2, 229–250.
Polat, N. (2011). Gender differences in motivation and L2 accent attainment: An investigation of young Kurdish learners of Turkish. *Language Learning Journal* 39.1, 19–41.
Polio, C. (2012). Replication in published applied linguistics research: A historical perspective. In G. Porte (ed.), *Replication research in applied linguistics*. Cambridge: Cambridge University Press, 47–91.
Popper, K. R. (1970). Normal science and its dangers. In I. Lakatos & A. Musgrave (eds.), *Criticism and the growth of knowledge*. Cambridge: Cambridge University Press, 51–56.
Porte, G. (ed.) (2012). *Replication research in applied linguistics*. Cambridge: Cambridge University Press.
Porte, G. & K. Richards (2012). Focus article: Replication in second language writing research. *Journal of Second Language Writing* 21.3, 284–293.
Richards, K. (2003). *Qualitative inquiry in TESOL*. London: Palgrave Macmillan.
Richards, K. (2009). Trends in qualitative research in language teaching since 2000. *Language Teaching* 42.2, 147–180.
Richards, K., S. Ross & P. Seedhouse (2012). *Research methods for applied language studies*. London: Routledge.
Rossman, G. B. & B. L. Wilson (1985). Numbers and words: Combing quantitative and qualitative methods in a single large-scale evaluation study. *Evaluation Review* 9, 627–643.
Sarangi, S. & C. N. Candlin (2001). Motivational relevancies: Some methodological reflections on sociolinguistic practice. In N. Coupland, S. Sarangi & C. N. Candlin (eds.), *Sociolinguistics and social theory*. London: Pearson, 350–388.
Sarangi, S. & C. N. Candlin (2004). Editorial: Making applied linguistics matter. *Journal of Applied Linguistics* 1.1, 1–8.
Sayer, A. (1992). *Method in social science: A realist approach*. London: Routledge.
Shohamy, E. (2004). Reflections on research guidelines, categories and responsibilities. *TESOL Quarterly* 38, 728–731.
Small, M. L. (2011). How to conduct a mixed methods study: Recent trends in a rapidly growing literature. *The Annual Review of Sociology* 37, 57–86.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press

Swales, J. M. (1990). *Genre analysis: English in academic and research settings*. Cambridge: Cambridge University Press.
Tashakkori, A. & J. W. Creswell (2007). The new era of mixed methods. *Journal of Mixed Methods Research* 1.1, 3–7.
Tashakkori, A. & C. Teddlie (eds.) (1998). *Mixed methodology: Combining qualitative and quantitative approaches*. Thousand Oaks, CA: Sage.
Tashakkori, A. & C. Teddlie (eds.) (2003). *Handbook of mixed methods in social and behavioural research*. London: Sage.
Teddlie, C. & A. Tashakkori (2006). A general typology of research designs featuring mixed methods. *Research in the Schools* 13.1, 12–28.
Teddlie, C. & A. Tashakkori (2009). *Foundations of mixed method research*. Thousand Oaks, CA: Sage.
Vandergrift, L. (2003). Orchestrating strategy use: Toward a model of the skilled second language listener. *Language Learning* 53.3, 463–496.
Wesely, P. M. (2010). Language learning motivation in early adolescents: Using mixed methods research to explore contradiction. *Journal of Mixed Methods Research* 4.4, 295–312.
Yihong, G., L. Lichun & L. Jun (2001). Trends in research methods in applied linguistics: China and the West. *English for Specific Purposes* 20, 1–14.
Yoon, H. & A. Hirvela (2004). ESL student attitudes toward corpus use in L2 writing. *Journal of Second Language Writing* 13, 257–283.

A. MEHDI RIAZI is Associate Professor in the Department of Linguistics at Macquarie University, Australia, where he convenes and teaches courses in research methods and language testing and evaluation. His areas of interest include research methodology in applied linguistics, test validation, curriculum and program evaluation, reading and writing in a second language, and text analysis. His research projects and Ph.D. supervision lie in the above areas.

CHRISTOPHER N. CANDLIN is Senior Research Professor Emeritus in the Department of Linguistics at Macquarie University, Sydney. He was Head of the Department of Linguistics and the Foundation Executive Director of the Australian Government's National Centre for English Language Teaching & Research from 1987 to 1998, and established the Research Centre in Language in Social Life, also at Macquarie. His current research and Ph.D. supervisory interests lie in professional/organisational communication in the fields of language education, healthcare and law.

https://doi.org/10.1017/S0261444813000505 Published online by Cambridge University Press