THE BENEFITS AND CHALLENGES OF MIXING METHODS AND METHODOLOGIES:
Lessons Learnt From Implementing Qualitatively Led Mixed Methods Research Designs in Trinidad and Tobago

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There is increasing interest in the field of mixed methods research and the diverse ways in which quantitative and qualitative methodologies can be systematically combined. The first part of this paper describes the emergence of mixed methods research as a community of practice, distinct from the two dominant paradigms. The second part explores different mixed methods designs described in current typologies, with an emphasis on combinations that place equal or greater emphasis on the qualitative. I argue here that such designs, in which the qualitative is lead or dominant, are most useful for exploring complex and multiplex issues of education. I illustrate this argument with an analysis of the role of the qualitative in two recently conducted mixed methods research studies. The first was a concurrent nested (QUAL dominant) investigation of schools facing challenging circumstances and the second was a multilevel mixed methods study of secondary school choice in Trinidad and Tobago. The three lessons learnt were that (1) appropriate mental models and design rules in typologies are necessary for efficient implementation, (2) interaction between and across research teams can facilitate integration of qualitative and quantitative findings, and (3) qualitative findings can add value to meta-inferences by providing new, additional, or even conflicting perspectives. I then discuss the challenge of implementing mixed methods research studies in the Caribbean, including the need for attention to using quality criteria and targeting greater levels of integration.

The Emergence of Mixed Methods Research

In the Midst of the Paradigm Wars

Although for some, research paradigms are simply mental models for guiding practice; for others, paradigms are regarded as stable worldviews, with supportive assumptions, constructs, and propositions (Greene & Caracelli, 1997; Morgan, 2007). These and other

paradigmatic considerations have dominated the debate over research methodologies (Bryman, 1984). Up to the 1970s, positivism reigned supreme as its adherents tried to elevate this approach to the uppermost epistemic position, such that "doing quantitative" became the gold standard of education research (Howe, 1992, 2009). However, by the end of the 1980s, in what has been called the golden age of qualitative research, the constructivist-interpretive paradigm had become firmly entrenched within several fields, including that of education (Denzin & Lincoln, 2005; Ridenour & Newman, 2008).

However, as in all paradigmatic shifts, the positivists were quick to respond to the challenge. Stung and seemingly chastened, some reluctantly embraced concepts such as multiple realities and grudgingly accepted the possibility of a link between knowledge and the knower (Onwuegbuzie, 2002). At the same time, in the qualitative arena, alternative and supportive epistemological stances, such as critical theory and feminism, emerged (Denzin & Lincoln, 2007). At the root of the continued conflict, however, were the paradigm purists who vociferously argued for the superiority of one method over another and the incompatibility of different approaches (Johnson & Onwuegbuzie, 2004). Indeed, the paradigm wars sometimes led to real division, philosophical and physical (Gage, 1989), with language and rhetoric often used to divide and sometimes even to subjugate (Guba, 1990).

Fuelling the paradigm war were dogmas, such as the incompatibility thesis, the myth of "good" science, and the absurdity of strong relativism; and the traditional dualisms, which pitted one approach against another (Howe, 1988). With hindsight, this fuel was perhaps more ephemeral than real (Bergman, 2008), for if social phenomena are complex and knowing is subject to multiple realities, how could one philosophical paradigm be considered best or even superior? Indeed, how could any one method fully capture such complexity? It seems reasonable to conclude that some issues are best captured by adopting multiple mental models and employing different methodological approaches. Consequently, even in the midst of the conflict, dissenting voices emerged. For example, while many understood the conflict to be over paradigm and philosophy (Yanchar & Williams, 2006), there were those who denied the existence of any strong link between epistemology and methodology (Bergman, 2008). For example, Brannen (1992) suggested that it was unusual in practice "for epistemology or theory to be the sole determinant of method" (p. 3), and the distinction between different approaches often proved to be greater in theory than in practice. Thus, some felt that researchers needed to be pragmatic when responding to different constituencies. Others were beginning to question the

unchangeable, immutable, and exclusive nature of belief structures (Morgan, 2007).

Conception and Birth of the Mixed Methods Movement

These dissenting voices were part of an emerging community presenting a third perspective on doing research. It was well into the qualitative boom, and before the culmination of the sanguinary paradigm wars, that Jick (1979) considered the issue of mixing methodologies within organizational research. However, mixed methods research is neither a recent nor a bastard birth and the historical roots run deep. Teddlie and Tashakkori (2003) suggested that the time of conception extended well past the 1959 multitrait-multimethod validity studies of Fiske and Campbell to the groundbreaking Hawthorne studies of the 1930s, which made use of empirical data, observations, and interviews. Perhaps it was fortuitous, then, that a study initiating the humanistic perspective in management science would lead to groundbreaking insights into the multiple realities of organizational work life. More recently, Brannen (2009) has suggested that the date of conception is to be located in the use of multiple methods by Thomas and Znaniecki studying the Polish peasant in the 1920s.

Greene (2007, 2008) provided yet another perspective on the historical development of this third community of practice. She argued that in some applied fields like evaluation, the different methodologies have always coexisted comfortably (Datta, 1994). Thus, an alternative explanation for such willing acceptance of mixing methodologies may be that in the applied social sciences, evaluators and researchers are often confronted by complex and multiplex social phenomena that are not easily amenable to single frame probing. Complex social issues tend to be unforgiving to rigid probes by inflexible researchers who are insisting on their personal epistemological stance while ignoring the realities of the practical (Rogers, 2008). Greene was therefore right in arguing that the messiness of complexity demands multiple investigative tools.

But Should We Be 'Mixing' At All?

With the emergence of a third methodological framework, some traditional qualitative researchers have been keen to embrace an approach that appeared philosophically in line with long-held tenets, such as triangulation. For example, Patton (2006) noted, with some excitement, the growing interest in the mixed methods movement, saying "wherever I go there's a crescendo buzz about mixed methods that may prove to be a tipping point. Or may not. There are important counter-

forces afoot in the land" (p. i). Others, however, have been uneasy with the many challenges to longstanding rules and procedures inherent in combining methodologies. For example, Morse (2005), while embracing the field, admitted to feeling a sense of heresy because this "sudden faddishness of mixed methods" had brought to the fore awkward and unanswered questions about mixing qualitative and quantitative approaches within a single set (p. 583).

However, some have been definitely less than embracing. Thus, Bazeley (2004) warned about the dangers of this "new" methodology and the paradigmatic and methodological issues that could be raised. Perhaps the most critical and burning issue was expressed best by Giddings and Grant (2007), who considered mixed methods research simply as a bastardization of positivism. Elsewhere, Giddings (2006) had issued this candid warning:

> Clothed in a semblance of inclusiveness, mixed methods could serve as a cover for the continuing hegemony of positivism, and maintain the marginalisation of non-positivist research methodologies. I argue here that mixed methods as it is currently promoted is not a methodological movement, but a pragmatic research approach that fits most comfortably within a postpositivist epistemology. (p. 195)

Perhaps there was some validity to these fears. Poor quality research, masquerading as mixed methods, often violated basic assumptions of both methodologies (Morse, 2005). Some responsible for these violations were indeed chameleons, even imposters, trapped within a positivistic skirt and cloaked in pretence of naturalistic inquiry. Giddings and Grant (2007), for example, observed that in many instances, what was actually mixed were methods rather than methodologies, with the qualitative component too often in the subservient role. Many violators, however, were simply novice researchers in an emerging field, capturing but not fully comprehending the essence of the third paradigm. Niglas (2009) alluded to this when she spoke of the "immature readiness" of some new researchers employing mixed methods as a tool (p. 36). This, then, was not a problem of mixed methods research per se, but simply a case of poor research conducted without attention to quality criteria, a problem also common in the two dominant paradigms (Miyata & Kai, 2009; Rolfe, 2006). Perhaps the two issues most often ignored by novice researchers when planning and implementing mixed methods research are the adoption of an explicit philosophical stance and a design framework for organizing the inquiry.

Revisiting the Issue of Paradigm in Mixed Methods Research

Early in the movement, mixed methods researchers had sought to position themselves within the diversified paradigmatic landscape. Five distinct philosophical stances supportive of mixing were put forward. These included the (1) a-paradigmatic, (2) alternative, (3) complementary strengths, (4) substantive, and (5) dialectic approaches (Greene, 2006, 2007). While the a-paradigmatic stance disconnected paradigm from methodology, the substantive perspective interlinked substantive and paradigmatic issues. The alternative paradigmatic stance called for new mental models or ways of thinking to guide methodological issues in practice, whereas the dialectical stance gave attention to the new insights that could be derived from differences between the various approaches. The complementary strengths stance is strongly attuned to the philosophical assumptions of each approach, considering the methodologies as different and requiring appropriate implementation.

In practice, mixed methods researchers adopt either a single or multiple mental models. For example, in the dialectic, substantive and complementary strengths stances, multiple paradigms are honoured and made explicit (Moran-Ellis et al., 2006). A dialectical stance is certainly not foreign to qualitative researchers who often make use of different epistemological stances within the same interpretive family; and in mixed methods research, this philosophical framework might optimize mixing (Betzner, 2008). A single paradigm stance can be adopted and this might be transformative-emancipatory (Mertens, 2003), critical realist (McEvoy & Richards, 2006), or pragmatic (Johnson & Onweugbuzie, 2004). Pragmatism has emerged as the most frequently chosen single mental model, because it is the foundation for rejecting the incompatibility thesis and provides the scaffolding upon which a practical, multi-perspective, and flexible research philosophy is built (Bryman, 2006b, 2007; Denscombe, 2008). Some mixed methods researchers, however, chose to adopt an a-paradigmatic approach, which considers mental models as irrelevant to methodological considerations (Bergman, 2008).

Despite the popularity of pragmatism in the mixed methods research community, the transformative-emancipatory paradigm has great value in the disciplines of sociology and education, because it argues that knowledge is not neutral but reflects the power and social relationships within the societies we construct (Mertens, 2003). Thus, this model acknowledges that many constructs are simply social creations and some are even privileged. The focus therefore becomes the lives and

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experiences of marginalized groups and the analysis of asymmetric power relationships. As with the constructivist-interpretive, the transformative-emancipatory paradigm acknowledges multiple realities. Although "objectivity" is considered possible, this is to be achieved by involvement with the communities. McEvoy and Richards (2006) proposed critical realism as another viable single approach to conducting mixed methods research. Critical realists see the world as an open system and causal mechanisms as tendencies. Thus, for research, the ultimate goal is to develop deeper levels of explanation and meaning. Critical realists are comfortable with both methodologies and the philosophical approach is consistent with all forms of methodological triangulation.

Typology as "Mixing" Rule and Procedure

The complexity and diversity of mixed methods approaches means that definition and typology have become critical to good practice. According to Johnson, Onwuegbuzie, and Turner (2007), the term *mixed methods research* has gained ascendancy over alternatives like *integrative research* and *mixed research*. The *mixed methods* label suggests that it is the methodologies and not the methods that are mixed. Johnson et al. (2007) provide a synthesis of 19 definitions:

> Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration. (p. 123)

Johnson et al. also distinguished among three subtypes of mixed methods research—qualitative dominant, pure mixed, and quantitative dominant. Thus, the role of the qualitative in mixed methods research might be (1) equal or interlaced (Mendlinger & Cwikel, 2008); (2) lead or dominant (Ivankova, Creswell, & Stick 2006; Mason 2006); or (3) uniquely separated and later combined (Moran-Ellis et al., 2006). Relevant to the purpose of this paper, Johnson et al. defined qualitative-dominant mixed methods research as "the type of mixed research in which one relies on a qualitative, constructivist-poststructuralist-critical view of the research process, while concurrently recognizing that the addition of quantitative data and approaches are likely to benefit most research projects" (p. 124).

A research design addresses different aspects of the research procedure, from philosophical assumptions to data analysis. A design might be considered mixed if it employs qualitative and quantitative

approaches at any stage, including research questions development, sampling strategies, data collection approaches, data analysis methods, or conclusions (Creswell & Garrett, 2008; Tashakkori & Creswell, 2007). Mixed method designs are easily distinguishable from monomethod studies, which make use of a single approach. However, Teddlie and Tashakkori (2009) consider integration to be the primary criterion for determining mixed methods status. Thus, they defined *quasi-mixed methods research designs* as studies that make use of two or more approaches at some stage while failing to integrate the methods in any way. Such studies are relatively common (Bryman, 2006a; Moran-Ellis et al., 2006; Niglas, 2004).

Typologies are classification schemes used to describe various mixed methods designs, and are important to good practice because they include implicit rules, procedures, and criteria for mixing. Currently, there are several typologies in the literature. Teddlie and Tashakkori (2009) listed seven criteria commonly used in mixed methods design typologies: (1) number of approaches, (2) number of strands, (3) implementation, (4) stages of integration, (5) priority, (6) function, and (7) ideological perspective. Most current classifications address at least four of these core issues: (1) priority (QUAN or QUAL dominant or equal); (2) implementation (parallel, sequential, conversion, multilevel, or combination); (3) integration; and (4) theoretical perspective (implicit or explicit and related to purpose or research questions) (Creswell, Plano Clark, Gutmann, & Hanson, 2003).

The earliest typology by Greene, Caracelli, and Graham (1989) was based solely on research purpose and included five categories: (1) triangulation, (2) complementarity, (3) development, (4) initiation, and (5) expansion. Designs for expansion and initiation often give priority to the qualitative, which is able to identify paradoxes and contradictions and provide new insight or different perspectives on the issue under study. Another early classification scheme proposed by Tashakkori and Teddlie (2003) gave attention to the (1) number of methodological approaches, (2) number of strands or phases, (3) type of implementation process, and (4) level from which data are gathered. This classification is useful because it recognizes the possibility of multiple levels and strands, a common feature of more complex designs. More recently, Leech and Onwuegbuzie (2009) presented a three-dimensional typology based on (1) the level of mixing (partially mixed versus fully mixed); (2) time orientation (concurrent versus sequential); and (3) emphasis of approaches (equal status versus dominant status). The concept of level of mixing is also considered in Niglas' (2009) classification of typologies.

The Creswell and Plano Clark (2007)[1] typology provides a clear role for each component in terms of timing, weighting, and mixing and is thus especially useful for new researchers in the field. Creswell and Plano Clark (2007) proposed four main design types, with multiple variants: (1) the *triangulated* design, to obtain different but complementary data; (2) the *embedded* design, in which one data set provides a supportive secondary role; (3) the two-phase *explanatory* design, which builds or explains quantitative results; and (4) the *exploratory* design, which is also two-phased but led by the qualitative. Each set has multiple variants based on emphasis and purpose. Creswell and Plano Clark's (2007) embedded, triangulated, and exploratory categories all include *qualitative dominant design variants*, in which emphasis is placed on the qualitative and the constructivist-interpretive mental model governs.

Embedded or nested models are fully mixed designs (Niglas, 2009), which make use of different approaches at the design, implementation, and analysis levels, with one type of data embedded within the other set. In one variant, qualitative data are embedded within a quantitative design, for example, focus group or qualitative observation within an experimental study. In another variant, the quantitative data are secondary to the qualitative and the interpretation is qualitatively led (Lieberman, 2005). The qualitative leads in all three variants of the exploratory design (Kelle, 2006). One such is the instrument development model, which has long been used in the field of measurement for constructing quantitative instruments grounded in the experiences of participants (Creswell & Plano Clark, 2007). The taxonomy development model has also been used to build models and themes grounded in participant views. These themes may then be subjected to empirical measurement and validation (Plano Clark & Creswell, 2008).

Morse and Neihaus (2009) developed a unique classification scheme based on theoretical drive, which they defined as the overall inductive or deductive direction of the inquiry. This is a useful typology for qualitative researchers because it clarifies the primary intention and philosophy behind the overall study (Morse, Niehaus, Wolfe, & Wilkins, 2006). Morse and Neihaus (2009) considered three main approaches: (1) qualitatively driven mixed methods designs, (2) quantitatively driven mixed methods designs, and (3) complex mixed and multiple method designs. Each approach includes several variants with different combinations and relationships between the components. Qualitative methods often use an inductive approach and seek discovery, whereas quantitative studies frequently use deduction and focus on theory testing. Morse and Neihaus recognized that although a qualitative component

might have equal weighting, the overall project might still be deductively driven. Morse (2005, 2009) also identified the core component of the study, which is the primary method used to address the research question. Morse and Niehaus argued that some qualitative methods, such as grounded theory, should stand as a primary method and if another qualitative method were to be used, it must be as a secondary component. Thus, for these authors, the typology rules apply to both mixing methodologies and mixing methods.

Using Qualitatively Led Mixed Methods Research To Study Complex Issues

I suggest that a 'qualitatively driven' approach to mixing methods offers enormous potential for generating new ways of understanding the complexities and contexts of social experience, and for enhancing our capacities for social explanation and generalization. Such an approach can draw on and extend some of the best principles of qualitative enquiry. In the process, it can benefit from ways in which qualitative researchers have sought to develop constructivist epistemologies, and to engage with thorny methodological issues especially around questions of interpretation and explanation. (Mason, 2006, p. 10)

Education has always been a core field for mixed methods research (Creswell & Garrett, 2008). According to Niglas (2004), however, the implementation of mixed methods research designs in education is not without its problems. In her review of education research, she found a diversity of approaches, but her classification suggests that 93 of the 142 studies (65%) included a dominant qualitative strategy in data utilization. However, not many studies offered a clear rationale for mixing. Those that did, tended to emphasize complementarity and expansion purposes; but where triangulation was the goal, the original meaning of the term was not fully captured. Additionally, most studies were integrated only at the data inference stage, where this essential aspect of mixing suddenly appeared.

I would argue that in several instances, qualitatively driven or qualitative dominant mixed methods studies are best able to capture the complexity of some educational and social issues (Creswell, Shope, Plano Clark, & Green, 2006). For example, monomethod qualitative studies are often limited in transferability because of small sample size.

In situations of complexity and diversity, however, the lack of variation in a sample becomes a hindrance to fully capturing the nuances of a phenomenon. Moreover, when data from limited sample sets are used to inform educational policy, the problem is presented only partially and ignores the variation across contexts. Multiple qualitative methods can capture different perspectives, thereby enhancing the ability to represent complexity and multiple levels. More than that, however, combining different data sets in mixed methods strategies enhances transferability, generalizability, and practical significance (Onwuegbuzie & Leech, 2004). These arguments are illustrated by reference to two research studies conducted by the author in the period 2006 to 2009.

Two Illustrative Studies

Purpose, rationale, and design

Both studies were planned and implemented in collaboration with the Division of Educational Research and Evaluation (DERE) of the Trinidad and Tobago Ministry of Education (TTMoE). The projects presented a unique opportunity to gather high-quality data to inform critical policy issues. The first policy issue was secondary school choice in Trinidad and Tobago, for which there was little information at the time. Although empirical databases were available and could be mined using recently developed techniques, quantitative data alone would not provide answers to the question of "how choice was constructed" by stakeholders. Thus, qualitative information was also needed on how real families made decisions on secondary school choice in Trinidad and Tobago. Empirical international studies were widely available but would be of limited value because different rules and procedures in choice systems often lead to different understandings and impacts (De Lisle, Keller, Jules, & Smith, 2009). Special attention to variation in the qualitative sample would be necessary to accommodate possible differences in social class and geographical location (Willms & Echols, 1992).

Low performance among specific schools was the second policy issue in need of further research. Indeed, improving low-performing schools has become a concern throughout Latin American and Caribbean (Vegas & Petrow, 2008). Differences in school performance have been evident in the findings of both national assessments and international assessments, such as the Progress in Literacy Survey (PIRLS) (Mullis, Martin, Kennedy, & Foy, 2007). Recent local attempts at developing meaningful school performance measures had suggested that differential school performance might be linked to contextual factors such as rurality and socio-economic status. Thus, identifying low- and high-performing

high-poverty schools became an important research goal. However, to be useful in providing advice on school improvement, context-specific qualitative data on the nature of the challenge were also needed.

Table 1 summarizes the nine key steps of a research procedure. These steps follow the 13-stage Onwuegbuzie and Leech (2006) framework, and included: (1) mental models, (2) rationale and purpose, (3) research questions, (4) overall design, (5) sampling design, (6) data collection, (7) data analyses, (8) inferences, and (9) report writing. As shown, there were differences between the two studies, especially in the level of integration, timing, and weight of the qualitative component. The school choice study was designed primarily to achieve complementarity and triangulation. In the challenging school study, the research design was intended to serve both developmental and expansion purposes. Initiation was a secondary purpose in both designs. As shown in Table 1, both studies explicitly adopted a multi-method qualitative approach (Collier & Elman, 2008). The focus of integration was on the meta-inferences, which are the combination qualitative and quantitative findings (Tashakkori & Teddlie, 2003).

The School Choice Study (De Lisle, Keller, et al., 2009)

Using the typology of Creswell and Plano Clark (2007), the mixed methods research design for the secondary school choice study may be described as a *triangulated multilevel model*. This variant employs different methodologies (quantitative and qualitative) to address different levels (macro and micro) within a system. Figure 1 illustrates this research design. As shown, three levels of the system were envisioned. At the overall system level, the formal framework of rules and procedures for secondary school choice was evaluated in the quantitative descriptive study (Moe, 2002, 2008). Decision making at the level of the family was analysed primarily using qualitative methodology. In theory, system rules and procedures are filtered and interpreted by family members, so the qualitative data collection was intended to capture the system rules as perceived by parents and children. Using the Morse and Niehaus (2009) typology, it becomes clearer that this investigation is really three separate projects in one research programme, with each study meant to be independently published. The children and parent projects used an inductive drive, whereas the study of the system was deductively driven. In theory, however, the overall programmatic thrust was inductive because the focus was on the construction of choice from the perspective of the participants.

Table 1. Basic Research Design Elements of the Two Mixed Methods Research Studies Conducted By the Author

Research Step	School Choice Study	Challenging School Study	Approach to Integration
1. Mental Model	Overall inductive drive, with postpositivism for the QUAN and interpretive-constructivist for the QUAL components	Postpositivism for Stage 1, interpretive-constructivist for QUAL	Complementary strengths/ Transformative-emancipatory for some projects in choice study
2. Rationale & Purpose	Initiation, triangulation, and complementarity	Development, expansion and initiation	Designs are explicitly mixed methods
3. Research Questions	Most were separate QUAN and QUAL questions, but a few mixed RQs	All mixed RQs	Mixed RQs facilitate integration
4. Overall Research Design	Multi-level triangulated	Sequential Explanatory with Embedded Qualitative in Phase 2	Attention to rules of typology
5. Sampling Designs	Concurrent Mixed - Full Cohort for QUAN/ Probability & Maximum variation for QUAL	Sequential - Full cohort for Phase 1 and Mixed method purposive for 2	Linkages across different samples
6. Data Collection	Secondary data for QUAN. Multiple for QUAL	Secondary data for QUAN. Multiple for QUAL	Use of multiple methods and methodologies for different levels of phenomenon
7. Data Analyses	Descriptive and logistic regression. Text analysis	Regression Analysis for QUAN and multiple approaches for QUAL, including data transformation	Separately conducted in parallel for school choice projects
8. Meta-inferences	Parallel findings with meta-inferences	Integrated findings	Meta-inferences are fully integrated
9. Report	Discussion organized around research questions-QUAN and QUAL data integrated in conclusion	Both phases reported separately to date. QUAL and quan of Phase 2 integrated	Attention to links between different types of data

Figure 4. Visual ethnography as contradiction: Resources available but not utilized at one urban challenging school site.

In terms of emphases and pacing, the research programme may be annotated in the following manner: QUAN + [QUAL-quan] + [QUAL-quan].
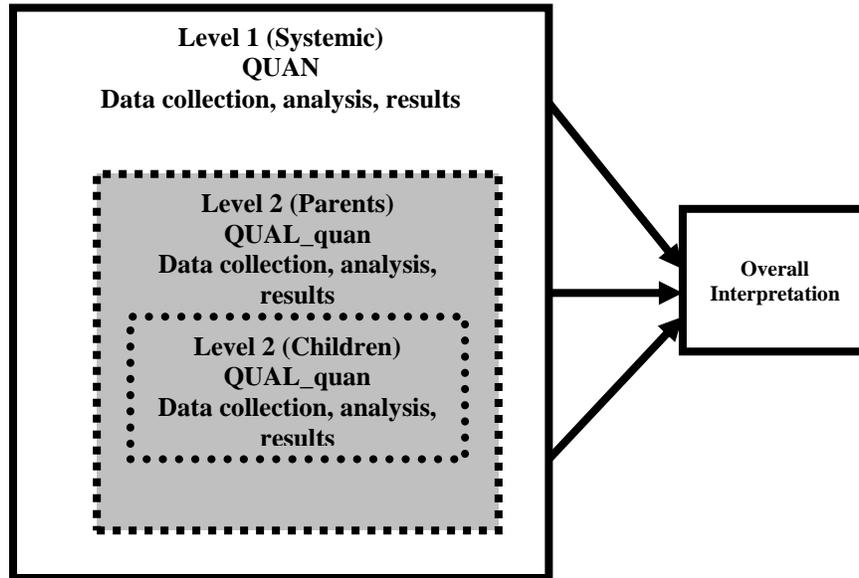

Figure 1. The multilevel triangulated mixed methods design in the school choice study.

The mixed methods sampling design was a concurrent mixed approach with independent quantitative and qualitative sampling strategies implemented in parallel (Teddlie & Yu, 2007). The quantitative phase employed full cohort secondary data for 11 years of Eleven Plus examinations (1995–2005). The qualitative sample was designed to ensure maximum variability by making use of both purposive and probability sampling (Onwuegbuzie & Collins, 2007). Four schools from each educational district were selected based on location and socio-economic context. Teams of researchers gained access to each site before interviewing parents and children. Saturation was reached with 10 sites across six districts.

We anticipated that children's decision-making processes would be significantly different from parents and might even be influential in the family's final list of choices (Reay & Lucey, 2000). Thus, a unique feature of this research programme was the inclusion of children's agency and voice, a feature omitted from several international studies. From this perspective, an emancipatory-transformative mental model was employed in seeking to understand how the primary participant, the

child, experienced the phenomenon. Each qualitative project employed multiple methods for exploratory and verification purposes (Brewer & Hunter, 2006). The main data collection tool was the focus group, but soft laddering[2] and individual interviews were also used to capture the heuristics of the decision-making process (Reynolds & Olson, 2001; Veludo-de-Oliveira, Ikeda, & Campomar, 2006). The focus group interview for children was enhanced by the use of a variety of information elaboration techniques such as mindmapping, storytelling, word association, and visualization methods (Bystedt, Lynn, Potts, & Fraley, 2003). These techniques were critical to obtaining information from children in the 8 to 10-year-old age group.

The Challenging School Study
(De Lisle et al., 2008; De Lisle, Smith, et al., 2009)

The design of the challenging school study is shown in Figure 2. Based on the typology of Creswell and Plano Clark (2007), the overall design is *sequential explanatory*, beginning with a quantitative monomethod study and ending with a follow-up mixed methods QUAL-quan study designed to explain and expand on the findings. Notably here, Phase 2 is not a qualitative monomethod study, but a QUAL-driven or qualitative-dominant mixed methods research design, with an explicit focus upon qualitative themes to support explanation. The quantitative data in this project is qualitized (Morse & Niehaus, 2009; Tashakkori & Teddlie, 2009). From the standpoint of Creswell and Plano Clark (2007) typology, the Phase 2 study is an *embedded* or *nested qualitative dominant* design. The overall sampling strategy was sequential mixed methods, in which the qualitative sample was a subset of the quantitative sample (Teddlie & Yu, 2007). The quantitative study used full cohort data for all 557 primary schools coded, and included data from the National Schools Dietary Services Limited (NSDSL) on the percentage of the school population provided with free meals. Based on the criteria of 90% free school meals and an Academic Performance Index (API) placing the school in the lower and upper quartiles, 12 schools were selected. Six schools in the lower quartile were categorized as low-poverty, low-performing (lp2). From these, three sites were selected based on location and type of schooling (co-ed/single sex).

The embedded qualitative dominant mixed methods design of Phase 2 emphasized qualitative multi-method exploration and verification. The use of multiple qualitative methods enhanced the ability to reveal contradictions and paradoxes, thereby improving legitimation (Meijer, Verloop, & Beijaard, 2002). The multiple qualitative methods included

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ethnographic field notes, document analysis, individual and focus group interviews, structured and unstructured observations of classrooms, and visual ethnography. None of these approaches are considered stand-alone methods according to Morse & Niehaus (2009). These multiple methods were intended to capture the reality and multiple facets of children's lives, another obstacle when studying complex issues in education (Creswell & Garrett, 2008; Hemming, 2008; Pink, 2001). These qualitative approaches were supplemented by quantitative surveys of stakeholders, standardized assessments of students by teachers, structured observations of classes, and collection of site records. Two types of surveys were conducted. The survey of teachers and parents used the qualitative sample in the focus groups, while the assessment of students by teachers and the student self-report engagement survey used a wider probability sample.
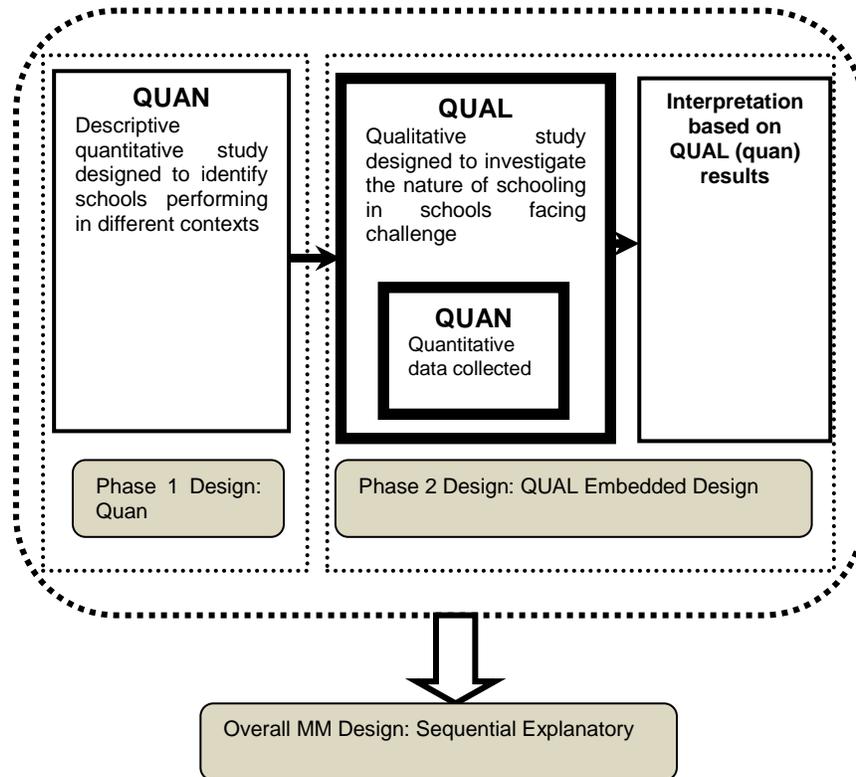

Figure 2. The mixed methods design in the challenging school study.

School Leadership
Raymond Hackett
Jerome De lisle
Rinelle Lee Piggott
Deon Rodriguez
Isabelle Burris-Paul

Teaching-Learning Systems for Literacy & Numeracy
Vena Jules
Krishna Seunarinesingh
Rhoda Mohammed
Alicia Gayah Batchsingh
Genevieve Thompson
Kamini Bhagaloo

Teachers & Teaching
Phaedra Pierre
Vena Jules

Parent-School-Community
Carol Keller
Samuel Lochan

Methodology
Jerome De Lisle
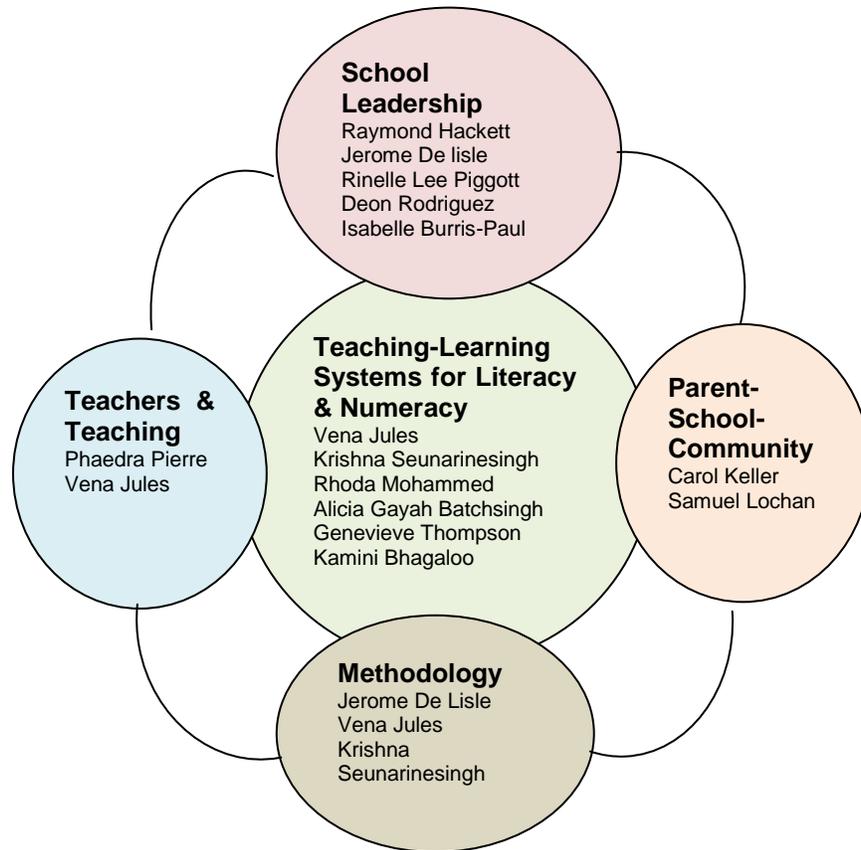Vena Jules
Krishna
Seunarinesingh

Figure 3. Organizations of teams by target area in the Challenging School Project.

Implementation and analysis

Creswell and Plano Clark (2007) suggested that research teams are needed to conduct concurrent mixed methods studies because both components must be implemented at the same time. Research teams were also used even in Phase 2 of the challenging school study because of the nested design. Individual members were classified as investigators and field assistants. Field assistants were postgraduate and senior undergraduate students with substantial experience in schools. The field assistants were provided with considerable formal training in methods and content. For the challenging school study, research teams were organized by both target area and methodology, with team leaders appointed for each. Figure 3 lists the target area teams in the challenging

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school study. It is to be noted that several members spanned across the teams, facilitating the integration process.

A variety of mixed methods analytic approaches was used (Teddlie & Tashakkori, 2009). The school choice study made use of parallel mixed data analysis in which separate quantitative (descriptive) and qualitative (narrative) analyses were conducted. Findings from each analysis provided an independent understanding of the phenomenon, with attempts at integration in the meta-inferences. Each phase of the challenging schools study was reported as a separate study. The Phase 2 study was analysed using a conversion mixed data analysis approach that included qualitization of the numeric data. Qualitization included the creation of narrative profiles from the survey data from both the qualitative and quantitative samples (Tashakkori & Teddlie, 1998).

Findings and Lessons Learnt

An Explicit Mental Model and Typology Are Needed for Efficient Implementation

The philosophical orientation and theoretical drive of the study should be made explicit at the start and must be used as a guide for decision making during the process of implementation. An appropriate mental model was critical to efficient implementation because several choices had to be made throughout each implementation stage. An overriding philosophy was often the key to resolving thorny issues about the nature and intention of different data collection and analytic activities. For example, in Phase 2 of the school choice study, decisions had to be made about the nature of observation. Should the observation be structured or unstructured? Should an instrument be used to guide observations or should field assistants record what they observed using anecdotal records? Given a deductive drive, observational methods using checklists and standardized schemes would be expected; however, a constructive philosophy would give attention to unstructured approaches that might better capture the uniqueness of teaching/learning. In the end, the decision was to use a broad framework describing different levels of authentic teaching coupled with extensive field notes and video, allowing the primary investigators to capture and reinterpret the teaching/learning act. Although, in theory, a mixed methods researcher might adopt an a-paradigmatic stance, simply collecting quantitative and qualitative data without attention to the philosophical assumptions inherent in an approach could lead to inappropriate choices. A complementary strengths mental model seemed most appropriate in both studies because

it facilitated the multiple purposes of triangulation, expansion, and complementarity (Betzner, 2008).

In both studies, the research designs were aligned to specific models, with relationships and procedures clarified at the start. It appears that design rules from a typology are necessary for the logical and systematic development of a mixed methods research study (Onwuegbuzie & Leech, 2006). Although the current typologies are by no means exhaustive, they are useful because they provide rules and guidelines for mixing, thereby ensuring the distinctiveness of the field (Collins & O'Cathain, 2009). Using a typology appears critical to successful implementation because it prevented many of the problems often reported in pseudo-mixed methods studies. For example, paying attention to the design rules in the challenging school study enabled different parts of the study to articulate with each other. Likewise, although existing typologies did not fully describe the multi-component design of the school choice study, the explicit focus on an overall inductive thrust ensured that prominence was given to the overall goal of the programme, namely, to identify how participants on the ground constructed choice based on perceived system rules.

The Research Team is an Important Mechanism for Achieving Integration

Formal collaboration within and across teams proved critical to implementing the mixed methods research and achieving higher levels of integration, with dialogue and collaboration often leading to greater synergy and new insights into emerging issues (Hall & Howard, 2008). Formal and informal team meetings were the medium through which quantitative and qualitative findings were shared, and this process led to greater reflexivity for individuals and teams. The challenging school project employed multidisciplinary teams, in which members were able to draw on the skills and competencies of individual researchers in both substantive and methodological areas. Different investigators took the lead on social, teaching/learning, literacy, and methodology issues, and collaboration ensured that varying perspectives were shared.

The way in which team collaboration led to integration might be illustrated in the case of the school choice study in which the quantitative team initially analysed the data without regard to gender. As the qualitative team led by Vena Jules began to analyse the transcription data, they soon observed that several families in Central Trinidad made different decisions for male and female candidates. This qualitative finding led the quantitative team to re-analyse the empirical data for

males and females separately. This new empirical analysis was extremely fruitful and led to several new insights about differences in gendered choice patterns. For example, families often used the fifth and sixth choices provided by the Ministry of Education from 2001 to 2006 for females, but not for males. Interestingly, the Ministry of Education had taken the decision to eliminate the fifth and sixth choices in 2007, a policy decision that, this meta-inference suggests, would have impacted negatively on female opportunity in the St. George East Educational District. These findings point to the complexity of the issue and the need for multilevel studies using different methodologies. It suggested that even at the system level, small policy changes could impact severely on specific subpopulations.

The Qualitative Findings Often Provided a Different but Insightful Perspective

Findings from the different methodologies were not always complementary but captured different perspectives of the phenomenon. However, in describing the issue fully, both contradictory and complementary findings were needed to capture nuances and to inform education policy. For example, several of the qualitative findings, though unique, had important implications for the development of sustainable education policy. For example, in the school choice study, it was the qualitative interviews which suggested that family decision-making processes were complex and multistaged, involving both parents and child as well as extended family members and teachers. This is illustrated in the following extended narrative of an Eleven Plus candidate talking about the way she selected her schools of choice:

[Interviewer: How did you go about choosing your schools?] We sat together as a family and we chose all four schools. I had Holy Name Convent on my list but Miss [the teacher] made me put a secondary school instead. So I had to put in Woodbrook Secondary School because that is what my mother wanted. I wanted St. George's College as my first choice but I had to choose St. Joseph's Convent for my first choice instead. And I wanted Bishop's Anstey as my second choice. [Interviewer: So who decided that Holy Name Convent would have been the school to drop?]. My Mummy; that wasn't part of the discussion. . . [Later in the interview] There was only one school I did not agree with- which was Woodbrook Secondary. [This was] because I wanted either St Augustine Girls or Holy Name Convent [instead], but Miss [the teacher] made me take off Holy Name Convent. Actually, it was my

Mummy and Miss who made me take off Holy Name Convent and put in a Secondary school, although I wanted to put [as the secondary school], Diego Martin Secondary.

[Fifth Standard Female in Coeducational Primary School in Port of Spain and Environs Educational District]

The data from soft and hard laddering led to the discovery that participants might use both compensatory and non-compensatory rules in the multistage decision-making process. In non-compensatory decisions, good and bad attributes do not balance out and a school might be rejected or accepted simply based on one attribute. Non-compensatory rules were often used to eliminate schools in the early stages of decision making. Some factors such as geographic location were used disjunctively, whereas other factors such as safety and academic achievement were used conjunctively. For example, a family might choose only from schools meeting some minimum or maximum value on one or more variable, as illustrated in the following quotation:

My choices were really simple for me because I have segmented [them] towards my salary and this traffic congestion into Port of Spain. I think about all of these things - I have to get up 4 o'clock in the morning to go to Port of Spain and I have friends and their children who have to go to school with pillows and when they reach to school, they can sleep before school start. All these things you have to think about. I think that schools in Central here are just as good as [any] Port of Spain school. [Schools like] Presentation, Couva Sec. [For example], Couva Sec get nine scholarships last year, so they are ranking above the schools in Port of Spain and all the stress for my son to go to school early in the morning and [there is] real traffic which should be easing up these couple of years.

[Parent in Focus Group, Caroni Educational District]

These findings were important to policy generation because it suggested that simple linear universal models of choice (such as a ranking of factors) were inadequate for explaining the way families chose schools in Trinidad and Tobago. It is also apparent that the variation in the decision-making heuristics could not be captured by any quantitative method, including hard laddering. It was hypothesized that given a survey listing of school factors, families might rate some characteristics as more important, but in real decision-making contexts, these factors were likely to be weighted and used within some complex

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decision-making heuristic. The non-sequential, multiple-phased decision-making strategy employed by parents and children in choosing secondary schools was best assessed by data collected from focus group and soft laddering interviews, the latter requiring extensive interaction and probing of the participant. This meta-inference suggested that the Ministry of Education must be cautious about crafting new rules for school choice, even if seemingly based on patterns in the empirical data. Moreover, as revealed in the quantitative data, school choice was considered gendered activity and so some factors were applied differently for males and females. An example was school location, which was often used conjunctively for females, with distant schools eliminated in the early decision-making rounds.

The meta-inferences were an important vehicle integrating quantitative and qualitative findings, but the nature and relationship between the quantitative and qualitative inferences varied. Integration did not mean the absence of conflict because the quantitative and qualitative captured different aspects of the same phenomenon (Slonim-Nevo & Nevo, 2009; Teddlie & Tashakkori, 2009). The relationship between findings from the different components in both studies are classified in Table 2 as (1) initiating; (2) conflicting; (3) confirming (complementary); or (4) explanatory and expansion (infuse or modify). Findings were considered initiating if revealed in Phase 1 of a sequential study or in one phase only of a concurrent study. For example, in the school choice study, only the time-sequenced full cohort data highlighted the changing nature of the local education market as choice rules and the perceived value of schools changed. In other instances, however, an initial finding was matched by later findings using a different methodology. In some instances, the later inferences acted in a confirmatory or complementary manner. In other instances, the findings were conflicting. For example, in the challenging school study, the empirical data suggested that there was a correlation between resources and school achievement, but the case study did not bear out this pattern, with all sites well resourced and the rural school staffed with highly qualified teachers. Findings from other approaches could also provide explanatory value by expanding on an initial finding or by adding deeper insight.

Table 2 shows 17 meta-inferences developed for the two illustrative studies. Ten of these meta-inferences were described as initiating. The 10 are equally divided between quantitative and qualitative findings. The large number of initiating findings from the quantitative component was possibly due to (1) the sequential explanatory design in the challenging school study, and (2) the high-quality multiple cohort census data in both

studies. Nevertheless, the qualitative data added significant value because inferences often had significant and direct implications for education policy. For example, the implications of gendered patterns in school choice and the complex nature of decision-making heuristics have already been noted in the school choice study. Another useful qualitative inference from the challenging school project was the mechanism for limiting the opportunities for learning for students. These appear to be directly related to high teacher and student absenteeism, along with the nature of teaching/learning. Moreover, high levels of training and resources might not directly lead to high-quality teaching for economically and socially disadvantaged students, because even when teachers were trained and resources were readily available, these resources might not be used in teaching/learning. This is revealed in the photographs of one of the sites in Figure 4, where despite teacher protestations about limited resources, teaching materials remained locked away in a resource room. Thus, it might be that beliefs about the students, families, and communities, and the nature of teaching/learning were more influential in classroom practice. Additionally, the salience of nutrition issues and student absenteeism in the early grade levels of the school had important implications for future schooling and school improvement policies.

The Challenge of Implementing
High-Quality Mixed Methods Research

The three lessons highlighted—use of typologies for implementation, teams for integration, and the value of the qualitative findings for meta-inferences—point towards the value of qualitatively led mixed methods variants. However, mixed methods research should not be considered inherently valid (Bazeley, 2004); instead, trustworthiness and credibility must be assured through the application of rules and procedures and attention to quality criteria. Indeed, the development of quality criteria has been a concern for the mixed methods community for some time. Onwuegbuzie and Johnson (2006) argued that the most salient validity issues faced by mixed methods research were representation, legitimation, and integration. *Representation* is the difficulty of representing lived experience through text and numbers; *legitimation* refers to the trustworthiness of inferences; and *integration* to the multiplicative and additive threats that result from combining methods. This leads to the crux of the problem in producing high-quality mixed methods research, namely, that some mixed methods studies are

fundamentally flawed at the start because they combine and multiply threats to validity and trustworthiness within each methodological approach.

Table 2. Different Types of Findings and Meta-inferences Derived From the Mixed Methods Research Studies

Research Programme	Finding Type	Method/ Methodology	Meta-inferences
School Choice	Initiating	QUAN	The pattern of school choice and the nature of the education market varied significantly across geographic space.
	Initiating	QUAN	Families from non-Christian or non-traditional Christian religions often preferred either their own schools or government-managed institutions to schools managed by Christian denominations.
	Initiating	QUAN	Some schools drew from a wider range of circuits compared with others.
	Imitating	QUAL	School choice is gendered, with school factors and choices weighted differently for male and female candidates.
	Initiating	QUAL	Parents and children used a variety of decision rules based on simple ranking, disjunctive, conjunctive, and compensatory combinations of factors.
	Initiating	QUAL	For most parents, location is a factor in choosing schools even when those schools are perceived to be high achieving.
	Confirming	QUAL/ QUAN	Measures of academic school success and correlates have the highest valence among the school factors.
	Explanatory	QUAL	The qualitative findings explained the root reasons for stakeholders highly valuing specific school factors and schools and strongly rejecting some schools in the education marketplace.
	Explanatory/ Expansion	QUAN	In the period when the 5th and 6th choice was offered, this option was important for parents from well-populated districts such as St .George East and Caroni and for female candidates.

(continued)

Table 2 (continued)

Research Programme	Finding Type	Method/ Methodology	Meta-inferences
Challenging Schools	Initiating	QUAN	Some schools are able to perform adequately despite economic and social disadvantage in the school population.
	Initiating	QUAN	Low-performing, high-poverty schools are found in both urban and rural areas.
	Initiating	QUAL	Significantly reduced opportunities to learn occur through reduced time on task (in classroom and school) and teaching that keeps students disengaged.
	Initiating	QUAL	Poor nutrition and student absenteeism are significant issues in schools facing challenge.
	Conflicting	QUAL with QUAN	Some low-performing, high-poverty schools have qualified staff.
	Conflicting	QUAL with Component QUAN	In the interview data, teachers rationalized their expectations for student performance and considered their judgement justified. Therefore, in the component quantitative, teachers did not report low efficacy beliefs.
	Conflicting	QUAL observation and video ethnography with focus group QUAL	Teachers had access to a great deal of resources, but non-use or misuse became significant issues, possibly related to the nature of teaching/learning. However, teachers often claimed not to be well-resourced.
	Conflicting	QUAL parent focus group with QUAL teacher focus group	In the rural low-performing school, some parents were very unhappy with the quality of education, but teachers thought that the parents were not concerned or comfortable with the climate and work ethic.
	Confirming	QUAN with Component QUAN and QUAL	The free school meal index was an accurate assessment of social and economic disadvantage in schools.
	Explanatory	QUAL and component QUAN	Social and economic disadvantage operated through several mechanisms, including limited family resources, time spent with student in the home, and inability to help student or actively interface with the school. The school's response to the parent and child was often alienating and negative.

Teddlie and Tashakkori (2003) considered *inference quality* and *transferability* (for some studies) to be at the heart of the quality issue. Inference quality derives from both design quality and interpretive rigour, and includes (1) within-method consistency, (2) conceptual consistency, (3) interpretive agreement, and (4) interpretive distinctiveness. For mixed methods research, Onwuegbuzie and Johnson (2006) put forward the unique term *legitimation* instead of *validity* and argued for nine types of evidence: (1) sample integration, (2) insider's views, (3) weaknesses minimization, (4) sequential relationships, (5) conversion, (6) paradigmatic mixing, (7) commensurability, (8) multiple validities, and (9) the political dimension. A central question for any mixed methods study, then, is whether the methodologies are simply conducted in parallel or whether integration is attempted at one or more stages (Yin, 2006). The work of Bryman (2006a) and Kinn and Curzio (2005) suggests that very few mixed methods studies achieve high levels of integration. This study suggested that integration works best when planned and effected by a team; a finding confirmed in Jang, McDougall, Pollon, Herbert, and Russell (2008). Collaborative mixed methods research conducted by groups of researchers working within different approaches and disciplines must be structured to ensure dialogue on the findings. Contradictions and confirmations might be clarified early and then subjected to further discussion, investigation, and analysis. A fully integrated design would be difficult to manage, but could yield unique insights (Teddlie & Tashakkori, 2003). There is certainly, then, a greater need for protocols on fully integrated designs, such as in found in the work of Mendlinger and Cwikel (2008) and Lieber (2009).

Reflecting on the Future of Mixed Methods in the Caribbean

The Caribbean certainly needs more indigenous knowledge to direct successful education reform (Jules, 2008; Louisy, 2004). If intelligent policy making is to be encouraged, data management systems with high-quality information from sound research must be developed (Sanderson, 2009). Perhaps, in the past, there has been an over-reliance on decontextualized and transferred innovation, with little exploration of implementation and evaluation processes within the local context (Jules, 2008); however, such insensitivity could have contributed to the frequent implementation failures. Holmes and Crossley (2004) pointed to the value of qualitative research in such a context, but large-scale empirical data is also required because of significant variation across contexts (De Lisle, Smith, & Jules, 2010). Mixed methods research presents an opportunity to explore both worlds by allowing in-depth discovery of

indigenous patterns, practices, and traditions, while at the same time benefitting from the advantages of high generalization through large-scale empirical research.

Poorly designed mixed methods studies of the past should not prevent researchers working either in the quantitative or qualitative paradigms from seeking out the benefits of using high-quality mixed methods studies for initiation, expansion, and triangulation. However, in studying complex issues, there are important advantages to selecting research designs in which the qualitative has the lead role. Qualitative researchers might be keen to include mixed methods in their repertoire, rather than trying to head off some future "sucker punch" by post-positivistic opponents. Mixed methods research represents a unique way of seeing and investigating the world; an approach that is congruent with philosophies used in naturalistic inquiry. Moreover, in the study of complex and multiplex social issues, mixed methods can add to the repertoire of both qualitative and quantitative researchers, enabling them to achieve important legitimation goals, such as greater transferability. To be sure, the qualitative has always been multiplistic, iterative, interactive, dynamic, and open to new approaches, as seen in the case of crystallization (Ellingson, 2009). Both case and ethnographic research have traditionally made use of multiple methods, with some approaches even crossing the methodology boundary. Dialectical mental models, therefore, have a foundation in the qualitative paradigm. The use of mixed methods research will also enhance the quality, impact, and meaning of education research in the Caribbean. With the low levels of statistical literacy in the population, the qualitative findings in a mixed methods study may have greater utility and influence for some consumers. Moreover, the explanations provided by the qualitative component can provide extended explanation grounded in the data, along with deeper insight into recurring processes and repeated patterns identified in large-scale empirical data.

However, there is also a word of caution from these findings. As mixed methods research advances in the Caribbean, greater attention must be paid to the use of typologies and the application of quality criteria. Attention to mixed methods protocols that describe systematic development and implementation must include a special focus on the generation of integrated meta-inferences, the gold standard of quality. Unfortunately, institutions of higher education in the Caribbean have often been slow to prepare students for some new methodological trends; and, sadly, there have been very few seminars and workshops in the area of mixed methods research. It seems appropriate, then, to introduce

formal teaching in postgraduate courses in education and the social sciences, especially in the discipline of evaluating social and educational programmes. Such training will help novice researchers and postgraduate students to exercise greater caution as they maximize the many opportunities provided by the mixed methods research agenda (Collins & O'Cathain, 2009; Morse 2005).

Notes

1. Creswell and Plano Clark (2011) revised the typology of 2007, consolidating frameworks, changing labels, and introducing new designs.

2. Soft laddering is a qualitative interviewing technique designed to explicate reasons behind particular choices.

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