Educational Management Administration & Leadership
ISSN 1741-1432 DOI: 10.1177/1741143205051054
SAGE Publications (London, Thousand Oaks and New Delhi)

Methodological Issues Related to Causal Studies of Leadership

A Mixed Methods Perspective from the USA

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ABSTRACT

This article explores different understandings of causality and their implications for the study of educational leadership. The article first details differences among three broad methodological traditions in educational research (the quantitative, qualitative, and mixed methods approaches), especially with regard to causal explanations. This is followed by a presentation of different methodological approaches for assessing the impact of educational leadership on school outcomes, drawing specifically from school effectiveness research. Five propositions regarding causality issues in studies of educational leadership are presented and then assessed. The article concludes with a brief description of specific educational leadership research studies that were guided by the pragmatic, mixed methods approach advocated throughout this text.

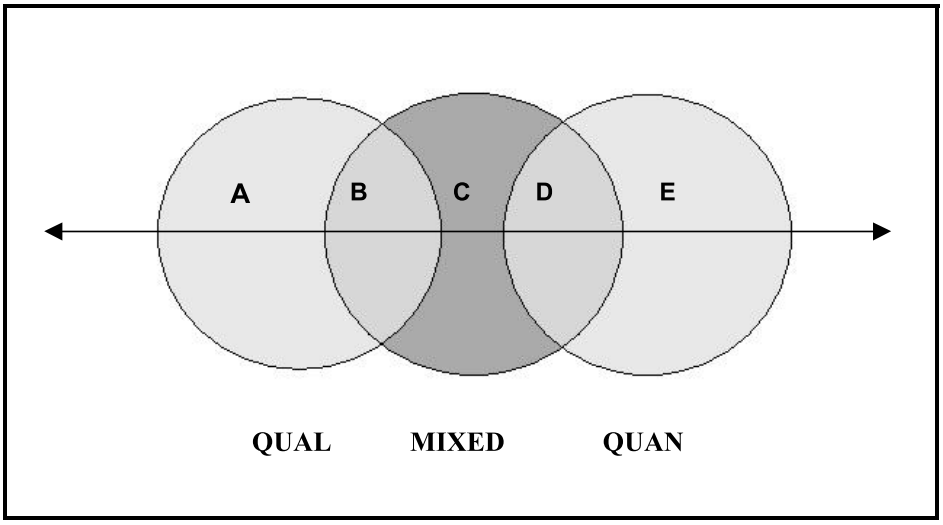
KEYWORDS *paradigms debate, pragmatism, qualitative methods, quantitative methods, school effectiveness research*

There is an ongoing debate in educational research regarding issues associated with causal relationships and appropriate methods for determining them (e.g. Cook, 2002; Levačić and Glatter, 2003; Maxwell, 2004; Slavin, 2003). There is a parallel international debate regarding the assessment of the impact of leadership factors on student achievement and other outcomes of schooling (e.g. Hallinger and Heck, 1996; Teddlie et al., 2000; Witziers et al., 2004).

This article is one of two paired pieces (one UK, one USA) in this special issue of *EMAL*, which explore different understandings of causality and their implications for the study of educational leadership. This article is divided into two parts:

- Causality and the three methodological communities: details differences among three broad methodological traditions in educational research, especially with regard to causal explanations

Figure 1 The QUAL–MIXED–QUAN continuum



Zone A consists of totally QUAL research, while Zone E consists of totally QUAN research. Zone B represents primarily QUAL research, with some QUAN components. Zone D represents primarily QUAN research, with some QUAL components. Zone C represents totally integrated MM research. The arrow represents the QUAL–MIXED–QUAN continuum. Movement toward the middle of the continuum indicates a greater integration of research methods. Movement away from the center (and toward either end) indicates a greater segregation of research methods. (Tashakkori and Teddlie, 2003: 690, 708)

- Methodological issues in causal studies of leadership: presents different methodologies for assessing the impact of educational leadership on school outcomes, drawing specifically from school effectiveness research

I conclude this article with a description of some of my own research concerning educational leadership, which has been guided by the pragmatic, mixed methods approach which I advocate throughout this text.

Causality and the Three Methodological Communities

The Three Methodological Communities and the Paradigms Debate

Currently there are three distinct methodological communities working in educational research in the USA: quantitatively oriented researchers (QUANs), qualitatively oriented researchers (QUALs), and mixed methodologists (MMs) (see Figure 1).[1] The QUANs and QUALs participated in an extensive paradigms debate during the 1980s and early 1990s. This paradigms debate was based on the incompatibility thesis, which is the notion that post-positivism[2] (and its variants) is on one end of a set of philosophical dimensions and constructivism

(and its variants) is on the other, and that the two points of view are incompatible (e.g. Lincoln and Guba, 1985).

Paradigm 'purists' further extended the incompatibility thesis to research methods: investigators should not use both quantitative (QUAN) and qualitative (QUAL) methods in their projects owing to the incompatibility of underlying paradigms. While much energy was being expended on the paradigms debate in the USA, another group of researchers disregarded the incompatibility thesis, especially as it related to the use of both QUAL and QUAN methods. Several of these scholars criticized the incompatibility thesis, noting that mixed methods (MM) were already widely used throughout the social sciences, including education.

These MM scholars posited the compatibility thesis, which states that it is acceptable to mix QUAL and QUAN methods in research studies that call for different types of data to answer their questions. As a result of these methodological trends, there has been a proliferation[3] of influential MM books and articles published in the USA over the past 15 years (e.g. Brewer and Hunter, 1989; Creswell, 2003; Greene and Caracelli, 1997; Morse, 1991; Newman and Benz, 1998; Patton, 2002; Reichardt and Rallis, 1994; Tashakkori and Teddlie, 1998, 2003).

The paradigms debate waned somewhat in the mid-1990s and early 21st century (e.g. Patton, 2002), mainly because 'most researchers had become bored with philosophical discussions and were more interested in getting on with the task of doing their research' (Smith, 1996: 162–3). Explicit manifestations of the paradigms debate between QUALs and QUANs are rare at this time, with each side apparently content to work within its own epistemological and methodological borders.[4] Some MMs are actively interested in reconciliation among the three communities, since the integration of different methods is a hallmark of that orientation.

The Paradigms Debate and the Issue of Causality

Despite this overall trend toward detente in the paradigms debate, the gap between the methodological 'left' and 'right' in educational research has widened recently in the USA, partially owing to the federal government's endorsement of 'scientifically based research' (SBR) through the Institute of Educational Sciences in the US Department of Education. The passage of the No Child Left Behind Act of 2001 included a definition of SBR and required federal grantees to expend their research funds on 'evidence-based strategies' (e.g. Feur et al., 2002). The passage of the Education Sciences Reform Act of 2002 included the standard that causal relationships could be claimed 'only in random assigned experiments or other designs (to the extent such designs substantially eliminate plausible competing explanations)' (Eisenhart and Towne, 2003: 36). Many influential individuals in the QUAN community in the USA (e.g. Cook, 2002; Slavin, 2003) have been strong advocates for the use of experimental and quasi-experimental designs as the only way to establish causal relationships.[5]

On the other side of the causality issue, individuals associated with the most popular paradigms within the QUAL community (i.e. constructivism, post-modern perspectives) have serious issues regarding the possibility of making causal explanations.[6] Lincoln and Guba (1985), writing in the constructivist tradition, posited the substitution of the term 'mutual shaping' for causality. They concluded that 'All entities are in a state of mutual simultaneous shaping, so that it is impossible to distinguish causes from effects' (Lincoln and Guba, 1985: 37). In general, postmodern theorists do not think causal explanations are possible owing to contentious epistemological issues. Schwandt (1997: 15) concluded that 'postmodern approaches to social inquiry aim to deconstruct all language of cause and effect'. Denzin and Lincoln (2000b) concluded that a defining difference between the two approaches is that many QUALs embrace postmodern sensibilities, while QUANs do not.

Thus, many in the QUAN community in the USA believe that experimentation or quasi-experimentation are the only techniques that can establish causal relations, while many in the QUAL community think it is impossible to identify causal relations at all.

Pragmatism and Causality

As a result of the positions of the methodological 'right' and 'left' regarding causality and other issues, much of the middle ground in educational research in the USA has been relinquished to the MMs. Pragmatism is the philosophical orientation most often associated with MM (e.g. Biesta and Burbules, 2003; Howe, 1988; Maxcy, 2003; Tashakkori and Teddlie, 1998, 2003). Nielsen (1991: 164) suggests that pragmatism is a 'reactive, debunking philosophy' that argues against dominant systematic philosophies, making mocking critiques of meta-physical assertions such as 'the grand Either/Or'.

Thus, pragmatists would argue against the either/or positions regarding causality: either there is no way to establish causal relationships or the only way to establish causal relationships is through experimentation or quasi-experimentation. The pragmatist position[7] regarding causality is two-fold:

- There may be causal relations, but they are transitory, contextually bound, and hard to identify.
- The values of the researcher are crucial in interpreting causal effects and causal mechanisms.

Stone (1994) described John Dewey's causation theory as follows:

> . . . causation becomes meaningful and understandable only when logical inquiry into some real problem of life is successfully completed. . . . causation theory applied to social science is centered about resolving immediate, real-life, social problems of any given 'public' by means of the logical method of inquiry, the scientific method. . . . Resolving social problems in this manner, he thought, ensures that the

> 'practical' consequences will improve the quality of life for both individual and community.

This view of causality is based on certain ontological and axiological beliefs of pragmatists. The pragmatist point of view regarding the nature of reality also consists of two parts:

- There is an external world independent of our minds (Cherryholmes, 1992: 14).
- On the other hand, pragmatists deny that 'Truth' can be determined once and for all. They also are unsure if one explanation of reality is better than another.

According to Cherryholmes (1992: 15), the pragmatists' choice of one explanation over another 'simply means that one approach is better than another at producing anticipated or desired outcomes'.

Axiology is a crucial dimension for pragmatists. Pragmatists believe that values play a large role in conducting research and in drawing conclusions from studies, and they see no reason to be concerned about that influence. As Cherryholmes stated:

> For pragmatists, values and visions of human action and interaction precede a search for descriptions, theories, explanations, and narratives. Pragmatic research is driven by anticipated consequences. . . . Beginning with what he or she thinks is known and looking to the consequences he or she desires, our pragmatist would pick and choose how and what to research and what to do. (1992: 13–14)

Thus, pragmatists decide what they want to research guided by their personal value systems; that is, they study what they think is important. They then study the topic in a way that is congruent with their value system, including variables and units of analysis that they feel are the most appropriate for finding answers to their research questions. They also conduct their studies in anticipation of results that are congruent within their value system. This general description of the way in which pragmatists conduct their studies portrays the manner in which many researchers in the social and behavioral sciences actually do conduct their studies, especially research with important social consequences.

Methodological Issues in Causal Studies of Leadership

The following section presents methodological issues as they relate specifically to causal studies of leadership. Particular emphasis is placed on school effectiveness research (SER) in this section, because (1) this is an area of study in which educational leadership has been examined extensively and (2) I have conducted research in that area for two decades and have an awareness of some of the complex methodological issues involved.

There is considerable evidence of a link between school leadership and school effectiveness in literature from several countries. Despite this, there is a lack of clarity regarding the best methods to further examine this link, both in terms of *causal effects* (i.e. the magnitude of the relationship between educational leadership and school outcomes) and *causal mechanisms* (i.e. the processes whereby educational leadership affects school outcomes) (e.g. Maxwell, 2004; Shadish et al., 2002). Part of the reason for this is disagreement among the methodological communities regarding how to best conduct research in this area.

Despite this disagreement, we can start this section with five propositions:

- Traditional randomized experiments and quasi-experiments are not likely to be utilized as research designs in causal studies of educational leadership at this time. Several reasons for this are discussed in this section.
- When conducting causal studies of educational leadership, researchers must develop alternatives to the traditional counterfactual causal warrants (based on experimental research) that have been given such prominence recently by the Institute of Educational Sciences. Levačić (this issue) came to this same conclusion based on her experiences in the UK.
- In this area of study, we need to know more about both causal effects and causal mechanisms.
- Indirect and reciprocal links between educational leadership and school outcomes need to be examined, as well as direct links. This is particularly true concerning the causal pathway between educational leadership, teacher practices, and student outcomes.
- The study of the relationship between school leadership and school effectiveness is a complex, contextualized one that requires the skillful blending of several methodological approaches.

The remainder of this section consists of an overview of the relationship between SER and causal studies of leadership, followed by descriptions of how the three communities can contribute to further meaningful research in this area.

School Effectiveness Research and Causal Studies of Leadership

Reynolds et al. (2000) concluded that there were three major branches of SER: school effects research, effective schools research, and school improvement research.[8] Two relevant areas of SER can be characterized as follows.

School Effects Research

These are studies of the scientific properties of school effects evolving from economically driven input–output studies to research utilizing multilevel models. In this area of SER, QUANs attempt to calculate the relationship

between school leadership/climate variables and school outcomes, while MMs conduct research that involves the estimation of differential school effectiveness across different levels of context.

Effective schools research

These are studies of the processes of effective schooling, evolving from case studies of outlier schools through studies using MM in the simultaneous study of classroom/school processes. In this area of SER, both QUALs and MMs attempt to understand the processes of effective schooling and how they interact with other school and classroom level variables in complex, contextualized educational settings.

In the history of SER (e.g. Reynolds et al., 2000), *school effects* research appeared first in the 1960s in both the USA (the Coleman Report) and the UK (the Plowden Report). The question for these early *school effects* researchers was 'Is there a relationship between malleable components of schooling (e.g. leadership) and school outcomes?' This is a causal effects question (i.e. *whether* x caused y) best answered by QUAN methods.

Effective schools research emerged in the 1970s, partially in response to results from the early school effects research. Again these studies emerged in both the USA and the UK at about the same time (e.g. Edmonds, 1979; Reynolds et al., 1976; Rutter et al., 1979; Weber, 1971). The questions for these early *effective schools* researchers were, first, 'What are the characteristics of effective schooling?' and then 'How do these effective schools characteristics lead to better school outcomes?' These are causal mechanism questions (*how* x caused y) best answered by QUAL methods.

Therefore, the SER communities in both the USA and the UK were initially divided into two camps, one concerned with the effect sizes of relationships, the other concerned with the processes of effective schooling. Later, more sophisticated SER has utilized MM to answer both causal effects and causal mechanism questions (e.g. Brookover et al., 1979; Mortimore et al., 1988; Teddlie and Stringfield, 1993). These studies have used QUAL information (typically case studies) to 'unpack' the results from QUAN analyses.

Quantitative Methods and Causal Studies of Leadership

As noted above, traditional randomized experiments and quasi-experiments are not likely to be utilized as research designs in contemporary causal studies of educational leadership.[9] Empirical evidence for this conclusion comes from the fact that there have been no experimental or quasi-experimental studies conducted on the effect of educational leadership on student achievement (e.g. Cook, 2002; Levačić, this issue). There are several reasons for this:

- In educational leadership studies, random assignment of treatment to sampling unit is hardly ever possible owing to ethical and practical issues.

- In educational leadership studies, there is no group that could be logically designated as the control. Part of the reason for this is that educational leadership is typically conceptualized as a continuous variable, while experimental treatments require the 'presence' or 'absence' of a treatment. Since the control group requires the absence of treatment, there would have to be 'no leadership' for that condition to exist. While some might argue that ineffective schools have 'no leadership', those schools, in fact, have 'negative' leadership. Control groups, in the traditional sense, make no sense in educational leadership studies.
- The independent variable (educational leadership) is not manipulable, except in a trivial sense. Even if we could perform experimental or quasi-experimental studies of educational leadership, the effect of manipulating some aspect of effective leadership (e.g. providing support to faculty) on student achievement is likely to be trivial for several reasons: the strength of the manipulation (compared to other school factors) is likely to be low; there are likely to be large pre-experimental individual differences between educational leaders with regard to the manipulated variable; it will probably be difficult to 'match' individual schools or leaders on important variables (i.e. variables related to plausible alternative explanations) before the study starts, thereby making it difficult to form a proper comparison group; and the influence of site-based contextual variables is likely to be high. Questions regarding educational leadership that could be answered by experimental or quasi-experimental designs seem trivial, given the complexity of the relationships among variables in the real world.[10]

Cook (2002: 179) concluded that 'randomized experiments are best when a causal question is simple, sharply focused, and easily justified'. Those conditions obviously do not exist in most studies of educational leadership.

Given that experimental or quasi-experimental studies of educational leadership are unlikely, what does quantitatively oriented research tell us about the relationship between leadership and student achievement? QUAN research on this issue has primarily consisted of regression based analyses aimed at answering the following two questions 'Is there a linear relationship between educational leadership factors and school outcomes?' 'If so, what is the magnitude of this relationship?'

Earlier SER literature reviews and meta-analyses (e.g. Bosker and Witziers, 1996; Teddlie et al., 2000) examined the relationship between a variety of school climate variables and student achievement. Bosker and Witziers (1996) concluded from their meta-analysis of over 100 studies that school level factors accounted for 8 percent of the net (adjusted for student background) variance in student level achievement. There was considerable variance across countries, with studies from Third World countries reporting the largest school effects, followed by studies from North America, then studies from the UK, the Netherlands, and industrialized nations from the Pacific Rim.

Two review articles summarized QUAN results related to the specific relationship between educational leadership and student achievement (Hallinger and Heck, 1996; Witziers et al., 2003). Witziers et al. (2003) presented a meta-analysis of 37 studies and concluded that school leadership has a small, yet statistically positive, direct effect on student achievement. They examined seven specific leadership behaviors, and the largest effect was for 'defining and communicating mission'.

Witziers et al. (2003) also reviewed the results from five studies in which the indirect effects of educational leadership (e.g. mediated through teacher behaviors) were estimated. Witziers et al. (2003: 418) concluded that 'The empirical evidence reported in these five studies support the tenability of the indirect effect model, and comparisons of the direct with the indirect model all favor the idea of mediated effects.'

These results support the position of Hallinger and Heck (1996: 15), who 'presented a conceptual scheme . . . for classifying nonexperimental studies of principal effects'. They presented three models: Model A (direct effects with or without antecedents), Model B (mediated effects with or without antecedents), and Model C (reciprocal effects). Hallinger and Heck then analyzed 45 studies and concluded that:

> The studies categorized under Models B and B1 used increasingly sophisticated theoretical models, stronger research designs, and more powerful statistical methods. These studies yielded more frequent instances of positive findings concerning the role of the principal in school effectiveness. (Hallinger and Heck, 1996: 37)

Information from these QUAN oriented reviews indicate that the effect of educational leadership on student achievement may be best modeled by examining the causal pathway between educational leadership, teacher behaviors and values, and student achievement (displayed in this issue by Levačić, Figure 1). Other authors writing in the SER literature (e.g. Reynolds and Teddlie, 2000a; Scheerens and Bosker, 1997) and in the field of educational administration (e.g. Leithwood and Jantzi, 1990) have also discussed the importance of this indirect link between educational leadership and student achievement.

Qualitative Methods and Causal Studies of Leadership

Several reviews of qualitatively oriented SER indicate that educational leadership is related to school outcomes (e.g. Levine and Lezotte, 1990; Reynolds and Teddlie, 2000a; Sammons et al., 1995). Evidence regarding the processes of effective leadership, *based to a large degree on QUAL oriented case-study research*, is one of the most widespread findings across the SER literature (e.g. Brookover et al., 1979; Edmonds, 1979; Mortimore et al., 1988; Reynolds et al., 1976; Rutter et al., 1979; Taylor, 1990; Teddlie and Stringfield, 1993; Weber, 1971) as summarized by Reynolds and Teddlie (2000b).

The five characteristics most often associated with the processes of effective

leadership are: (a) being firm and purposeful, (b) involving others in the process, (c) exhibiting instructional leadership, (d) frequent, personal monitoring, and (e) selecting and replacing staff (Reynolds and Teddlie, 2000b). Details regarding the first two of these characteristics are now discussed, since they illustrate the importance of contextual factors and of the link between educational leadership and teachers' values and practices.

'Firm and purposeful' leadership has been frequently cited as a major characteristic of effective leadership (e.g. Mortimore et al., 1988; Rutter et al., 1979; Teddlie and Stringfield, 1993). Case studies of improved schools, both in the UK and the USA, show the importance of individual leaders with a 'mission' (e.g. Louis and Miles, 1992), and there is a considerable literature concerning those persons whose style can be regarded as 'transformational' (e.g. Murphy and Louis, 1994).

Despite these general findings, the relationship between principal style and effectiveness as a leader is complex and contextually bound. 'Contextually sensitive' studies of school effectiveness include at least one school context variable in their design and compare schools that are differentially effective across levels of the context variable (e.g. the community type of school, the governance structure of schools). Two studies from the USA (Hallinger and Murphy, 1986; Teddlie and Stringfield, 1985, 1993) compared the leadership style of principals in effective schools that differed by the socioeconomic status (SES) of the students attending those institutions (e.g. low-SES, middle-SES). The SES variable proved to be very important in those studies:

- Principals in effective low-SES schools displayed the 'firm and purposeful' leadership style described above, a style that has been labeled 'initiator' (e.g. Hall et al., 1984).
- Principals in effective middle-SES schools demonstrated less direct control over the instructional process in their schools, preferring a more inclusive mode of interaction with faculty, a style that has been labeled 'manager'.

These case studies serve as examples of the type of information that QUAL studies of educational leadership can generate regarding the causal mechanisms at work in differentially effective schools. QUAN studies can approximate the magnitude of causal effects, but QUAL studies are required to provide insight into the causal mechanisms whereby effective educational leadership operates across different contexts.

The second characteristic of effective leadership concerns 'involving others in the process'. Mortimore et al. (1988) noted the importance of involving the deputy headteacher in making school-level decisions. Rutter et al. (1979) highlighted the need to make sure that all teachers felt represented and that their views had been considered. Sharing of academic leadership with faculty is also characteristic of effective principals in the USA (e.g. Teddlie and Stringfield,

1993). The process of effective leadership has been expanded beyond the principal in recent school reform research to include leadership teams (e.g. Chrispeels and Martin, 2002).

Results from the QUAL case studies discussed in this subsection echo the importance of the link between educational leadership and teachers' values and practices that was found in the QUAN studies presented in the last subsection.

Mixed Methods and Causal Studies of Leadership

MM designs can simultaneously look at causal effects and causal mechanisms; therefore, they constitute a powerful methodology for conducting causal studies of leadership. I now review MM research conducted by Sam Stringfield and myself approximately 15–20 years ago. This research illustrates the potential for MM to contribute to our understanding of the impact of effective leadership on student outcomes.

The following summary describes aspects of the third and fourth phases of the longitudinal Louisiana School Effectiveness Study (LSES-III and LSES-IV) conducted in 1984–5 and 1989–90 respectively. This research may be characterized as a sequential mixed model QUAN–QUAL design.[11]

The QUAN component of LSES-III utilized a causal comparative design[12] in which schools were differentiated on two dimensions: school effectiveness status (more effective, less effective)[13] and SES of student body (low-SES, middle-SES). The a priori hypothesis for LSES-III was that more effective schools would have teachers who displayed more effective classroom behaviors than did teachers in less effective schools.

The hypothesis was confirmed: more effective schools had teachers who displayed more effective teaching behaviors (e.g. produced higher classroom management scores) than did less effective schools (Teddlie and Stringfield, 1993). The investigators predicted that the schools would maintain their effectiveness status during the five-year period between LSES-III and LSES-IV, but QUAN data indicated that about half of the schools either improved or declined during that period. One low-SES school (Hoover Elementary) improved considerably on measures of student achievement and teacher behavior; for example, the overall time on task at Hoover increased dramatically from 52 percent in LSES-III to 85 percent in LSES-IV.

We used detailed QUAL case-study data to explain those QUAN results. A new principal, Mr Jameson,[14] had arrived at Hoover shortly after LSES-III. Our case study of Mr Jameson's behaviors indicated that he demonstrated educational leadership in four areas.

Method for selection and replacement of teachers

Mr Jameson had personally recruited nine new faculty members in his short four-year tenure at Hoover. He took great pains to recruit the best teachers

possible, especially since his school had a negative reputation in the community.

Type of classroom monitoring and feedback by the administration

Mr Jameson intuitively followed the procedure advocated by Deal and Peterson (1990): frequent and short visits to the classrooms on an unscheduled basis. Consequently, he could describe in detail the strengths and weaknesses of his teachers.

Support for individual teacher improvement by the administration

Knowledge of each teacher's weaknesses enabled Mr Jameson to focus personal assistance and professional in-service training to redressing those problems.

Overall instructional leadership by the administration, including allocating and protecting academic time

Mr Jameson actively managed the educational production function. He recaptured valuable academic time by rigorously enforcing the stated academic schedule and by personally monitoring breaks.

The sequential MM design of LSES-III and LSES-IV allowed researchers to conduct a series of logically related data collection and analysis steps:

- make initial predictions to be tested using QUAN data and statistical analysis;
- describe causal effects based on those QUAN analyses;
- utilize pattern matching techniques (e.g. Yin, 2002) to predict future behavior and assess the predictions using both QUAN data and QUAL data from case studies;
- identify negative cases (cases not adhering to the expected pattern); and
- develop descriptions of causal mechanisms from case-study data to explain how the unexpected events occurred.

Conclusions

This article first identified three separate educational research communities: QUANs, QUALs, and MMs. Similarities and differences among those communities were presented, especially with regard to their conceptions of causal explanations. Specific examples of the QUAN, QUAL, and MM approaches to the causal study of leadership were then presented, using examples from the school effectiveness literature.

The points of view presented in this article lead to several conclusions, including the following.

- Causal explanation consists of both the determination of causal effects (best accomplished with QUAN methods) and the specification of causal mechanisms (best accomplished with QUAL methods). MM research can address questions related to causal effects and causal mechanisms simultaneously.
- The relationships among educational leadership, teacher practices, and student outcomes are complex and highly contextualized. Research into these relationships requires the skillful blending of several methodological approaches. Therefore, the most productive designs in this area will probably be MM in nature, although purely QUAL or QUAN studies may be valuable in answering specific questions.

This article has presented a perspective for conducting causal studies of leadership that is based on pragmatism, acknowledges the importance of researchers' values, and advocates for the use of eclectic MM designs. Arguments presented in this article call for an avoidance of the excesses of the methodological 'right' and 'left' and for the study of causal relations using a wide variety of complementary methodological approaches.

Notes

1. Methodological orientation is more accurately described as a continuum of approaches ranging from the completely QUAN orientation through the mixed methods approach to the completely QUAL orientation (e.g. Creswell, 2003; Levačić and Glatter, 2003; Newman and Benz 1998; Tashakkori and Teddlie, 2003). Figure 1 illustrates this continuum. For ease of exposition and contrast, however, this continuum is treated as three distinct approaches in this article.
2. Post-positivism, which emerged in the 1950s, is the intellectual heir to positivism. It is a replacement for positivism that is still bound to the quantitatively oriented vision of science (e.g. Reichardt and Rallis, 1994). Post-positivism addressed some of the problems with positivism, such as the value-ladenness of facts, the theory-ladenness of facts and various epistemological issues.
3. The growing importance of MM as a distinct methodological movement is exemplified by a recent dissertation (Niglas, 2004) in which over 1100 journal articles from 15 education journals were content analyzed as having a QUAN, QUAL, or a combined design. 19% of the empirical articles had a combined (mixed methods) design.
4. QUANs in the USA generally acknowledge the value of QUAL research (e.g. Shadish et al., 2002). On the other hand, many QUALs continue to be critical of the 'received' QUAN tradition as demonstrated in the 2nd edition of the *Handbook of Qualitative Research* (Denzin and Lincoln, 2000a).
5. While there is a lingering perception that QUAN research dominates the concept of SBR in the USA, the Committee on Scientific Principles for Education Research (2002: 19) specifically stated that 'our vision of scientific quality and rigor applies to the two forms of education research that have traditionally been labeled "quantitative" and "qualitative"'. Therefore some influential individuals in the 'scientific' educational community in the USA acknowledge the importance of both QUAL and QUAN approaches.

6. There are members of the QUAL community who believe that causal explanations are possible, including Maxwell (2004) and Yin (2002).
7. There are numerous interpretations of pragmatism (e.g. Schwandt, 1997: 123–4). My description of pragmatism here is derived mainly from Cherryholmes (1992) and Stone (1994).
8. The school improvement literature is not discussed in this article, due to its overlap with other areas of study (e.g. school restructuring, comprehensive school reform). Some scholars (e.g. Thrupp, 2000) restrict their definition of SER to school effects research and effective school research, while considering school improvement research to be a separate field of study.
9. I am not arguing that traditional randomized experiments should never be used in causal studies of leadership; in fact, they could be very useful especially in MM research that also involves a QUAL component. My argument simply presents the difficulties in conducting experiments in educational settings as a counterpoint to the opinion that experimentation is the only true method for establishing causal relationships in studies of educational leadership.
10. Cronbach (1982: 134) concluded that Campbell preferred experimental studies on trivial issues as opposed to research on important issues where a 'glut of alternative theories is possible' (Campbell, 1959: 165). Cronbach further noted that Campbell's position was based on his desire to establish long-term scientific advances, rather than evaluating program impact in the shorter term.
11. A sequential mixed model design is defined as a multistrand mixed (QUAL–QUAN or QUAN–QUAL) design in which the conclusions that are made on the basis of the results of the first strand lead to formulation of questions, data collection, and data analysis for the next strand (Tashakkori and Teddlie, 2003: 715).
12. Causal comparative studies are 'aimed at the discovery of possible causes and effects of a behavior pattern or personal characteristic by comparing' units of analysis in which 'this pattern or characteristic is present' with units of analysis in which 'it is absent or present to a lesser degree' (Borg and Gall, 1989: 537). The absence of the behavior pattern constitutes a nonexperimental counterfactual.
13. The effectiveness status of a school was defined by whether that school scored above (more effective) or below (less effective) its predicted achievement score, which was based on a regression analysis that predicted that school's score using student SES values.
14. Hoover Elementary and Mr Jameson are pseudonyms.

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