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ABSTRACT

Using qualitative and quantitative methods in a single research project has been the subject of controversy. Purists argue that qualitative and quantitative approaches derive from different, mutually exclusive epistemologic and ontologic assumptions, and cannot be combined. Situationalists focus on methodology and assume that data collection and types of evidence flow logically from a particular methodology. Although both approaches may be used in a single study, quantitative and qualitative data cannot be combined. Pragmatists argue for the integration of methods in a single study. The authors agree with the pragmatic view, and further argue that both methods can be used fruitfully for corroboration, elaboration, or initiation, and that neither necessarily takes precedence over the other. To illustrate this point, specific examples of the contributions of qualitative and quantitative methods to corroboration, elaboration, and initiation are presented. They are taken from a large scale, three-year study of regional educational service agencies. The data collection methods included surveys as sources of quantitative data and open-ended interviews and reviews of documents as the primary sources of qualitative information. (BW)

NUMBERS AND WORDS: COMBINING QUANTITATIVE AND QUALITATIVE METHODS IN A SINGLE LARGE-SCALE STUDY

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Numbers and Words: Combining Quantitative and Qualitative Methods in a Single Large-Scale Study

The history of methodology in social and educational research reveals a vacillation between qualitative and quantitative approaches. Prior to World War II, field work dominated with the primary data sources deriving from interviews or participant observation. With the advent of public opinion polls and market research, reliance shifted rapidly to quantitative methods and survey approaches in particular. A polemic quickly arose between the two camps that engendered an "either/or" debate. Many researchers took the stance that their trade was a single-method enterprise and made vigorous defenses for and counter-attacks against each perspective. The debate continues even today, as one observer notes, "...the actual divisions are more notable than the possibilities for unification" (Smith, 1983).

There has been a great deal written about the battle between methods. This paper is an attempt to synthesize some of the more relevant points from that literature, elaborate our perspective on combining methods, and describe how it can be done by using examples from one large-scale r arch project.

Three Perspectives

Using qualitative and quantitative methods in a single research project has been the subject of controversy. Often confused and ambiguous, the debate is hindered by infrequently defined and overly broad concepts. At times the arguments rage at the paradigm level; at others, the concern is with research strategy; and at still others, at the level of data

collection techniques and types of evidence. The debate crosses levels capriciously, leading to confusion and frustration. However, three distinct perspectives about research strategies have emerged. At the risk of over-simplifying, we refer to these as the purist, the situationalist, and the pragmatist.

Purists usually argue at the paradigm level and hold that qualitative and quantitative approaches derive from different, mutually exclusive epistemologic and ontologic assumptions about the nature of research and society (Burrell & Morgan, 1979; Smith, 1983; Collins, 1984). Smith (1983), therefore, argues that the two approaches cannot be combined. Burrell and Morgan (1979) assert that different paradigms are "mutually exclusive....a synthesis is not possible, since in their pure forms they are contradictory, being based on at least one set of opposing meta-theoretical assumptions" (p.25). These assumptions, moreover, have direct methodological implications:

> It is possible, for example, to identify methodologies employed in social science research which treat the social world like the natural world, as being hard, real and external to the individual, and others which view it as being of a much softer, personal and more subjective quality. (Burrell & Morgan, 1979:2)

Hard or soft? Quantitative or qualitative? Assumptions about knowledge and social reality lead directly to one or the other methodology.

This perspective views social science research as a dichotomous endeavor. Naturalistic inquiry represents one extreme position; little manipulation of the research conditions characterize this approach. Experimental inquiry exemplifies the opposite extreme where all conditions are tightly controlled and the information to be collected is highly structured.

Situationalists focus on methodology and maintain that no single technique can lay claim to a monopoly of inference. They assume that data collection techniques and types of evidence flow logically from a particular methodology. A survey generates quantitative data while an ethnography results in qualitative data. Although both approaches may be used in a study, it is still felt that certain kinds of data are appropriate for specific situations. For example, in the Rural Experimental Schools study both survey and ethnographic approaches were used. In reporting the study's results, each component is presented and discussed separately. The quantitative data are reported in Rosenblum and Louis (1981) while the qualitative data are reported in a variety of places (see, e.g., Firestone, 1980). Similarly, in a study of Thai education, Fry, Chantavanich, and Chantavanich (1981) suggest using survey and demographic analyses to select extreme cases for in-depth ethnographic study. These two examples are typical of the situationalist perspective where each method is used for a specific purpose; true integration is not realized.

This view has led to attempts to establish criteria for judging when to collect each (Zelditch, 1962). Even that attempt at rapproachement still adheres to the beliefs that one should use either one method or another and that the situation dictates when to use each. The two approaches are viewed as "complementary" (Vidich and Shapiro, 1955:33), but still as representing distinct universes.

Little integration is fostered by either the purist or the situationalist view. Not so for the pragmatists who argue for the integration of methods in a single study. Sieber (1973:1337) summarizes the case for such a perspective: "If each technique has an inherent

weakness, it also has an inherent strength unmatched by other techniques." The trick is to tap the relative strengths and to make the most efficient use of both in attempting to understand social phenomena. Sieber (1973) and Madey (1982) outline how qualitative and quantitative methods can contribute to one another in the design, data collection, and analysis phases of a project. Similarly, in a discussion of evaluation research,[1] Reichardt and Cook (1979) describe how combining methods can (1) answer multiple research questions, (2) allow each method to build on the other, and (3) triangulate one with the other thereby overcoming the inherent biases in each.

While discussion on combining methods can address a number of key issues ranging from design to analysis, we will focus only on analysis. We address this issue because all too often researchers gloss over the critical analytic phase and show the combining of methods by demonstrating that qualitative data "enriched" survey information, or that qualitatively-derived hypotheses were tested out through subsequent quantitative data collection and analysis. We claim that each type of data can play a critical role in several phases of analysis.

Analysis: Corroboration, Elaboration, Initiation

Ultimately, combining methods in a single study is triangulation. Defined by Denzin (1978:291) as "the combination of methodologies in the study of the same phenomenon," triangulation allows the researcher to improve the accuracy of conclusions by relying on more than one type of data. Jick (1979) describes types of triangulation design ranging from

simple to complex. The simplest form is the within-methods design that include scaling or multiple comparison groups to test for the reliability of findings. Somewhat more sophisticated is the between-methods design that tests for convergent validity. Jick (1979:603) notes that this design is "currently the archetype of triangulation strategies." It brings together data collected through more than one method to see if there is convergence in the findings. We describe this function as corroboration.

A second between-methods design allows one type of data to elaborate the findings of the other. Elaboration provides richness and detail. It expands understanding of the phenomenon studied through refinement and development. Although Jick dismisses this function as often "parenthetical, even somewhat patronizing" (1979:603), when each data type is well-developed, elaboration can lend strength to an argument and provide a different perspective on the same phenomenon.

The most complex design, holistic or contextual, goes beyond scaling, reliability, or convergent validity. This design seeks to uncover variance. Jick (1979:603) notes that "it is here that qualitative methods, in particular, can play an especially prominent role by eliciting data and suggesting conclusions to which other methods would be blind." Because holistic triangulation is divergent, seeking variance or areas where findings do not converge, it can initiate interpretations and conclusions, suggest areas for further analysis, or re-cast the entire research question. Rather than seeking confirmatory evidence, this design searches for divergence.

The view adopted by most of the research community is that quantitative techniques are the most appropriate source for corroborating

findings initially noted from qualitative methods. Likewise, qualitative methods are best used to provide richness or detail to quantitative findings (elaboration), but should precede quantitative ones when clarifying the direction of inquiry (initiation). Thus, convention would have one method precede the other during the analytic process, depending on whether the researcher's intent is corroboration, elaboration, or initiation. We argue that both methods can work spirally (sometimes upwards, sometimes down), and iteratively derive a more complete understanding of the phenomenon in question. It is the contention of this paper that both methods can be used fruitfully for all three functions and that neither necessarily takes precedence over the other.

Background of the Study

The study from which examples have been selected to illustrate how both quantitative and qualitative methods can corroborate, elaborate, and initiate findings from the other method was a large-scale, three year study of regional educational service agencies (RESAs)[2]. RESAs are agencies located between the state education agency and local school districts. They are organizations that have recently emerged to provide a variety of services to groups of local school districts within a geographic area that would not be available if districts worked independently (Kimberly, Norling, & Weiss, 1983). Data were collected from the agencies and their clients, the local school districts, to learn more about the process by which new knowledge is disseminated to schools and how RESA services support school improvement programs. The data collection methods included surveys as sources of quantitative data and open-ended interviews and

reviews of documents as the primary sources of qualitative information. In the following section specific examples are used to illustrate the potential for both quantitative and qualitative data sources to corroborate, elaborate, and initiate.

Corroboration

Corroboration seeks a convergence in findings; that is, its purpose is to confirm or disconfirm established results. New perspectives or enriching detail are not sought; instead, the goal is to support an argument. In the following two examples, we show how each data type can be used to corroborate findings from the other.

Qualitative Supporting Quantitative

In the study of RESAs, a survey asked school administrators (1) how helpful their RESA was in activities like assessing district goals, identifying new curricula or instructional approaches, and achieving significant cost savings; (2) how RESA staff performed certain training and assistance roles in the field; and (3) what percentage of contacts with the RESA were initiated by the agency. The RESAs at opposite extremes were selected for case study: Farmland (a pseudonym) ranked first of eleven in helpfulness and training emphasis, and second in initiation; Rural-Industrial, in contrast, ranked ninth in helpfulness and initiation, and last in training emphasis. Having established the differences between the RESAs using survey data, we analyzed open-ended interviews conducted with these same administrators to see if the differences were supported or disconfirmed. Farmland was characterized as extremely helpful, innovative, and entrepreneurial. The interviewees felt that:

> The RESA's image is very positive among superintendents and professionals. There are structures that support us.
>
> I go to the RESA because I have faith in those people as the best place to get the answer.

Rural-Industrial was described as not much help and as not having any curriculum service. One school administrator remarked that:

> Other than in the areas of service to vocational and special ed students, there are no advantages from the RESA...but the bulk of students are not special ed and voc ed.

Thus, interview data were used to corroborate the idea that the two RESAs were perceived differently. In this case, the quantitative data drove the selection of agencies for case study and built the initial argument about variation in service orientation. Qualitative data were then used to lend support to the argument--to corroborate from an additional data source that variation existed.

Quantitative Supporting Qualitative

Using data from RESA field agents,[3] we argued that agents used two strategies for promoting reform in education; one emphasized assistance while the other relied on enforcement. The strategy of assistance required dissemination systems that put human helpers in contact with school systems to increase their access to legal and program knowledge needed to operate successful programs. The strategy of enforcement involved the use of regulations and mandates to promote reform in education. This latter strategy required close monitoring of school system activities to ensure that mandates were properly implemented.

Our assessment of which agencies played what role began with a qualitative review of the missions of the agencies in our sample. The results of that review indicated that some RESAs promoted the image of general assistance agencies, providing help in many areas, while others focused their assistance more specifically on the provision of knowledge through training and technical assistance. Still a third set of RESAs operated as branch offices of the State Department of Education and their responsibility was primarily regulatory. They were responsible for ensuring that school districts followed a state-mandated planning process, and that students achieved above minimum criterion levels on a basic skills test. Thus, the qualitative analysis suggested that two types did assistance work and that one focused primarily on enforcement activities.

This assessment was then corroborated by the quantitative data. Field agent surveys in each of the agencies (N=138) indicated the extent to which they played eleven different roles. A factor analysis of those roles revealed two factors that matched our assistance and enforcement distinctions. We then created scores for each individual which represented the two strategies of assistance and enforcement. Individual scores were aggregated for each agency and a bivariate plot of the mean agency scores revealed two distinct clusters. The first cluster scored high on enforcement activities and low on assistance while the second revealed the opposite pattern. These plots supported our qualitative identification of which agencies were of what type. Thus, the quantitative data were used to support the initial findings deriving from qualitative sources.

Elaboration

Elaboration provides richness and detail. The usual image is of "fleshing things out" or "putting meat on the bones." Typically, qualitative data are used to enrich the bare-bones of statistical results. In the following examples, we show that elaboration is a two-way street. While rich description undoubtedly enlivens means and frequency distributions, quantitative information can also add greater depth of understanding to qualitative results.

Qualitative Enriching Quantitative

RESAs were important resources for helping educators cope with a variety of pressures from an increasingly complex environment. They do so by performing two functions: political and technical linkages. These two functions were distinguished by both their content and process. Political linkage dealt with knowledge about regulations and legislation: what decisions were being considered and which outcomes were likely, what decisions had been made and what they meant, and--most important--what opportunities and constraints these decisions created for local school people. Political linkage was a process marked by clarification and negotiation as individuals tried to ensure that the most advantageous interpretation of a mandate was made both while it was being formulated and as it was being implemented and enforced. On the other hand, technical linkage dealt primarily with knowledge about curriculum and instructional practice: what should be taught and how. The technical linkage process entailed learning and selecting: identifying new practices or concepts,

selecting ideas for local use, and developing the skills to put them into practice.

To test whether field agents in the RESAs under study actually performed these two linkage roles, we gave respondents a list of role descriptors and asked them to indicate the extent to which they performed each. Responses to these questions were then factor analyzed to determine whether sets of items came together in coherent roles similar to what was hypothesized. That quantitative assessment revealed three distinct roles. The first, an expert/trainer, we defined as a specialist in a specific area who made knowledge available to schools through workshops, inservice, and more intensive consultations. This role fit closely with the theorized technical function. The second role, liaison, was defined as a go-between who did not provide knowledge directly, but who helped schools diagnose problems, find resources, and match appropriate clients with resources. This role combined both political and technical functions. The third role which we labeled the monitor was closest to what we meant by the political linkage function. We defined a monitor as someone who collected information from schools to determine their compliance with law and code.

We then used the factor analysis results to guide our examination of the qualitative interviews with the same field agents. We were able to build a much richer description of what was meant by each of the three roles and how they fit into the two theoretically defined functions. For each role type, we selected the highest scoring field agents and then reviewed their interviews to broaden our understanding of the role types. We used responses to an open-ended interview question which asked informants to "describe what you do in your field agent role." These

qualitative results clarified and expanded the definitions of each role type initially derived from quantitative analyses.

Quantitative Enriching Qualitative

One of our intentions was to describe RESA services from teachers' and administrators' viewpoints on three questions: (1) how were services delivered to local educators; (2) in what content areas were services provided; (3) what explained a successful assistance relationship? The data used were primarily qualitative, although survey data were used as elaboration throughout.

The interviews with district administrators and our previous knowledge about RESAs suggested that services were provided in five different modes: long-term project assistance, workshops, brief interactions, telephone contacts, and use of the resource center. Although we described these types of services using extensive quotes from the interviews to paint a picture of each service, we included survey data indicating over-all frequency of this type of activity. Here the quantitative data were used to corroborate our initial impressions of patterns of use.

Having established the type and general frequency of services, we analyzed the survey data to see how consistent these patterns were for different categories of school personnel. This analysis revealed that administrators received more services from their RESA than did teachers. Most dramatically, administrators were in touch via the telephone over ten times more often than teachers. This finding suggested that administrators' greater involvement was largely to arrange long-term projects and to have questions answered quickly. Teachers apparently did

not have the same informational needs. The survey data thus elaborated the interview data, providing a richness of detail about differences between teachers and administrators that the qualitative data alone could not provide.

In this example, qualitative data provided the evidence for an initial categorization of service types. These were then elaborated across types of school personnel through the survey data. The quantitative data thus provided a more detailed and varied description than the interviews alone.

Initiation

Initiation is the analytic function that turns ideas around. It initiates new interpretations, suggests areas for further exploration, or re-casts the entire research question. In the two examples below, one data source initiated new interpretations of the other. Initiation brings with it fresh insight and a feeling of the creative leap.

Qualitative Interpreting Quantitative

Using survey data, we found that looking for training and technical assistance was more an administrator task than a teacher task and that administrators searched for help from sources inside their districts and outside about equally. This finding was somewhat surprising because our sample had purposively selected districts that were frequent users of one external source--their RESAs. We had expected more external searching than internal. We also found, using the survey, that RESAs seemed to specialize and that district contacts with the RESA fell into regular patterns. To broaden our understanding of this patterned external searching, we turned

to the interviews for possible interpretation. We wanted to understand how discerning the search among assistance agencies was.

The qualitative data suggested two categories of behavior. The first, "the shoppers," had the resources and discrimination to select the most appropriate source of assistance for a given purpose. For example, one interviewer described his shopping behavior as follows:

> University of Pittsburgh--proximity, we know people on the staff, they have recognized leadership in the Department of Ed, we have done work with their Reading Department. Carnegie-Mellon--they have a teacher training center, one teacher went there for training. LRDC--for secondary ed, we participated in some studies....The IU--when we need inservice training and provide resources. We are members of a curriculum council and share what we are doing in that field and on the school improvement plan.

The second, "the loyalists," tended to rely on a single agency--the RESA--although that loyalty was relative. One administrator said that he turns:

> ...primarily to the RESA. That's the first point of inquiry. If the RESA can't respond, we go to others, often through the RESA reference bank.

Loyalists tended to go to their favored RESA first or for a referral to another agency; they didn't rely on the RESA exclusively. When they were unable to select an assistance agency themselves, they turned to the RESA--an agency they knew well or that knew them well--for assistance.

In this example, general patterns of assistance seeking were described through the quantitative data. The questions answered grew in complexity from a distinction between administrators' and teachers' assistance searches to percentage of external and internal searching to discrimination among external sources. Then, insight into this external search behavior was provided by the qualitative data.

Quantitative Interpreting Qualitative

Our data from the field agent portion of the study suggested that there were two strategies for promoting reform in education--assistance and enforcement. Our interviews with field agents in agencies most responsible for enforcement activities revealed an ambivalence about their role. The qualitative data clearly indicated that they were uncomfortable with the enforcement aspect of their work. At the time of our study, staff totaled 155 professionals responsible for the activities of 573 operating school districts and had a broad mandate to monitor compliance with state-mandated planning procedures, tenured teacher evaluation regulations, building codes, and budgeting procedures, as well as federal laws. They were also expected to visit all 2411 schools in the state at least once a year. As a result, their monitoring burden was substantial. Yet, the interview data suggested that many of them tried to downplay their enforcement role:

> The primary thought in our work is not to act as a monitoring agent.
>
> I don't do checklist monitoring. I feel more like a TA person. I help districts identify needs.

In fact, some were actually trying to define their work as assistance, as these quotes suggest:

> In the internal kind of work we do here, we try to provide service kinds of activities to local districts in terms of helping them meet all of the state and federal requirements for all the kinds of school programs that they offer.
>
> A lot of my time is spent on the phone answering field questions. The rest of my time is spent doing policy clarification and giving solutions to problems in meeting state guidelines and mandate for special education.

A clue to why field agents sought assistance roles when the agency mission was one of enforcement is offered by one interviewee:

I am viewed as an adjunct member of the management team of the local school district. In some cases I give workshops, but I usually serve an administrative role in the district.

A full explanation for this emphasis on assistance comes from the quantitative data and shows how quantitative data can be used to initiate new understanding about a relationship that was initially suggested by the qualitative data. An important reason why enforcement staff downplayed that aspect of their work was that they were recruited from the population they knew. Evidence of this came from the survey data. Analysis of demographic data in the survey indicated that 83 percent had worked as either teachers or administrators in schools. Moreover, they came from the very geographic areas they now were monitoring. For example, over two-thirds of the field agents who scored high on monitoring reported that their higher education training was within commuting distance of the region they now served. This is in comparison to less than half of those who did not report doing enforcement activities. We also created a local/cosmopolitan index (Gouldner, 1957) that expressed the proportion of field agents' work experience as a ratio of within-region to outside-the-state. Those who reported high enforcement activities had statistically significant higher localism scores than those who spent more time on assistance activities. This collection of quantitative data initiated an interpretation that helped us understand why the enforcement strategy as defined by the qualitative data was being downplayed by those who were expected to fulfill it.

Discussion

We are pragmatists, and our over-riding concern throughout the analytic phase of the study was to maximize systematic understanding of the role of RESAs in promoting knowledge use among local educators. The examples we have offered may suggest that the process of combining methods is straight-forward and relatively simple. To avoid misleading the reader, we feel we should describe several conditions supporting the research that gave us time and opportunity to allow the two data sources to interplay.

First, the study design was exploratory and complex. The exploratory nature allowed us to develop specific research questions as analysis proceeded and granted us room to play with the data, promoting the integration of analyses from both sources. The complexity of the design ensured that we had data on a variety of issues. From first conception, the study was grounded in theories of knowledge use and complex organizations, and research traditions in policy implementation, educational change, and innovation. These conceptual frameworks were balanced by the practical concerns and interests of policy-makers, RESA leadership, and our own organization's priorities. This balance, or tension, between theory and practice dictated a design that was methodologically sound and responsive to practical concerns. Yet when we began the study, little was known about RESAs. The exploratory and complex design maximized the possibility of systematically collecting various sorts of data while allowing the unexpected or novel insight to be uncovered. And practical concerns led to the need for a large-scale study.

A large-scale study requires large-scale resources. The second condition that supported the integration of methods was, then, resources.

Mostly, we had time. Although we operated with deadlines for discrete phases of the analysis, we had room to experiment. Guided by several broad topics, we had latitude in framing specific questions to help focus analysis. We conducted analyses separately, allowed results from one to trigger ideas for the other, worked independently and interdependently. None of this would have been possible without time, and we believe it is a crucial condition for exploratory research.

Third, we respected each other's methodologic training and expertise. One of us was trained quantitatively, the other qualitatively. Yet our orientations to research were sensitive to the potential of each approach.

Thus we had a design that fostered exploration and experimentation both in specific research questions and in combining data sources; we had the luxury of time to develop leads and uncover areas of possible collaboration; and we got along with each other. Neither one of us came to the project as a purist--we both knew the potential of the other's domain to further understanding of social phenomena.

Clearly, we believe that combining methods is productive. For example, one goal of the study was to increase knowledge about school improvement approaches and general assistance activities preferred by local educators. This knowledge would be useful to our organization in planning its dissemination activities, to state departments of education, and to RESAs themselves. Using only one data source would have provided limited information about the variety of services educators want. We were also able to explore fully the tensions created when states rely on enforcement tactics--negative sanctions--to promote change. Using only qualitative

data would have severely constrained our understanding of the conflicts experienced by field agents charged with enforcing law and code.

Both the purist and the situationalist perspectives foster the idea that qualitative and quantitative data should be kept separate, each serving discrete purposes. The purist would have them in entirely different studies, while the situationalist would place them side-by-side in the same study. Rather than using the sources as mutually exclusive ways of knowing, we explored how they could be more fully integrated. Numbers and words can work together to produce richer and more insightful analyses of complex phenomena than could either one alone.

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Notes

1. The distinctions between basic research, applied research, and evaluation research are as controversial as the debate between "hard"and "soft" methods. We will not enter into that discussion here.

2. A review of the overall project and a summary of findings from the multiple research reports can be found in Firestone, Rossman, & Wilson (1983).

3. Field agents are those individuals responsible for providing training and technical assistance to local school districts.