

# CHOICES IN CONDUCTING CLASSROOM-ANCHORED RESEARCH TO IMPROVE EDUCATIONAL QUALITY IN "DEVELOPING" COUNTRIES<sup>1</sup>

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*with*

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## Introduction

Educators and policy makers engaged in educational quality improvement efforts face many choices concerning the kind of research they might undertake to inform their initiatives. For example, colleagues in Ghana, Guatemala, and Mali, who are respectively concerned with improving educational quality by using different instructional resources, refining a unitary school model, and enhancing French language instruction in early primary grades, encounter methodological choices, including: Should they follow quantitative and/or qualitative research traditions? Should they carry out "true" experiments, assess relationships among variables in a "natural" setting, or develop thick descriptions or cultural analyses of teachers' and students' actions and their meanings?

Where should they undertake the research? On what or on whom should the research focus? Who should participate in the research? How should the findings be interpreted? How can the findings be reported and disseminated so that they are drawn upon in decision making about educational policy and practice?

This paper discusses some of the major methodological choices available to Host Country Research Teams and U.S. Research Support Teams involved in the "Improving Educational Quality" (IEQ) project, funded by USAID.<sup>2</sup> By drawing attention to methodological choices<sup>3</sup> we hope to encourage participants in this and similar projects to engage in dialogue about how to conduct studies that will help in enhancing the quality of education in various settings. To clarify, the dialogue is not just about the choices presented herein, but also about other ideas and approaches that colleagues in various contexts bring to the discourse based on their academic preparation, their experience, and their perceptions of the institutional and societal contexts in which they work.

This paper is more specifically focused on methodological choices in conducting "classroom-anchored" research, that is research that takes the classroom as the central focus of investigation, but that views the classroom as a site located in the context of schools and communities, educational systems and societies. Thus, in part we concur with Hammersley (1986a, p. ix) that: "if we are to understand the work of schools, and to improve or change their role, then above all we have to understand what occurs in classrooms ... where the real business of education is supposed to take place."<sup>4</sup> However, as discussed in another IEQ project paper (Adams et al., 1993), one can only effectively undertake and adequately understand efforts to improve educational quality if one considers the proximate and remote environments of classroom activity. According to Delamont (1976): "The classroom has to be seen against the background

of an on-going educational system operating at the school, local and national level" (p. 38) and "against large scale social and economic processes" (p. 20).

In the following sections of this paper we will first contrast the assumptions which serve as the foundation for three "scientific" traditions or paradigms of social and educational research: positivist science, interpretivist science, and critical science. This is followed by a discussion of how research questions would be framed differently in these three traditions. Then we will turn to an outline<sup>5</sup> of some of the main strategies, techniques, and issues associated with doing classroom-anchored research, focusing in more depth on two of these traditions: positivist (quantitative) and interpretivist (qualitative). Here we will discuss research design, sampling, measurement, data collection, and data analysis. Next we consider issues about disseminating research findings, the researcher's role in educational change processes, and the roles that school teachers, administrators, and policy makers might play in the research projects designed to inform decisions about how to improve educational quality. And finally, we conclude by considering some of the issues involved with translating or transforming research traditions developed in "developed" societies for their use in "developing" countries.<sup>6</sup>

### Assumptions Underlying Research Traditions

Prior to discussing choices of strategies and techniques, we want to explore some of the assumptions on which different research traditions rest. We hope, therefore, that any dialogue about research activity will consider carefully the assumptions those involved want to make about the nature of knowledge and knowing and about the nature of human activity. To ignore the assumptions of different research traditions opens one up to acting in ways that contradict what one believes.<sup>7</sup> Here we will briefly discuss some of the major assumptions underlying three scientific traditions of research: positivist or quantitative,<sup>8</sup> interpretivist or qualitative,<sup>9</sup> and critical.<sup>10</sup>

The similarities and differences among the three traditions (see Table 1 for summary of key points) indicate that there are real choices in how we approach the process of conducting classroom-anchored research. The differences between positivist and interpretivist science traditions are strongest with respect to the first two elements: "conception of theoretical knowledge" and "conception of the social world. That is, the positivist science tradition seeks to discover general laws of social phenomena (e.g., causal relations between certain teaching behaviors and children's language learning), while the interpretive science tradition is oriented to illuminating people's actions in and interpretations of particular situations (e.g., classrooms in specific community settings). Also note that the critical science tradition incorporates work that reflects both positions on both elements.<sup>11</sup> In terms of the "scientist's role in the social world," the clearest distinction is between the critical science tradition and the other two traditions, with the former eschewing notions of the possibility of separating technical or scientific and political or ethical issues and commitments and the latter celebrating such separation as a defining characteristic of "science."

**TABLE 1: KEY ELEMENTS OF THREE SCIENTIFIC TRADITIONS**

<u>ELEMENTS</u>	<u>Conception of Theoretical Knowledge</u>	<u>Conception of the Social World</u>	<u>Scientist's Role in the Social World</u>
<u>Positivist Science</u>	universal, context free, "objective"	causal relations among variables (social facts)	neutral, detached, objective inquirer
<u>Interpretivist Science</u>	context-dependent; orientation to "grounded theory" <sup>12</sup>	web of meaning and action, continually being socially constructed	"empathetic neutrality," <sup>13</sup> involved subjectively to collect and interpret data
<u>Critical Science</u>	either	either	committed and engaged; seeks understanding to foment progressive social change

There is an on-going debate regarding the theoretical and practical possibilities of combining approaches and techniques from the different traditions (e.g., Babbie, 1990; Bogdan and Biklen, 1992; Eichelberger, 1989; Eisner and Peshkin, 1990; Soltis, 1984; Vulliamy, Lewin, and Stephens, 1990). As Hammersley (1986b: xix) comments: There seems to be a growing trend for social scientists to become locked into competing "paradigms," and this includes classroom researchers. ... There is no doubt that classroom researchers face difficult methodological problems, whatever the tradition in which they work. ... Given this, it seems essential to approach these problems with some humility, examining the arguments of those in other traditions with an open mind. We concur with the necessity of keeping an "open mind." Whether one sides with the compatibility or the incompatibility of the traditions, one needs to make informed choices -- by being aware of the alternatives within and among scientific traditions -- on how to conduct classroom-anchored research and on how to inform and influence educational policy and practice.

Asking Research Questions in the Three Traditions

The choice of tradition(s) has implications for or is implied by the way one frames research questions or what some term the research problem. This section discusses these point in two ways. First, we look at the topics of research initially identified in the three core countries in the Improving Educational Quality project to demonstrate how research questions related to each of these topics could be framed from within the three

TABLE 2. EXAMPLES OF RESEARCH QUESTIONS IN THREE SCIENTIFIC TRADITIONS

Country	GHANA	GUATEMALA	MALI
Topic	Instructional Resources	Unitary Schools	French literacy
TRADITION			
POSITIVIST	<ol style="list-style-type: none"> <li>1. Does more frequent use of textbooks increase student (math, etc.) achievement?</li> <li>2. Are textbooks more effective than other instructional resources in promoting on-task behavior of students in school?</li> </ol>	<ol style="list-style-type: none"> <li>1. Which instructional practices in unitary schools promote cognitive and socio-emotional development?</li> <li>2. Do some curricular materials promote creativity more than others?</li> </ol>	<ol style="list-style-type: none"> <li>1. Are reading and literacy levels enhanced by bilingual (versus immersion) instruction?</li> <li>2. Which instructional materials promote more positive attitudes toward French language?</li> </ol>
INTERPRETIVIST	<ol style="list-style-type: none"> <li>1. How are texts used by teachers and students in classrooms?</li> <li>2. How do students and teachers view the instructional value and content of texts?</li> </ol>	<ol style="list-style-type: none"> <li>1. What happens in unitary schools and how do teachers and students view these experiences with respect to cognitive, socio-emotional, and creativity development?</li> </ol>	<ol style="list-style-type: none"> <li>1. How do teachers and students socially construct French literacy lessons?</li> <li>2. How do students interpret and develop strategies for taking reading tests?</li> </ol>
CRITICAL	<ol style="list-style-type: none"> <li>1. Are male or female students more likely to benefit from texts being used during instruction?</li> <li>2. Does the content of texts critique or legitimate existing social inequalities?</li> </ol>	<ol style="list-style-type: none"> <li>1. Do unitary schools promote "development" for some groups at the expense of others?</li> <li>2. Is liberation or social control more closely tied to the way creativity is defined in classrooms?</li> </ol>	<ol style="list-style-type: none"> <li>1. Which ethnic or linguistic groups are (d's)advantaged by introducing French in the early grades?</li> <li>2. What messages about the value of African cultures are conveyed in French lessons?</li> </ol>

traditions. Second, we categorize some of the extant classroom-anchored research, especially that which has been undertaken in "developing" societies.

The initial topics identified by Host Country Research Teams in Ghana, Guatemala, and Mali are presented in Table 2 along with some examples of research questions that could be asked from within each scientific tradition. The different questions highlight that in the **positivist science tradition** the focus is on assessing relationships among variables (seen to be objective and factual); in the **interpretive science tradition** the stress is on exploring what individuals are doing and thinking (without presuming that the categories of analysis can be predetermined); and in the **critical science tradition** the concern is to understand how what goes on in classrooms, schools, and communities benefits some social groups and not others.<sup>14</sup>

Another way to clarify how the research questions posed reflect assumptions associated with one or another scientific tradition is to examine existing studies. In Table 3 we classify research questions associated with some potentially relevant classroom-anchored research studies in terms of the scientific traditions with which they are most closely identified.<sup>15</sup>

TABLE 3: RESEARCH QUESTIONS POSED IN RELEVANT STUDIES TRADITIONS

Scientific Tradition	Research Questions from Cited Studies
Positivist	<p>Which of two instructional approaches (systems) is more effective in developing Venezuelan students' skills in solving textbook problems in science or mathematics? (Bascones and Novak, 1985)</p> <p>What is the effect of different types of rhetorical organization on the second language reading comprehension of non-native speakers of English in the United States? (Meyer and Freedle, 1984)</p> <p>What impact does textbook availability have on student learning in Uganda? (Heyneman and Jamison, 1980)</p> <p>What factors account for the effect that textbook use has on student mathematics achievement in Thailand? (Lockheed, Vail, and Fuller, 1986)</p>
Interpretivist	<p>What do elementary school students in the United States learn in an instructional program designed to develop their ability to confront and solve meaningful, real-world problems? (Davidman, 1978)</p> <p>How is a school-centered curriculum innovation, which was originally conceptualized in a "developed" society, implemented in a secondary school in a "developing" country like Papua New Guinea? (Crossley, 1984)</p> <p>How are traditional educational practices combined with "modern" Western-style schooling in a community in Ghana and what aspects of the situation are viewed positively and negatively by students, teachers, and parents? (Grindal, 1972)</p> <p>How do school administrators, teachers, and community members understand and evaluate school-focused efforts to promote rural community development in the Philippines? (Manalang, 1977)</p>
Critical	<p>What are the differences between the instruction girls and boys receive in reading and mathematics in elementary school classrooms in the United States? Did the differences in instruction correspond with girls' relatively higher verbal achievement and boys' relatively higher quantitative achievement on school examinations? (Leinhardt, Seewald, and Engel, 1979)</p> <p>What gender role messages are sent in the official curriculum (e.g., textbooks) and the hidden curriculum (e.g., school's authority structure, teachers' attitudes and classroom interaction) and which are received and internalized by male and female secondary school students? What implications does this have for the social and cultural reproduction of gender relations in the African society of Togo? (Biraimah, 1982)</p> <p>How is school failure accomplished through teacher-student in Bolivia, Colombia, Peru, and Venezuela, and what implications does this have for the perpetuation of poverty in Latin American societies such as these? (Avalos, 1986)</p> <p>How are students' identities as members of gender, racial, and social class groups drawn upon by them, their teachers, and their parents in socially constructing "successful" and "unsuccessful" school careers in St. Croix, West Indies? (Gibson, 1991)</p>

## Research Approaches and Techniques in the Different Traditions<sup>16</sup>

Having considered differences in framing research questions in the different scientific traditions, we now turn to examine the methodological choices (both between and within the scientific traditions identified above) concerned with research approaches and techniques. Before discussing the range of choices, however, it seems worthwhile to recall Alfred North Whitehead's caution: "Some of the major disasters of [hu]mankind have been produced by the narrowness of men [or women] with a good methodology ... to set limits to speculation is treason to the future" (quoted in Shulman, 1981, p. 11). In our effort to stimulate dialogue about methodological approaches and techniques, we seek to encourage creative and context-relevant forms of disciplined inquiry that may inform and be informed by such speculation.

Below we focus on the methodological choices between and within the positivist and interpretivist scientific traditions. We do not devote a specific section to discussing methodological choices within the critical science tradition because, as discussed above (see Table 1), this tradition incorporates assumptions about the nature of theoretical knowledge and the social world reflective of the other two traditions.<sup>17</sup> Hence, the methodological approaches and techniques employed by researchers in the critical science tradition are described below in the context of positivist and interpretivist traditions.<sup>18</sup>

### Positivist Science Tradition

In this section we will review issues related to design, sampling, measurement, and data analysis for different research approaches within a positivist science tradition; in a subsequent section we will deal with similar issues concerning research approaches within an interpretive science tradition.

#### *Research Designs*

For researchers working within a positivist science tradition there are series of design choices. A major choice is between "**true experimental**" designs or designs that are variously labelled causal-comparative," "quasi-experimental," "ex post facto," "correlational," or "**survey research**" (Babbie, 1990; Eichelberger, 1989; Jaeger, 1988; Porter, 1988). Within true experimental designs one may choose between posttest-only control group, pretest-posttest control group, and various factorial designs (Campbell and Stanley, 1963; Tuckman, 1972, pp. 106-113). For the second type of design, which as a shorthand we will refer to as survey research, there are also choices between cross-sectional and longitudinal (including cohort and panel) designs (Babbie, 1990; Moser and Kalton, 1972).<sup>19</sup>

In all these cases researchers are usually seeking to find out if **causal relationships** exist between variables, normally referred to as "independent" and "dependent" variables. The **independent variable** is conceived and/or operationalized as that variable that causes variation or produces change in the **dependent variable**. For example, one may be interested in determining whether one particular method versus another method for using textbooks in instruction (the independent variable) promotes more student learning of say mathematics (the dependent variable). Or one might be

interested in examining whether certain types of experiences in unitary schools (compared to other types of experiences) leads to greater cognitive development, creativity, or socio-emotional development. Another case would be studying whether certain methods of teaching French as a second language yield higher levels of fluency or more positive attitudes toward the language.

**Three conditions** must be satisfied in order to establish that a causal relationship exists between two variables: 1) there is a statistical **association** or covariation between the variables, 2) the **time-ordering** of the two variables is such that the independent variable occurs in time prior to the dependent variable, and 3) the effect of **other variables** on the dependent variable has been **controlled**. Whether the first condition is satisfied or not is relatively easy to determine when analyzing data (see discussion below), and the approach is basically the same in true experimental and survey research designs.

The two designs, true experimental and survey research, seek to satisfy the second condition in different ways. In a true experiment the environment is manipulated in order to have the changes or differences in the independent variable occur before any changes or differences are measured in the dependent variable. In a survey research design the researcher either uses a longitudinal design or, if using a cross-sectional design, argues that the "natural" order of the variables is for the independent variable to occur prior to the occurrence of the dependent variable. For example, in most cases it may be reasonable to assume that a student's sex (male or female) is determined prior to his or her entering a classroom and receiving more or less attention from a teacher. In contrast, it may be less clear whether creative capacity is acquired or developed before or after entering school.

Concerns related to the third condition, that the effect of other variables have been controlled, are often discussed in terms of the **internal validity** of a research design. Threats to internal validity (see Campbell and Stanley, 1963; Eichelberger, 1989, pp. 156-64; Tuckman, 1972, pp. 74-79) limit one's confidence that the independent variable(s) have produced the observed change or difference in the dependent variable.<sup>20</sup>

Experimental and survey researchers use different approaches to achieve this goal of establishing (at an acceptable level of internal validity) that a causal relationship exists. In the **true experiment** researchers strive in designing the study to control the effect of all other variables besides those which are of specific interest in the study. These other variables are controlled in the design by a process of **random assignment** of study participants or subjects (e.g., students) to **experimental** (those receiving some kind of treatment -- e.g., a type of method of instruction used with a textbook) and **control groups** (those not receiving any special treatment).

In **survey research** designs, researchers do not seek to manipulate or alter the setting they are studying (e.g., by random assignment of students to classrooms or instructional experiences), but rather seek to **control** for the effects of **other variables after the fact** (ex post facto) when they analyze their data. This is done either by trying to match the characteristics of members of experimental and control groups or by using statistical procedures (such as partial correlation, multiple regression, or analysis of covariance), which allow one to examine the relationship between two variables net of the

effect of others (see section on data analysis).<sup>21</sup> For example, in studying (in a survey approach) the effect of certain activities in unitary schools on the development of creativity, one would need to control for the students' other experiences (in an outside of school) that might also promote creativity.

In both true experimental and survey research designs there are problems in satisfying the three conditions of causality, although many argue that the true experiment is mostly likely to achieve a high degree of internal validity. This advantage of the experimental design, however, has to be weighed against the practical and ethical<sup>22</sup> problems involved in manipulating educational environments, such as classrooms and schools, that is necessary in true experimental designs.

### *Sampling and Generalizability of Findings*

Generally, educational researchers in the positivist science tradition are not only concerned with being able to report causal relationships between independent and dependent variables in one setting or with one group of students and teachers who were directly involved in the study (the **sample**). In addition, they are oriented to draw some conclusions that are generalizable to a larger **population** of settings or people. For instance, if you are interested in studying the effectiveness of different strategies for teaching French as a second language in primary school classrooms, it is unlikely that you would have the resources to conduct such a study involving all students, teachers, classrooms, schools, communities, etc. However, you would ideally want to be able to do a study involving a sample of these that would allow you to **generalize** to the entire (or at least a larger) population of students, etc. This is where choices about sampling become relevant.

The first set of choices concerns the nature of the sample to be used.<sup>23</sup> In a) descending order in terms of likelihood of yielding a representative sample and b) ascending order in terms of ease of implementing the procedure, the different kinds of sampling procedures are: simple random,<sup>24</sup> systematic,<sup>25</sup> quota,<sup>26</sup> and convenience<sup>27</sup> (Babbie, 1990, pp. 65-101; Fink and Kosekoff, 1985, pp. 53-64; Fowler, 1988, pp. 19-44; Moser and Kalton, 1972, pp. 61-187).<sup>28</sup>

The representativeness of the samples yielded from these forms of sampling, especially the first two, can be enhanced, moreover, by stratification and (single- or multi-stage) cluster sampling approaches. To obtain a **stratified random sample**, for example, one would first divide the population into strata (based on age, sex, and/or rural/urban residence) and then randomly draw an appropriate number of members from each strata. A multi-stage systematic **cluster sample** of students in a state/province or country would be obtained by systematically selecting from a list of local educational authorities (lea's), then systematically selecting from a list of schools in these lea's, then systematically selecting from a list of classrooms in these schools, and then systematically selecting from a list of students in these classrooms.

The other important choice in sampling involves the question of size. The larger the **sample size**, the greater the precision in estimating population characteristics (parameters) from sample characteristics (statistics), but also the greater the cost in

collecting data from the sample (for more details see Babbie, 1990, pp. 75-80; Moser and Kalton, 1972, pp. 61-78, 146-151).

### *Conceptualizing and Operationalizing Variables*

The next set of choices facing the researcher focuses on how to define and measure the conceptual variables incorporated in the study, whether they categorized as **independent variables**, **dependent variables**, **intervening variables**, and **control variables**<sup>29</sup> in experimental and survey research studies. The potential difficulty of defining and measuring variables in one's study has been illustrate in another project paper (Adams, 1993) regarding the alternative ways of conceiving and measuring educational quality. Even if we agree, for instance, that educational quality is defined by outcomes of schooling, we still need to define the relevant outcome: standardized achievement test scores, grades, attendance, literacy activity or other behavior outside of school, creativity, socio-emotional development, etc. And given any conceptually defined variable, we are faced with the task of identifying or developing a valid and reliable measure of that conceptual variable (e.g., "achievement").

There are various approaches to measuring variables: 1) giving tests (Borg and Gall, 1989, pp. 245-320), 2) administering questionnaires (Babbie, 1990; Fink and Kosecoff; Fowler, 1988; Oppenheim, 1966; Sudman, 1982), 3) conducting interviews (Gorden, 1980; Yarrow, 1960), 4) using observation schedules (Delamont, 1976, pp. 14-16; Galton, 1978).<sup>30</sup> Discussing each of these strategies of data collection (tests, questionnaires, interviews, and observation) is beyond the scope of this project paper; the point to emphasize here is the need to work toward maximizing quality (validity and reliability) of the data collected. **Validity** may be defined as the extent to which some measurement procedure accurately measures the conceptual variable or construct that it is designed to measure,<sup>31</sup> while **reliability** concerns the measure's stability or the consistency of results obtained when using a particular measure.<sup>32</sup>

### *Data Analysis*

The main purpose of data analysis in the positivist science tradition is to assess the strength and significance of relationships among variables. although researchers in this tradition are also interested in determining and presenting descriptive statistics on individual variables.<sup>33</sup> We will begin with a brief discussion of the choices in the latter case before focusing on choices in analyzing relationships among variables.

There are also a variety of **measures of association** between variables. Measures of association are used to answer questions, such as does spending more time in class engaged in oral conversation increase students' fluency in French? When concerned with the **strength** of the association, one can choose, for example, between nonparametric statistics (e.g., percentage differences, gamma) or parametric statistics (e.g., pearson's product moment correlation, multiple regression, analysis of variance or covariance, discriminant analysis).<sup>34</sup> When focusing on the **significance** of the relationship between variables, which deals with the issue of whether the probability that the relationship is different from zero at an acceptable level greater than chance, one

can also choose among nonparametric statistics (e.g., chi-square) or parametric statistics (e.g., z, t, and F) (see Eichelberger, 1989, pp. 201-214).

### Interpretivist Science Tradition

Having reviewed issues of design, sampling, measurement, and data analysis for different research approaches within a positivist science tradition, we now turn to a discussion of similar issues with reference to research approaches within an interpretive science tradition.

#### *Research Design and Role of the Researcher*

Because of the assumptions on which interpretivist research is conducted, research designs are not fully determined in advance and followed unreflexively like in research undertaken within a positivist tradition. As Lincoln and Guba (1985, p. 225) observe, in the interpretive science tradition the "role of the researcher is that of the research instrument, and the design of qualitative research is deliberately open-ended to allow a natural unfolding of understanding and reflection." Questions about design, like many other methodological issues, are subject to rethinking and alteration throughout the course of a study. Generally, one needs to make choices from the following approaches: participant observation, nonparticipant observation, and interviewing only. One also has to choose between **single or multi-site investigations** (Bogdan and Biklen, 1992, pp. 69-75) and whether the research is undertaken by an individual or a team of researchers (Douglas, 1976, pp. 189-226).

**Participant observation** and **nonparticipant observation** involve similar strategies. The distinction is in the level of involvement as a participant in the settings. There is an extensive literature about the advantages and disadvantages of becoming a participant in the setting, which can be summarized as the opportunity to use one's own experiences as a data source and to establish stronger rapport as well as the danger of not being able to maintain a sufficiently detached perspective needed to analyze the social situation or cultural scene being investigated (see Bogdan and Biklen, 1992; Eisner and Peskin, 1990; Goetz and LeCompte, 1984; Spradley, 1980).

Regardless of what degree of participation one adopts at various points of the research, one also engages in **observation** as well as other forms of data collection, including **interviewing** and **collection of documents** and other **artifacts** (Agar, 1986; Dobbert, 1982; Erickson, 1986; Hammersley and Atkinson, 1983; Nash, 1973; Smith, 1979; Woods, 1986). Central to this design (and data collection) strategy is the concept of **triangulation** (Denzin, 1971), which encourages the use of multiple types and sources of data in order to develop a multiple-perspective account of a social situation or social processes.

For example, if one was studying how textbooks are used and what meanings they have for teachers and students in primary school classrooms, one might observe the use or nonuse of textbooks in classrooms (and perhaps more broadly in schools and communities); interview teachers and students to ascertain their understandings and attitudes they have about textbooks, etc.; and collect and do a content analysis of textbooks, other books, and other artifacts or materials that serve as instructional

resources from the perspective of teachers and students. Or if one was concerned with the how the unitary school program is socially constructed in various settings and how participating students, teachers, and community members come think and act in school and community settings, one might observe in these settings, interview key informants, and collect and analyze official and personal documents as well as other things produced by those involved. A similar range of data could be collected when studying how language and reading instruction is accomplished and how participants (e.g., male and female students, residents in rural and urban areas, members of different ethnic group/linguistic communities) come to interpret, make use of, and benefit from such experiences.

Given the intense and extended nature of relationships between the researcher and the "researched" in participant and (to a lesser extent) nonparticipant observation, we should stress the importance of how one gets access to field sites and how one establishes and maintains relations with the variety of people with whom a researcher comes in contact. Access is actually an on-going process, starting from informal negotiations for an opportunity to do research in a school system, school, and classroom, and continuing with informal negotiations to gain access to events occurring in particular sites at particular times and to thoughts and feelings people in the setting have about these events. One makes use of **gatekeepers** at each level and at different times to gain entry, while recognizing that there are always additional gatekeepers with whom to negotiate initial and continued access. Furthermore, because most social situations are characterized by some degree of conflict, one should be aware that being seen to establish close relationships with some individuals and groups may make you suspect with other individuals and groups.

One may choose between conducting research in a **covert** or **overt** manner. Here one must weigh the advantages of gaining access to a setting, from which one might otherwise be restricted, with ethical considerations involved in covert research. Some argue that by being honest about the general purpose of one's research and being responsive to questions asked by those in the setting (without violating promises of **confidentiality** and **anonymity**), one is more likely to establish rapport and to obtain more valid and reliable data over the long term (see Punch, 1986, pp. 38-44),

As is the case for observational studies (Delamont and Hamilton, 1976; Irwin and Bushnell, 1980), interpretive science studies involving interviewing are different than interview studies rooted in the positivist science tradition (Mischler, 1986). In the latter case the focus is on measuring variables so that relationships among them can be analyzed. In interpretive science tradition, what some have termed "**ethnographic interviewing**" (Spradley, 1979) the concern is to construct a "thick description" (Geertz, 1973) of people's lived experience, the webs of meaning and action that are constituted by the intersection of biography and broader historical and contemporary social processes. Such studies might involve **life histories** or, somewhat more narrowly, work or student **career histories**, or, even more narrowly, **event experience interpretations** (Bogdan and Bicklen, 1992, pp. 96-101).

For instance, if one was investigating efforts to develop competence in and commitment to using French as a second language, one might interview students (or

former students) about their experience of learning and using or not using French in classrooms, among peers, in the family-community settings, etc. Or if one was studying how creativity or socio-emotional development was being fostered through unitary schools, one might want to interview parents, students, and teachers to elicit what they understand by these terms and how they see experiences in unitary schools or elsewhere in the community as providing opportunities to develop and use certain types of creativity and socio-emotional maturity.

### *Sampling and Selection*

Within the interpretive science tradition one is concerned with sampling and selecting "people, their abstracted traits or responses, events, artifacts and other objects, time segments and settings" (Goetz and LeCompte, 1984, pp. 64-65). The processes of sampling and selecting, moreover, are engaged in by the researcher throughout the course of the study. While some researchers working within an interpretivist science tradition employ probabilistic methods of sampling (as is promoted within the positivist science tradition), others use a different logic, what has been termed "theoretical sampling" (Glaser and Strauss, 1967) or "criterion-based selection:"

[C]riterion-based selection may be divided into two groups. The first is composed of strategies used to locate an initial group or setting for the study or to select units [people, time, events, locations, etc.] from populations determined to be relevant during early phases of research. This includes comprehensive selection, quota selection, network selection, and selection on the bases of extreme cases, typical cases, unique cases, reputational cases, ideal-typical or bellweather cases, or comparable cases. The second group of selection strategies involves progressive and sequential processes and includes negative-case selection, discrepant-case selection, ... and selection and comparison of cases testing theoretical implications. (Goetz and LeCompte, 1984, pp. 77-78).

As noted above, researchers working strictly within an interpretivist science tradition do not regularly employ probabilistic sampling approaches. This is because their assumptions of about knowledge and human experience discourage them from seeking to establish generalizable laws about human thought and action. In this tradition there is concern to **generalize or extrapolate** from the findings in one setting, but it is more often on a basis of "case-to-case transfer" or "analytic generalization" (Firestone, 1993). For case-to-case transfer the reader is encouraged to determine the applicability of a thickly described case to other cases with which they may be familiar. In analytic generalization the object is to generalize to a theory, to test and refine theory through the research project and then to use the refined theory (perhaps with new contingencies) as a basis for seeking to understand other settings or people that were not part of the study.

### *Data Collection*

Collecting data through participant and nonparticipant observation as well as ethnographic interviewing is a complex process, requiring curiosity, facility in inductive and deductive reasoning, interpersonal skills, and facility in gathering, organizing, and

holding on to huge amounts of data. Remember that many forms of inquiry within the interpretivist science tradition include the collection of documents and other artifacts, and for those with the resources and skills to do so data may also be collected with the aid of photography, audio and video recordings.

Data collection via observing and interviewing entails asking a combination of broad, general and narrow, specific questions of events or activities that one is observing as well of people one is interviewing. Sometimes the focus of data collection is very general, a process referred to by Goetz and LeCompte (1984) as "mapping" or "shagging around:"

In qualitative research relying only on interviews, mapping is addressed by questions that elicit general profiles and by interviewer's fishing expeditions -- broad, open-ended questions intended to reveal serendipitous data. Shagging around [in observational studies] involves casing the joint: getting acquainted with participants, learning where [and when] they congregate, recording demographic characteristics of a study group, mapping the physical layout of a site, creating a description of the phenomenon or the particular process under consideration. (pp. 89-90).

This process of focusing on broader, general questions in observational and interview research is termed a "grand tour" by Spradley (1980, p. 79), which he contrasts with what he labels a "mini-tour:"

The form taken by the mini-tour questions [asked through observing and interviewing] is identical to the questions that lead to grand tour observations except that the mini-tour questions deal with a much smaller unit of experience. In asking yourself either type of question, you will always begin with phrases like the following:

1. What are all the ... places, acts, events, feelings ...
2. Can you describe in detail the ... objects, times, goals ...
3. Can you tell me about all the ... people, activities.

Additionally, such research rarely follows a linear path from problem definition through data collection and data analysis to drawing conclusions. Rather the research process is better represented as a cyclical one (Ely, 1991). For instance, Spradley (1980, pp. 31-34) notes that one enters the cycle by selecting a research project and one exits the cycle, albeit temporarily, by writing a report of research. However, during the research one goes through many cycles involving "asking [general and more narrowly focused] ethnographic questions ... collecting ethnographic data ... making an ethnographic record ... analyzing ethnographic data."

When conducting observational and interview studies within an interpretive science tradition, a researcher normally records data in the form of fieldnotes, which: consist of two kinds of materials. The first is descriptive, in which the concern is to capture a word-picture of the setting, people, actions, and conversations as observed. The other is reflective -- the part that captures more of the observer's [or interviewer's] frame of mind, ideas, and concern. (Bogdan and Biklen, 1992, p. 108).

Although fieldnotes may be constructed in different ways, researchers must attend to issues of the credibility of the data collected. It is important to rely extensively on low-inference descriptions.<sup>35</sup> Verbatim quotes are generally better than paraphrasing of verbal behavior. Having a detailed, written record of exactly what a teacher and students were doing at a particular point in time in the classroom is a more useful form of data than high-inference generalizations, such as "it was noisy and students were not in their seats," "the teacher made use of textbooks," or "some French was spoken in the classroom."

Issues of credibility of data (and the results of data analysis) in research conducted within the interpretivist science tradition have been discussed by Goetz and LeCompte (1984, p. 210), adapting the language of positivist science -- reliability and validity:<sup>36</sup>

Credibility mandates that canons of reliability and validity be addressed whenever ethnographic techniques are used, even when they are adapted within a broader, more positivistic design. ... External reliability addresses the issue of whether independent researchers would discover the same phenomena or generate the same constructs in the same or similar settings. Internal reliability refers to the degree to which others researchers, given a set of previously generated constructs, would match them with data in the same way as did the original researcher. ... Internal validity refers to the extent to which scientific observations and measurement are authentic representations of some reality; external validity refers to the degree to which such representations can be legitimately compared across groups.

### *Data Analysis*

Data analysis "involves working with data, organizing them, breaking them into manageable units, synthesizing them, searching for patterns, discovering what is important to be learned, and deciding what you will tell others" (Bogdan and Biklen, 1992). As noted above, within an interpretivist science tradition, data analysis is an ongoing process, intimately connected with data gathering. Of course, at some point (when time or financial constraints require it or, preferably, when data collection is no longer yielding new insights) the process of data collection comes to an end, and data analysis continues afterwards (Ely, 1991, pp. 139-178). The amount of data analysis that occurs after completing observations, interviews, and document collection may vary from one study or researcher to the next.

There are various discussions of data analysis in the interpretivist tradition (Becker, 1958; Bogdan and Biklen, 1992, pp. 153-83; Goetz and LeCompte, 1984, pp. 165-245; Miles and Huberman, 1984; Tesch, 1990), a situation that represents a major change from 15 years ago. Below we draw more heavily on Spradley's (1979 and 1980) very readable and explicit presentation of an approach to the analysis of data collected in an interpretivist tradition. In delineating Spradley's approach, however, we are not suggesting that his approach should be followed in some cookbook-like fashion nor that other approaches are not worth examining as one makes choices about analyzing data. Data analysis is a process that draws on human capacity for inductive and deductive

reasoning, and researchers should devise a strategy for working with data that facilitates the best use of their capacities, while keeping in mind the concerns about credibility discussed above.

Spradley describes four steps in data analysis, which are connected with different steps of data collection as part of a "developmental research" cycle: domain, taxonomic, componential, and theme analysis. The first step is to sort data into cultural domains, each of which is "a category of cultural meaning that includes other smaller categories" (1980, p. 88). As part of a **domain analysis** one might sort excerpts from fieldnotes or interviews into cultural domains, such as "kinds of classroom activity in which French is used for communication" or "ways to use textbooks in classrooms" or "events providing opportunities for students to be creative." The second step in analyzing data is to create a taxonomy of the elements (excerpts from fieldnotes or interview transcripts) in each cultural domain. **Taxonomic analysis** further sorts the data in a manner that reveals in each domain the subsets of elements and how these subsets are related to each other and to the cultural domain as a whole. The next step is termed **componential analysis**, which involves the "systematic search for components of meaning [or contrasts] associated with cultural categories" (1980, p. 131). Componential analysis, then complements taxonomic analysis, because the latter emphasizes similarities among elements within a cultural domain, while the former focuses on the basis for contrasts among such elements. The final analytic step in a research cycle is to conduct a **theme analysis**. A cultural theme may be defined "as any principle recurrent in a number of domains, tacit or explicit, and serving as a relationship among subsystems of cultural meaning" (1980, p. 141). In this step of the analysis the researcher is attempting to look across domains and identify general statements that capture or represent important dimensions or dynamics of a social setting.

### Connecting Research and Educational Policy/Practice: The Roles of Researchers and Practitioners

Having completed planning and conducting the research project (or better before initiating the investigation), one also needs to consider how to communicate and make use of what can be learned from the experience of disciplined inquiry. It is often the case that the next (and last step) of the research process is to write a report. Research reports, articles, or books based on research undertaken in a positivist or interpretivist tradition often contain the following sections, which relate closely to some of the sections above:

- 1) Introduction and Statement of the Problem (Research Questions),
- 2) Theoretical Issues,
- 3) Method (Design, Sample, Measurement, Data Analysis),
- 4) Findings, and
- 5) Interpretation, Discussion, Conclusions, and Recommendations.

However, when research is undertaken with a specific intent of influencing decisions about policy and practice to improve educational quality, writing a report or even combining this with making oral presentations to the key policy makers and practitioners may not be enough. Moreover, it is important to note, as King (1981) does,

that this interest does not rule out attention to theory (see also Vulliamy, Lewin, and Stephens, 1990). In his discussion of externally funded, policy-oriented research in "developing" countries, King (1981, p. 349) notes that:

Whatever the record on implementation of the results of such research, it is at least arguable that work of a more theoretical nature may equally be implementable (cf. the work of Freire, which ... has reached and affected many people with responsibility for literary policy).

Indeed, we recognize that research results and theorizing related to such may influence policy-makers' and practitioners' decisions and actions. As Cooley and Bickel (1986, p. 119) discuss, research may be used instrumentally and conceptually in the policy and practice arena:

**Instrumental use** refers to documentable use where the [research-generated] information is explicitly employed in the making of a decision, or the solving of a problem. ... **Conceptual use** refers to uses that influence policy maker's [and practitioners] thinking about issues.

Nevertheless, it is clear that without special attention and effort on part of researchers (as well as policy-makers and practitioners) research may not be put to either of these uses. It is certainly not uncommon for teachers, administrators, and policy makers to criticize the products of researchers' activity as inaccessible or irrelevant (e.g., Brause and Mayher, 1991), while researchers lament the lack of attention to and influence of their research findings.

In recent years educational researchers in conjunction with policy makers, administrators, and teachers have sought to develop strategies for strengthening the link between research and educational policy/practice. We can identify three general models employed in such efforts: decision-oriented research, collaborative action research, and research as collective praxis. And although proponents of each model have expressed and demonstrated an openness and commitment to drawing eclectically on different research approaches and techniques, it would appear that each seems to be more firmly rooted in one of the three scientific traditions we have been discussing, respectively: positivist, interpretivist, and critical.

In their book on the subject, Cooley and Bickel (1986, p. 3) describe **decision-oriented educational research (DOER)** as "research designed to help educators as they consider issues surrounding educational policy, as they establish priorities for improving educational systems, or as they engage in the day-to-day management of educational systems." A key element in this model from the researcher's standpoint is a "client orientation," operationalized through an "on-going educational dialogue" (p. 27) in which the researcher "works hard at trying to understand the information needs of the client and to meet those needs" (p. 36). The DOER model also stresses the "importance of being methodologically eclectic" (p. 41) and the need for "a continuous activity of data collection and analysis, which we refer to as monitoring and tailoring" (p. 57). However, working within the DOER model the researcher works with a client (usually defined as policy makers or administrators, though there is no logical reason to exclude teachers) to provide information (social facts of both quantitative and qualitative varieties) needed by the client to make certain decisions. The researcher is in dialogue with the client, but

each has his or her own specified and fairly distinct role: researcher and policy maker or practitioner. The researchers are not directly engaged in making policy or directly involved in educational practice, and the policy makers and practitioners are not active participants in the research process.

Similar to the DOER model, **collaborative action research** is concerned with enhancing the use of research by educational policy makers and practitioners. According to Eliot (1982, p. 1):

Action research might be defined as: the study of a social situation with a view to improving the quality of action within it ... [The] total process – review, diagnosis, planning, implementation, monitoring effects – provides the necessary link between self-evaluation and professional development. (quoted in Winter, 1989, p. 3)

However, collaborative action research offers some contrasts to the DOER model. First, while there is evidence of methodological eclecticism, proponents argue that collaborative action research has more affinity to the approaches and techniques associated with what we have termed the interpretive science tradition (Hustler, Cassidy, and Cuff, 1986; Winter, 1989). Second, and perhaps more importantly, the collaborative action research model entails not only dialogue about, but also joint participation in, research by "researchers" and "teachers" (although there is no logical reason to exclude educational administrators and policy makers). This model, thus, builds on the notion that educational practitioners normally engage in inquiry and that their practice can be enhanced by making it possible for them to commit more time and energy to the research process (Brause and Mayher, 1991; Kincheloe, 1991; Wagner, 1990). Nonetheless, a division of labor still seems to exist in that even though the "practitioner" assumes rights and responsibilities in the research process, the "researcher" in many cases remains somewhat detached from the policy and practice arena; the researcher is involved as a collaborator in research design, data collection, and data analysis, but remains somewhat detached from the "professional" and "political" activity of educational policy making and practice. This is perhaps ironic, because one of the premises of collaborative action research is the "democratic social and political ideal, the ideal of a creative and involved citizenry" (Winter, 1989, p. 4).

The third model, **research as collective praxis**, shares some of the elements with, but it is also framed in contrast to, the other two models, most explicitly, collaborative action research. In her chapter on "Research as Praxis" Lather (1991, p. 56) comments that: "I am arguing for an approach that goes well beyond the action research concept. ... The vast majority of this work operates from an ahistorical, apolitical value system" (see also Bodemann, 1987). Key to the model of research as collective praxis is the researcher acknowledging and acting upon her or his political commitments in the context of collective theorizing and practice, collective praxis, with others in a settings, including "non-professionals" such as students and community members (Fine, 1989; Gitlin, et al., 1992; Reinhartz, 1984). In this way the line between "researcher" and "practitioner" is further blurred as those who identify (or are typified) primarily as in one of these roles, in fact, play both. Not only do policy makers, administrators, teachers, students, and community members participate in research, but "researchers"

become active participants in the settings working with others to understand and change schools and society. According to Bodemann (1978, pp. 410-411), the "researcher" in this model: 1) "participates fully, freely and self-critically in the setting;" 2) "observes [etc.] and renders a description of the facts and 'on-goings' of the setting, but in the context of his [or her] biographical position;" and 3) based on his or her "commitment and the evidence, received and theoretically grounded, he [or she] can actively intervene ... with others who partake in a comparable predicament and with all those who identify with this predicament and who are willing to change it."

### Conclusions

This paper represents an attempt to identify and discuss some of the choices that researchers face as they engage in classroom-anchored research in connection with efforts to improve educational quality in developing countries. In writing and disseminating this paper as part of the Improving Educational Quality project, however, we are not seeking to impose one or another set of research assumptions, traditions, approaches, strategies, or techniques on colleagues, whether they be members of Host Country Research Teams or their respective U.S. Research Support Teams. Neither are we suggesting that the ideas (and references) presented herein are the only ones on which researchers in and outside this project can and should draw. We concur with Vulliamy, Lewin, and Stephens (1990, p.4) that:

while some issue of research design, execution and analysis may be generalizable, others are more specific to the cultural and political context of the research setting ... [and] that different circumstances lead to different constraints and possibilities concerning the process of research.

We are acutely aware of the problem of "cultural imperialism" through research and other processes (Vulliamy, Lewin, and Stephens, 1990, p. 212). As Diambomba (1981, p. 355) articulates, there is a real problem if research activity in projects similar to IEQ are reduced to:

a mere exercise in the re-creation of 'Western research environments' in the Third World. ... [Such as] drive to recreate Western research appears to be one of the reasons why potential African [etc.] researchers may not do research; fear of non-acceptance of their work by peers overseas or by their local representatives reduces them to almost total inaction.

Our intent in sharing some of what we can distill from different scientific traditions with which we are familiar is to encourage colleagues working in various contexts to engage in a dialogue (with each other and with us) about how to conduct research. We believe that this dialogue will be enriched if the ideas presented here are considered along with ideas that other colleagues bring to the conversation from a variety of other written sources and experiences. We share Shaeffer's (1981) desire to promote informed flexibility and imagination in research activities in "developing" and "developed" world. Our hope is that such dialogue will not only be helpful to them and their work, but that we may also learn from the ideas about research that are generated through this process.

## Endnotes

1. This is a revised version (February 1994) of a draft manuscript initiatively circulated among IEQ personnel on 8 July 1993.
2. This project is being undertaken under contract (No. DPE-5836-C-00-1042-00) with the U.S. Agency for International Development by a consortium including the Institute for International Research (prime contractor), Juarez Associates, Institute for International Studies in Education of the University of Pittsburgh, the Far West Regional Laboratories, and the Center for the Study of Literacy at the University of Pennsylvania.
3. That there are choices in how one goes about doing research is certainly not a new idea. For example, the point was made centuries ago by Aristotle (in De Anima [On the Soul]): "if there is no single and general method for solving the question of essence, our task becomes still more difficult; in the case of each different subject we shall have to determine the appropriate process of investigation" (quoted in Shulman, 1981, p. 8). The focus of this paper is not on the "soul" or "essence" of human beings, but studying "educational quality" may present some of the same challenges identified by Aristotle. As Adams (1993, p. 4) has argued in another IEQ project paper, "even under intense scrutiny the concept of educational quality has remained somewhat elusive, and many persistent questions surround any attempt at definition."
4. Although some progress has been made since the time of Pfau's (1986: 293) writing this, it still is unfortunately the case that "social scientists have only vague ideas about what occurs in the classrooms of most countries of the world and how classroom behaviors vary from one part of the world to another." The IEQ project is committed to expanding and deepening our understandings of classrooms (in context), while also focussing on developing effective strategies for linking classroom-anchored research to on-going efforts directed at improving educational quality.
5. Information provided in endnotes is included to amplify on points identified in the main body of the text. The endnotes and references cited, thus, provide the reader with an opportunity to go into more depth on specific points that may be of particular interest.
6. We place quotes around the terms "developed" and "developing" in describing countries to signal that these are shorthand labels that do not necessarily reflect our analysis of the world system. Other terms that might be appropriate or "rich" and "poor," "dominant" and "subordinate," "First World" and "Third World," "center" and "periphery," or "metropolis" and "hinterland" (e.g., Zachariah, 1986).
7. According to Ernest Nagel in his essay "Philosophy in Educational Research" (1971: 238): "Although no one can be explicitly aware of all the tacit assumptions one is making in the conduct of any inquiry, it is well to realize that one is always operating within some framework of presuppositions, and to be habitually on the lookout for those that are highly questionable" (quoted in Greene, 1981, p. 5).
8. The positivist science tradition, what some would label the quantitative research approach, has for many years dominated academic and policy-oriented investigations. As Soltis (1984, p. 6) notes, "there seems to be a basic common agreement within this majority group that educational research must be empirical, objective, and value free – scientific in the positivist's sense." Popkewitz (1981, pp. 6-7) identifies additional assumptions of positivist science: "theory is to be universal, not bound to specific contexts" and theory is developed and tested with reference to empirical examination of causally-related, mathematically quantified variables.

9. In the interpretive science tradition, what some would term the qualitative research approach, "research questions are not framed by operationalizing variables; they are formulated in all of their complexity, in context. ... They are also concerned as well with understanding behavior from the subject's own frame of reference" (Bogdan and Biklen, 1992, p. 2). Popkewitz (1981, pp. 10-13) similarly contrasts interpretive from positivist science, but he also indicates that both traditions share a goal of developing "a descriptive 'neutral' theory about social [and practical] affairs ... [which is] contemplative and hence detached from social situations." And Patton (1990) emphasizes that within the interpretive science tradition research is undertaken "natural settings" and the researcher serves as the "key instrument" in data collection aimed at developing "grounded theory."
10. The critical science tradition has a long history but only in recent years has had much visibility in educational research. Those identifying with this tradition "reject the idea of value-free research into human social, political, and educational phenomena as a myth and stress the need for inquiry that takes into account the historical-ideological moment we live in and the influence it has on us" (Soltis, 1984, p. 7). As Popkewitz (1981, p. 15) observes about the critical science tradition: "A critical social science is, at root, normative and substantive as well as formal. ... Conventional distinctions between fact and value, philosophy, politics, and science are not maintained. ... The function of critical [science] is to understand the relations among value, interest, and action and ... to change the world, not [merely] to describe it."
11. Later in this paper we will not discuss separately methodological issues (i.e., sampling, data collection, data analysis) for the critical tradition because of this fact that the critical science tradition includes approaches (e.g., quantitative and qualitative) associated with the other two traditions.
12. See Glaser and Strauss (1967).
13. See Patton (1990).
14. Research within the critical science tradition often focuses on concerns about unequal relations between gender, racial/ethnic, social class, and national groups. Feminist, liberationist, marxist, and dependency or neo-colonial theoretical approaches may serve to underpin research in the critical science tradition.
15. Readers may also wish to consult these and similar studies for details about how the researchers proceeded to collect and analyze data to address these research questions.
16. We agree with Vulliamy, Lewin, and Stephens (1990, p. 5) that there is value in researchers becoming familiar with structured discussions about how to do research as well as reading accounts of the research experience of others. We would argue that even more can be learned if these sources of insights are complemented with a series of simulated and actual research experiences. In this paper we focus mostly on the structured discussion of issues related to doing research, but refer the reader to accounts of the research experience (Burgess, 1984; Golden, 1976; Hammond, 1964; Reinharz, 1984; Roberts, 1981; Shaffir, Stebbins, and Turowetz, 1980; Walford, 1987) and hope that readers themselves will become engaged in research in conjunction with their reading.
17. In a recent book focusing on research approaches within what I would label the critical science tradition (from a feminist perspective), Shulamit Reinharz (1992) includes chapters on experimental research, survey research, ethnography, interview research, and content analysis. Additionally, many aspects of the approaches and techniques employed by those engaged in

critical ethnography (Anderson, 1989; Lather, 1991; Masemann, 1982; Simon and Diplo, 1986; Thomas, 1983) are dealt with in the section on the interpretivist science tradition, where ethnography is discussed.

18. This is not to argue that research conducted within the critical science tradition is the same as that conducted within the other traditions, but that many methodological aspects are similar. Certainly, as we have seen above, the kinds of research questions that are posed are different, and, as we shall discuss later, the uses to which critical scientists may put their understandings derived from research also may be contrasted with how researchers in the other traditions operate.
19. A cross-sectional design involves collecting data at one point in time, while a longitudinal design entails collecting data from the same people (panel) or similar groups of people (cohort) at two or more points in time.
20. It is common to discuss internal validity in relation to another concept, external validity, that is, the extent to which the observed causal relationship between the independent and dependent variable can be generalized to other populations, settings, and other studies using different measures (see Campbell and Stanley, 1963; Eichelberger, 1989, pp. 164-70; Tuckman, 1972, pp. 72-89). We have decided to connect the discussion of external validity with that of sampling (see below) since both deal with the question of generalizability.
21. Because studies employing survey research types of designs do not seek to manipulate the environment, they are sometimes termed "field research" or research in "natural setting" in contrast to experimental research which occurs in "laboratory settings." Note also that the line between these two types of settings is not real clear, in that classrooms and schools could be used as "laboratories" in the context of research on efforts to improve educational quality, even though at other times or from a different vantage point they might be considered "natural" settings.
22. For example, is it ethical to provide textbooks to some students and not to others in order to investigate whether the use of textbooks (as hypothesized) increases learning?
23. Here we will focus on sampling of a population of subjects in a study, but we should remember that especially in the case of experimental design the generalizability of the results, i.e., the **external validity** of the design, also concerns the sampling of contexts and the sampling of measures and variables including in the study.
24. A simple random sample is obtained with the aid of a random number table or some other procedure that guarantees that each member of a population (e.g., students) has an equal chance of being included in the sample, a basic mathematical criteria for representativeness.
25. A systematic sample is obtained by selecting every n<sup>th</sup> member from a list of the entire population of members. If the list of members of the population approximates a random ordering, then this procedure yields almost as representative a sample as a simple random sample.
26. A quota sample is obtained by identifying the key characteristics of members of the population (e.g., age, sex, rural/urban residence), and then selecting members (on a non-random basis) until each quota category (e.g., 10 year old boys residing in rural areas) has the appropriate number of members.
27. A convenience sample is obtained by selecting the most easily accessible members of a population (on a non-random basis), e.g., students who attend school closest to the research project office or those whose teachers are known by the researchers.

28. The first two sampling procedures pose the difficulty of requiring a complete list of all members of the population; the process of random sampling is also more complicated and time-consuming than systematic, quota or convenience sampling.
29. To clarify, **intervening variables** are variables that are conceived to occur in a temporal and causal chain between independent and dependent variables; **control variables** are variables that are introduced as co-variates in order to control for (or eliminate) the effects of other variables on the dependent variable(s) (see discussion above in design section).
30. Pfau (1986) distinguishes observation instruments in terms of whether they consist of "rating" or "category" systems, with the latter being preferred because it is viewed as a low-inference measure.
31. There are five general approaches to assessing the validity of a measure, particularly measures of complex variables (e.g., achievement) that require more than one item on a test, questionnaire scale or index, etc. The first two approaches (which are minimally required to assess validity) involve the judgment of an individual researcher (or better that of a panel of experts), while the third through fifth also involve some data collection and statistical analysis: **face validity** involves an appraisal of the degree to which an item is relevant to the content of the conceptual variable being measured; **content validity** involves an appraisal of the degree to which a set of items included in a test, scale, or index is representative of the breadth of content of the construct being measured; **predictive validity** involves an assessment of the degree to which a measure is associated with behavior that is predicted to be associated with the conceptual variable being measured; **construct validity** involves an assessment of the degree to which a measure is associated with prior differences in characteristics of people hypothesized to be related to the conceptual variable being measured; and **concurrent validity** involves the assessment of the degree to which a measure is associated with what is assumed to be a valid measure of the construct being measured.
32. One can see that if a measure is not reliable, it cannot be valid; if a measure provides different results (without any changes having taken place), then the measure cannot provide an accurate measure of a conceptual variable. Here are three approaches to assessing the reliability of a measure, especially measures of complex variables (e.g., creativity or fluency in a language) that require more than one item on a test, questionnaire scale or index, etc. (see Eichelberger, 1989, pp. 119-22): **stability of data over time** (e.g., test-retest), **internal consistency** (e.g., split-half, item-scale analysis), and **equivalence of alternative test forms**. Note that the procedure for assessing the equivalence of alternative test forms, administering two measures at the same time and assessing the relationship between the two measures, is mathematically equivalent to the procedure used for assessing concurrent validity and in some ways the same as assessing split-half reliability.
33. There are many types of descriptive statistics that one can choose from in describing the **central tendency** (e.g., mean, median, mode) and **variability** (e.g., range, quartile, standard deviation, variance, percentages) (see Eichelberger, 1989, pp. 107-113). These would be used if one wanted to describe a group of students in terms, respectively, of their average score and range of scores on some measure of cognitive development
34. Note that the kinds of statistics one may legitimately employ in describing and analyzing data are at least in part constrained by the level of measurement that was employed in collecting the data. One can distinguish between the following four levels of measurement (in ascending order of mathematical precision): **nominal** level measures merely classify data, that is, separate them into categories that differentiate in name only; **ordinal** level measures also have the property that the

categories imply a definite order, e.g., from lower to higher; **interval level measures** also have the property that the numerical distances between categories have an **intrinsic meaning** which is equal throughout the entire range of the measure; and **ratio level measures** also have the property of having a non-arbitrary zero, so that it is logical to think of a category as being twice the value or category (numerically and conceptually) as another value or category. In most cases **parametric statistics**, the more powerful form of statistics, may only be legitimately used with interval and ratio measures, while **nonparametric statistics** (see Hollander and Wolfe, 1973) may be used with variables measured with all four levels of measurement.

35. While interpretivist science approaches share a concern with those, like Pfau (1986), in the positivist science tradition for low inference measures, interpretivist science approaches do not as often seek to quantify their observations. Rather those working within the interpretivist tradition often seek low-inference, qualitative measures of people's contextualized actions and meanings.
36. Their discussion to some extent imposes different (quasi-positivist) assumptions and aspirations on research conducted within interpretive science tradition. While some researchers in the interpretivist science tradition feel uncomfortable with their language and approach, we believe Goetz and LeCompte's (1984) discussion has heuristic value, if employed with caution.

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