GUEST EDITORIAL

What Constitutes Valid Research? Qualitative vs. Quantitative Research

James B. Reswick, ScD

Associate Director for Research Sciences
National Institute on Disability and Rehabilitation Research
Washington, DC

In 1988, I became Associate Director for Research Sciences of the National Institute on Disability and Rehabilitation Research (NIDRR), an organization devoted to rehabilitation research covering all nature of impairments and all ages of persons. Coming from a background of engineering sciences, I thought I knew what constituted valid research, but must admit now, five years later, that my concept was sorely limited. New knowledge often serves to teach one how much one does not know. While this was true in my case, I have begun to better understand the varied nature of research as found in all of the sciences and I would like to share what I have learned with you in this editorial.

Research is done in many fields and takes many forms. Among the words used to characterize different types of research, I propose to discuss the following: 1) **scientific,** 2) **basic,** 3) **applied,** 4) **directed,** 5) **hard,** 6) **soft,** 7) **participatory action research (PAR),** 8) **quantitative,** and, 9) **qualitative.**

Research is **scientific** when it employs the **scientific method.** The key to the scientific method is *replicability.* A method is scientific to the extent that procedures are described objectively and in detail so that another investigator may repeat and independently verify results. A method to be scientific must be **valid** and **reliable.** Validity is the degree to which scientific observations actually measure or record what they purport to measure and reliability is the repeatability, including interperson replicability, of scientific observations.

Of first importance is the fact that *all* of the types of research listed *can* be scientific or said in another way, none of them can be used to define research as unscientific. All that counts is whether or not the research meets the test of scientific method as previously defined.

I may quickly put aside the adjectives **basic, applied,** and **directed.** In basic research, the investigator is not concerned with the immediate applicability of his results but rather seeks understanding of natural processes. In applied research, as the term suggests, the investigator has an application in mind and wishes to discover knowledge that can be used to solve a problem or contribute to society. The goal of directed research (which can be either basic or applied) is usually established within an organization by someone other than the investigator. **Hard** and **soft,** carrying possibly pejorative connotations that have nothing to do with the scientific method, are inappropriate to use with the word **research. Participatory action research (PAR)** is a term that has recently gained acceptance.

It recognizes the need for persons being studied to be included, as far as possible, in the design and conduct of all phases of the research that affects them. It is obvious that it has little relevance in physical science research that does not involve human subjects, and it has minimal importance in studies that involve large, highly distributed populations that respond to questionnaires, etc. As will be shown later, PAR is such an integral part of qualitative research that it loses its sanction to be especially named.

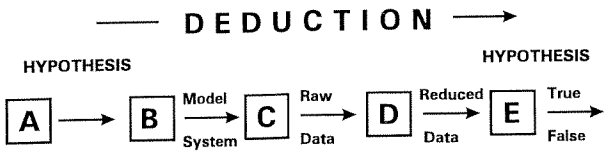
The terms that do define significantly different types of research are **quantitative** and **qualitative.**

It is true that quantitative research is usually associated with the physical and biomedical sciences while qualitative research is found mostly in the social sciences. But neither is exclusive of the other. In fact, a great deal of social science research is highly quantitative involving, as it does, advanced statistical methods.

Quantitative and qualitative research differ in at least three major ways. First, the *process* is very different; second, the *tools* are different; and, third, the *outcomes* differ. I propose to discuss these differences through the use of block diagrams that represent models of the two processes. They are used with the understanding—even caveat—that they are only idealizations. Real world research modifies and blends them as it does with all models.

I propose to compare the processes, tools, and outcomes in the following:

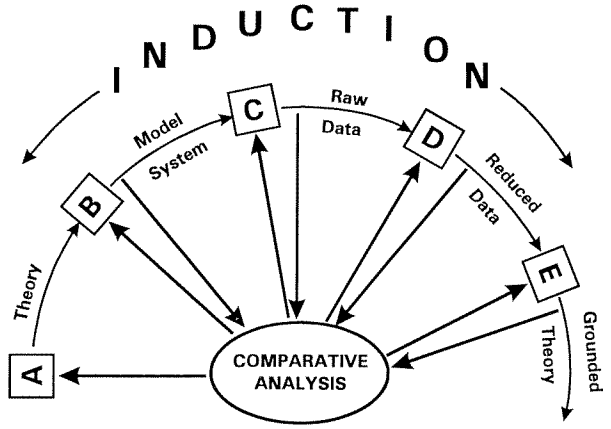
Processes: As shown in **Figure 1,** the quantitative research process is linear and unidirectional. In automatic control theory it would be termed "open loop." The researcher is able to isolate the experimental or study system, define the parameters, and select and measure relevant variables with precision and accuracy. The thinking process is essentially deductive following a creative act of hypothesis formulation.



A. Formulate Hypothesis.
B. Define experimental model/system, variables and measurements.
C. Perform experiment or carry out study.
D. Analyze data, test for reliability and validity.
E. Deduce truth or falsity of hypothesis.

Figure 1.
Quantitative research

In **Figure 2,** I attempt to illustrate the inductive character of qualitative research and its iterative or closed-loop feedback nature. The qualitative researcher cannot define the system and its variables with the relevancy and accuracy of the quantitative researcher. The researcher, therefore, creates an initial theory (based perhaps on intuition and experience), and proceeds to organize the study, apply tools, and gather data. As data accumulate and are reduced, the researcher may well redefine the model and alter the study design employing a refining method called **comparative analysis.** The diagram shows the central role of comparative analysis in qualitative research, how it occurs at any point in the process, and at any time, and suggests its feedback nature. Comparative analysis means to continually compare assumptions, structure, data, and outcomes with all available information including reports in the literature and to continually test data for reliability and validity. As first indications begin to suggest a



A. Conjecture theory.

B. Define model/system, question(s), study format, variables, instrument design.

C. Carry out study, gather data, interview, lead focus group(s), participate/observe.

D. Analyze data, test for reliability and validity.

E. Formulate theory grounded on data.

Figure 2.
Qualitative research

theory, the researcher may alter and refine the study to produce new data that support this emerging theory or perhaps to point in another direction. This process continues until a theory, well grounded in data, takes credible form.

The involvement of study group persons as partners in the research is integral to the qualitative feedback research process and, in a large part, is vital to its success. This sort of critical sharing of research responsibility between researcher and those being studied is the essence of PAR. Since it has always been vital to the success of much qualitative research, I would take the position that PAR should not be given the status of a newly recognized kind of research, but rather be seen as one of many factors intrinsic to qualitative research.

Tools: The quantitative researcher may work in the laboratory with instruments that measure quantities with precision and accuracy and, when required, work with animals or oversee research that studies human subject responses. In studies involving human subjects, they may serve as their own controls or they may be members of matched controlled populations. Statistical methods provide tools to measure reliability and validity of results.

The tools of the qualitative researcher are likely to include questionnaires, focus groups, interviews, and personal participation and observation.

Outcomes: The outcome of quantitative research is usually a truth test of an *a priori* stated hypothesis.

The outcome of qualitative research is a **grounded theory.** The process starts with a theory based on experience and intuition. It ends with a theory that is grounded on data. If the data are reliable and valid and the study can be replicated by others, then the theory is credible and the process is scientific.

In conclusion, I may have trod on dangerous ground. My aim was to suggest that many types of research exist and none of them is necessarily more scientific than another. If the reader takes exception or thinks of better ways to view these matters, so much the better. Perhaps, then, I will have initiated a qualitative research process with a life of its own.

James B. Reswick, ScD