Under normal conditions the research scientist is not an innovator but a solver of puzzles, and the puzzles upon which he concentrates are just those which he believes can be both stated and solved within the existing scientific tradition.

Thomas Kuhn

Both the No Child Left Behind (NCLB) Act of 2001 and the Education Sciences Reform Act of 2002 have brought evidence-based research front and center in education by requiring federal programs under each act to use their allocations on evidence-based strategies. The definition of scientifically based research from NCLB purports research that involves the application of rigorous, systematic, and objective procedures to obtain reliable and valid knowledge relevant to education activities and programs; and includes research that:

1) employs systematic, empirical methods that draw on observation or experiment;
2) involves rigorous data analyses that are adequate to test the stated hypotheses and justify the general conclusions drawn;
3) relies on measurements or observational methods that provide reliable and valid data across evaluators and observers, across multiple measurements and observations, and across studies by the same or different investigators;
4) is evaluated using experimental or quasi-experimental designs in which individuals, entities, programs, or activities are assigned to different conditions and with appropriate controls to evaluate the effects of the condition of interest, with a preference for random-assignment experiments, or other designs to the extent that those designs contain within-condition or across-condition controls;
5) ensures that experimental studies are presented in sufficient detail and clarity to allow for replication or, at a minimum, offer the opportunity to build systematically on their findings; and
6) has been accepted by a peer-reviewed journal or approved by a panel of independent experts through a comparably rigorous, objective, and scientific review.

(No Child Left Behind Act of 2001)

Although critics have questioned the soundness and rigor of what constitutes legislatively derived scientifically based research in education (Berliner, 2002; Erickson & Gutierrez, 2002; Lather, 2004, St. Pierre, 2002), they still underscore the importance of “articulating and upholding standards of high quality science” in education research (Shavelson & Towne, 2001). Educational researchers have worried that the “narrow definition s of research or science might trivialize rather than enrich our understanding of education policy and practice, and that the splendors of unfettered scholarship will be eroded by creeping tides of conformity and methodological zealotry” (Feuer, Towne, & Shavelson, 2002).

The public debate has centered around two fundamental questions: What constitutes “scientifically based” research in education? and Is scientifically based research the only or the best approach to meaningful studies of educational phenomena? (Eisenhart & Towne, 2003). In late 2000, a National Research Council (NRC) committee of leading education scholars examined these fundamental questions and published its report in the spring of 2002.
According to the NRC (2002, 2005), education has its own set of features that set the parameters for the design of scientific education research. Accordingly, scientific research in education, like scientific research in the social and natural sciences, should:

- Pose significant questions that can be investigated empirically
- Link research to relevant theory
- Use methods that permit direct investigation of question
- Provide a coherent, explicit chain of reasoning to rule out counter-interpretations
- Replicate and generalize findings across studies
- Disclose research to encourage professional scrutiny and critique

The application of these scientific principles to education is based upon the premise that:

Education is multilayered, constantly shifting, and occurs within an interaction among institutions (e.g., schools and universities), communities, and families. It is highly value laden and involves a diverse array of people and political forces that significantly shape its character. These features require attention to the physical, social, cultural, economic, and historical environment in the research process because these contextual factors often influence results in significant ways (National Research Council, 2002).

Education research, the NRC report (2002) purports, serves two related purposes: to add to fundamental understanding of education-related phenomena and events, and to inform practical decision making. Education research that explains, describes, or predicts closely resembles “traditional” scientific inquiry and should adhere to the following contextual conditions: to build theory, to formulate research questions, to design and conduct studies, and to draw conclusions. The following questions are important for the conduct of scientific research in education:

- Is there a clear set of questions underlying the design?
- Are the methods appropriate to answer the question and rule out competing answers?
- Does the study take previous research into account?
- Is their a conceptual basis?
- Are data collected in light of local conditions and analyzed systematically?
- Is the study clearly described and made available for criticism?

The importance of linking design-study research questions with corresponding research methods cannot be overemphasized and both quantitative and qualitative methods are needed to fully explore the wide array of research questions (National Research Council, 2002; Shavelson, Phillips, Towne, & Feuer, 2003). According to Fraenkel and Wallen (2006), good research questions possess four essential characteristics:

1. The question is *feasible* (i.e., it can be investigated without an undue amount of time, energy, or money).
2. The question is *clear* (i.e., most people would agree as to what the key words in the question mean).
3. The question is *significant* (i.e., it is worth investigating because it will contribute important knowledge about the human condition).

4. The question is *ethical* (i.e., it will not involve physical or psychological harm or damage to human beings or to the natural or social environment of which they are part).

Finally, in order for an educational researcher to search for information relevant to a research question, a thorough review of the literature is warranted. In addition to a review of the literature regarding scientific research in education, ConQIR will conduct a literature reviews pertaining to the following topics:

- Survey Methods
- Identification & Recruitment
- Interviewing & Re-Interviewing
- Inter-Rater Reliability
- Recruiter Training
- Electronic COE
- Sampling Methods
- Pilot Testing
- Adoption and Diffusion of Materials, Products, & Systems
- Training of Trainers
- Capacity Building

References


Shavelson, R.J., & Towne, L. (2001). On scientific research in education: Questions, not methods, should drive the enterprise. National Research Council Committee on Research in Education.
