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Title pages

*Accumulating Evidence: Procedures for Resolving Contradictions among Different Research Studies**

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Significant knowledge in the social sciences accrues ever too slowly. A major reason is that various research studies on a particular question tend to be of dissimilar designs, making their results difficult to compare. An even more important factor is that social science studies frequently produce conflicting results, which hinder theoretical developments and confuse those responsible for the implementation of social policies. In this pioneering effort the authors suggest criteria for determining when data from dissimilar studies can be pooled. Methods for recognizing fundamental differences in research designs, and for avoiding the creation of artificial differences, are offered. A paradigm, labeled the "cluster approach," is proposed as a means of combining the data of studies from which conflicting conclusions have been drawn. Major emphasis is placed on ways that the paradigm might solve problems presently faced by educational researchers, and several studies comparing the effectiveness of pre-school programs are used to illustrate the cluster approach.

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Key passages

The thirteenth stroke of a clock is not only false of itself, but casts grave doubts on the credibility of the preceding twelve.

Mark Twain, *Autobiography*

Mark Twain's statement captures a striking part of the experience of doing educational research. It seems that for every twelve studies reaching a specific conclusion, it is always possible to find a thirteenth that disagrees. Mark Twain's solution might well have been to put all thirteen behind him, and light out for the Territories. The research equivalent of Mark Twain's action would be to discard the conflicting evidence, and initiate a new study. But this action would entail three costs. First, a great deal of information, much of which might be potentially valuable, would be thrown away. Second, a decision would be postponed for at least the length of time required by the new research. Third, from the point of view of the next reviewer of the literature, this new research would simply be the fourteenth in the set of studies. No matter what its results, for the next reviewer the contradictions remain. Thus, for any researcher, it is worth making an attempt to find a way to combine and reconcile conflicting studies.

The traditional starting point for finding such a way, in both educational and scientific research, is a review of the existing literature. These reviews frequently contribute to educational policy decisions. Essentially they involve three steps. First, all the relevant empirical studies are gathered together. Second, studies with inadequate sampling procedure, measurement and instrumentation, or methods of analysis are identified and discarded. Third, the conclusions from the remaining studies are assembled and compared in an effort to find consistent results. The third step often encounters contradictions; similar studies frequently produce contrary results.

When the purpose of the literature review is primarily theoretical, inconsistencies in the results of various studies can be disconcerting. When the purpose of the review is to develop specific policies, however, such inconsistencies can paralyze attempts at public action. In a recent address to the American Educational Research Association, Senator Walter Mondale, speaking in the context of school integration, put the issue clearly:

What I have not learned is what we should do about these problems. I had hoped to find research to support or to conclusively oppose my belief that quality integrated education is the most promising approach. But I have found very little conclusive evidence. For every study, statistical or theoretical, that contains a proposed solution or recommendation, there is always another, equally well documented, challenging the assumptions or conclusions of the first. No one seems to agree with anyone else's approach. But more distressing: no one seems to know what works. As a result I must confess, I stand with my colleagues confused and often disheartened.¹

The Senator's quandary is understandable. Further, his description of the lack of consistency in educational findings unfortunately applies not only to research on integration, but to many other issues in educational policy as well. Even apart from the formulation of educational policy, the contradictions we encounter among similar studies with different conclusions cripple a fundamental component of the scientific process: the systematic accumulation of knowledge.

Most readers who are familiar with educational research journals, as well as other social science journals, will recognize the following paradigm. An author reports the results of his research, and concludes his article with a statement that reads, "While I have found X, Y, and Z, further research on this subject is needed." What does this statement imply? It implies the author is interested in seeing further results, collected by himself or by others, which will either corroborate or contradict his own findings. Thus, the author must believe, as most researchers and policy makers do, that evidence and knowledge should be cumulative. But for evidence to be cumulative, there must be accessible procedures for accumulating it. Currently, there appear to be few systematic efforts to accumulate information gradually from a set of disparate studies.

We present here the outlines of a strategy for accumulating information.

[Home](#)

[Contents](#)