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ABSTRACT

A generation ago, Fred N. Kerlinger proposed that there were a number of myths that pervaded educational research. An overview of three specific myths is presented, followed by a discussion of the degree to which these myths have been overcome or still exist in educational research. The first of these myths, the "methods" myth, is centered about the naive misperception that research design is synonymous with research methodology, and that merely gathering data constitutes research. A second myth is an excessive concern with practicality, a preoccupation with the immediate "payoff" when designing, conducting, or evaluating research, rather than an interest in the advance of theory. A third myth, the "statistics" myth, was probably meant by Kerlinger to denote two distinct problems. One is a fundamental disregard for statistics as an informational and methodological tool, and the other is a failure to understand that research design and statistical analysis are intimately related. Although some progress is being made in addressing each of these myths, they continue to persist and exert adverse effects on the quality of educational research. (Contains 60 references.) (Author/SLD)

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Kerlinger's Research Myths: An Overview with Implications for Professors of Educational Research

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Abstract

A generation ago, Fred N. Kerlinger proposed that there were a number of myths that pervaded educational research. An overview of three specific myths--the "methods," "practicality," and "statistics" myths--is provided, followed by a discussion as to the degree to which these myths have been overcome and/or still exist in educational research.

Kerlinger's Research Myths: An Overview with Implications for Professors of Educational Research

> It is evident, to me at least, that research in education is changing and changing for the better. Quite slowly but nonetheless plainly, the emphasis is shifting in some institutions from exclusive concern with practical ends to more preoccupation with fundamental approaches to educational problems. (Kerlinger, 1959, p. 290)

The name Fred N. Kerlinger is easily recognizable to those who have received training in behavioral research. Kerlinger has been appropriately hailed since his death in 1991 as having "contributed to the transformation of the way behavioral scientists and educators read research reports, design and execute research, and draw conclusions and implications from their findings" (Pedhazur, 1992, p. 45). Relatively early in his career as an educational researcher, Kerlinger (1960) introduced the notion that educational research is fraught with a "mythology," that is, "a body of legends and beliefs purporting to be the rationale, purpose, and methods of educational research" (p. 149). Six "individual" myths falling within the purview of the general educational research mythology framework were mentioned by name (i.e., myths regarding "methods, statistics, measurement, practicality, 'educational research is special and different,' action research"--Kerlinger, 1960, p. 149).

In discussing these myths, Kerlinger leveled honest, and often blunt, criticisms toward the educational research community; yet, like earlier critics of educational research (e.g., Valentine, 1931, p. 105), he possessed an unflinching optimism as he contemplated the future of educational research, predicting a progression toward excellence in the practices employed by the next generation of researchers. For example, in 1959, Kerlinger wrote:

> In fifteen years, we shall probably not recognize educational research. . . . The disciplines and tools necessary for the scientific testing of theory will be accepted as part of the learning experience and equipment of all or nearly all graduate students in education. (p. 290)

A decade later, reflecting on a number of progressive improvements he had seen in research training and practice, Kerlinger noted "there is considerable hope that school-of-education atmospheres will become more congenial to research, that understanding of research will grow, that research training will improve and that better educational research will be done" (Kerlinger, 1969, p. 1140).

Has educational research indeed moved toward Kerlinger's view of excellence? Conversely, is educational research still rife with deleterious mythological perceptions and practices? My purposes in this paper are to overview three of Kerlinger's myths--the "methods," "practicality," and "statistics" myths--and

to offer my opinions regarding the degree to which these myths have been overcome and/or are still prevalent in educational research.

The Methods Myth

The methods myth (Kerlinger, 1960) is centered about the naive misperception that research design is synonymous with research methodology, that "gathering data constitutes research" (p. 149). Hence, becoming an educational researcher simply involves learning about methods for collecting and analyzing educational data. Kerlinger (1960) offered the overuse of survey methods as evidence of the proliferation of this myth. For example, researchers taken with the idea of studying educational change may substitute collection of survey data (i.e., "clerical work of a higher order"--p. 149) for true scientific investigation of the relationships among the variables under consideration. In correct practice, the researcher should not be so much concerned with determining "whether this method or that method should be used," but rather with answering the important question of "Which methods--of observation, measurement, analysis--help the development and testing of theory?" (Kerlinger & Pedhazur, 1973, p. 450).

Unfortunately, Kerlinger (1960) noted, the methods myth tends to perpetuate itself considering that commonly-used educational research textbooks generally emphasize methods over design, and, further, considering that "the professors of the

next generation are selected from the doctoral students of this generation" (p. 151). Hence, researchers pass on from generation to generation the tradition of blindly applying "standard" data collection and analytic strategies without regard for larger research design issues. For example, many researchers learn to use analysis of variance techniques out of habit without consideration being given to research design issues, even in cases in which intervally-scaled independent variables are utilized:

> If. . .the two independent variables [in a given investigation] are intelligence and social class, both ordinarily nonmanipulable and correlated, the assumption of zero correlation between them necessary for analysis of variance cannot be made. . . . Strictly speaking, if our independent variables are nonexperimental, then analysis of variance is not the appropriate mode of analysis. (Kerlinger, 1986, p. 305)

The methods myth tends to spawn a plethora of faulty methodological practices. It is interesting that despite the fact that many methodological flaws common in behavioral research have been exposed by insightful critics (cf. Carver, 1978; Glass, Peckham, & Sanders, 1972; Morrison & Henkel, 1970; Wainer, 1989), thoughtless repetition of poor practices (brought about, at least in part, by the methods myth) continues. Consider, for example, Thompson's (Thompson, 1989; Thompson, Smith, Miller, & Thomson, 1991) and Snyder's (1991) thoughtful investigations into the

reasons why educational researchers continue to utilize stepwise analytical methods despite the fact that egregious problems with the application of stepwise methods have long been substantiated.

The Practicality Myth

Initially conceptualized as an "overconcern with practicality" (Kerlinger, 1959, p. 282) and later designated as the "pragmatic-practical misconception" (Kerlinger, 1977), the practicality myth is characterized by a preoccupation with practicality (i.e., expectation of an immediate "payoff") when designing, conducting, or evaluating research. In other words, researchers motivated by this myth would erroneously view the identification and solution of practical problems in education as the general purpose of educational research. Kerlinger (1979, p. 288) maintained, instead, that "the solution of a research problem is on a different level of discourse than the solution of an action problem." The essence of research is the advancement of theory:

> The basic aim of science is theory. Perhaps less cryptically, the basic aim of science is to explain natural phenomena. Such explanations are called theories. Instead of trying to explain each and every separate behavior of children, the scientific psychologist seeks general explanations that encompass and link together many different behaviors. (Kerlinger, 1986, p. 8)

Because the practicality orientation violates so strongly the true nature and character of educational research, it is quite conceivably the most foreboding of all the educational research myths (Kerlinger, 1969). Additionally, the practicality myth serves as a detriment to an appropriate conceptualization of the functions of the university (Cronbach, 1966; Kerlinger, 1957, 1959):

> As the major emphasis of the educator in the university, practicality is narrowing, crippling, blinding, and generally bad. . . . [W]hen practicality becomes the overriding concern of the university educator, in schools of education or in any other schools of the university, then it is antithetical to the objectives of the university. (Kerlinger, 1959, p. 284)

Without a doubt, consultation and community service are necessary and viable functions of the university professor. Nevertheless, the implacable preoccupation of faculty members with these practical endeavors has too often constrained the university to become "either a social work agency, a consultation and lecture bureau, or, generally speaking, a 'do-good' center" (Kerlinger, 1957, p. 37).

Interestingly, the educational community, generally, and educational policy makers, more specifically, have historically favored and continue to favor research that has immediate practical implications (Kaestle, 1993; Kerlinger, 1969, 1977, 1979). After all, educational researchers are concerned with

"the practical problems of practical teachers in practical schools--teachers who deal with the practical problems of practical children of practical parents" (Kerlinger, 1959, p. 281). Hence, there has generally been a bias toward the conducting of results-oriented applied research at the expense of more theoretically-oriented basic research (Kerlinger, 1969, 1977), and research funding has typically been directed toward educational research projects with a practical focus (Kerlinger, 1959).

In fact, critics of basic research (e.g., Ebel, 1973) have argued that basic research promotes the virtue of uselessness and thereby offers little hope for the improvement of the process of education. By contrast, Kerlinger argued that basic research is more promising than applied research as a means for understanding educational phenomena (Kerlinger, 1959, 1969). Citing an example from biomedical research (Comroe & Dripps, 1976), Kerlinger (1979, pp. 291-292) illustrated that basic research was responsible for almost three times as many of the key articles that have impacted medical practice than research of any other type.

The Statistics Myth

Although Kerlinger (1960, p. 149) never indicated what precisely he meant by the "statistics" myth, a critical analysis of his writings would indicate he may have intended to use the term to denote at least two distinctive, though related,

problems: (a) a fundamental disregard for statistics as an informational and methodological tool (what will hereinafter be referred to as "statistics myth I"), and (b) a failure to understand that research design and statistical analysis are intimately related (what will hereinafter be referred to as "statistics myth II").

Statistics Myth I

In his book, *Behavioral Research: A Conceptual Approach*, Kerlinger (1979) noted the existence of a "serious misconception of statistics, which, if held strongly enough, is completely debilitating. . . . Its core seems to be that statistics has little or no relation and relevance to 'reality'" (p. 81). Adherents to statistics myth I view statisticians as methodological shamans who "perform complex and abstruse operations with numbers derived in mysterious ways" (p. 81), with the result being a multifarious series of numerical abstractions (i.e., "mysterious, undecipherable hieroglyphics"--Weed & Greenwald, 1973, p. 115) that have little or nothing to do with reality.

Concomitantly, the statistics I mythopoeist is prone to believe that behavioral constructs cannot, and should not, be quantified (e.g., that assigning a number to a given construct fails to represent the truly complex nature of that construct). As Tate (1965, p. 3) noted:

> Some social scientists are suspicious of figures. They believe that presenting evidence relating to man and his

> affairs in the form of numerical facts necessarily devitalizes and distorts the phenomenon which is under investigation. This amounts to the belief that social problems must be dealt with mainly on authoritative, traditional, or intuitive grounds.

Kerlinger (1979) countered this misperception regarding the usefulness of statistics (statistics myth I) by noting, first of all, that the purpose of behavioral statistics is not to attempt to mirror the reality of any particular individual within a given data set, but instead its purpose is to help researchers understand and interpret sets of data. In addition, noted Kerlinger, the history of research in the behavioral sciences has illustrated well that numerous psychological and behavioral phenomena have been quite accurately and meaningfully measured and quantified.

Statistics Myth II

Kerlinger also discussed a second type of statistics-related myth, somewhat akin to the methods myth, that often pervades educational research:

> There is a curious mythology about understanding and mastery of the technical aspects of research. Statistics is often called "mere statistics," and many behavioral researchers say they will use a statistician and a computer expert to analyze their data. An artificial dichotomy between problem conception and data analysis is set up. (Kerlinger & Pedhazur, 1973, p. 368)

Statistics myth II assumes that the researcher and the statistician are two different (and unrelated) persons and that forethought as to what statistical procedures will be utilized to analyze the data from a study is unnecessary. Researchers settle for less sophisticated data analytic methods (e.g., use of univariate statistical procedures when multivariate procedures would more appropriately honor the reality of the relationships among the variables under consideration--Kerlinger & Pedhazur, 1973) and/or do a poor job of interpreting the results of the methods they do use.

Because all statistical methods have certain inherent strengths and limitations and because each method implies certain assumptions about the data being analyzed, these methods are very likely to influence to some degree both the nature and selection of research problems (Kerlinger, 1969, 1986; Kerlinger & Pedhazur, 1973). Therefore, statistics myth II's claim that statistical knowledge is unnecessary to good research practice is unfounded; in fact, Kerlinger (1986, p. 622) noted that "it is almost impossible to do outstanding research, though one can do acceptable research, without being something of a methodologist." Kerlinger and Pedhazur (1973) go so far as to say that the researcher who lacks a basic knowledge of data analytic strategies is a "scientific cripple" (p. 369).

Limited knowledge of basic statistical concepts can also lead to inappropriate interpretations of statistical results (Tate, 1965). Chief among these misinterpretations of

statistical results is the common misunderstanding of statistical significance testing, namely, the ingenuous assumption that a statistically significant result is necessarily a noteworthy result, an issue that has received considerable attention for some time (e.g., Morrison & Henkel, 1970; Shaver, 1985; Thompson, 1996). Kerlinger devoted efforts towards quelling this erroneous mindset:

> . . .statistical significance says little or nothing about the magnitude of a difference or of a relation. With a large number of subjects. . .tests of significance show statistical significance even when a difference between means is quite small, perhaps trivial, or a correlation coefficient is very small and trivial. . . . To use statistics adequately, one must understand the principles involved and be able to judge whether obtained results are statistically significant and whether they are meaningful in the particular research context. (Kerlinger, 1979, pp. 318-319--emphasis in original)

Regarding the interpretation of the results of multiple regression analyses, for example, Kerlinger and Pedhazur (1973) advocated, particularly in cases in which sample sizes are relatively large, using both statistical significance testing and "the criterion of meaningfulness" (p. 286), with the latter being given the primary consideration.

Status of the Myths in Current Research Practice

Are these myths still prevalent in educational research? Or, have we attained to Kerlinger's bright view of the future? To some degree each of these three myths does indeed still exist; however, there is evidence that progress is being made toward eradicating these and other myths from educational research practice.

Prevalence of the Methods Myth

It could be argued that we have seen a substantial move towards eradicating the methods myth at least as regards putting the correct structural framework (i.e., course work and textbooks) in place. My familiarity with curricula in educational graduate programs indicates that, at least structurally speaking, courses normally imply that research design serves as the foci of the various "methodology" courses. It would appear as well that most "educational research" or "social science statistics" textbooks anchor their discussion of methodological issues within the framework of research design. For example, Sprinthall (1990) includes a chapter on "The Fundamentals of Research Methodology" (chapter 11) in his basic statistics text and presents most of the statistical methods covered within a research design context. Heiman's (1996) text has similar features. Hinkle, Wiersma, and Jurs (1988) do not include a separate chapter on research design in their text, but they do present a number of research scenarios to illustrate the design issues inherent to utilization of the various techniques covered.

Despite these advances in educational research curriculum and course materials, there is considerable evidence, however, that the previously noted problems associated with the misapplication of methods are by no means defunct. Studies of educational dissertations, for example, have consistently found numerous instances of inappropriate or at least indiscriminate applications of methodological procedures (cf. Davis & Davis, 1989; Eason & Daniel, 1989; Jarrell, Johnson, Chissom, & Hughes, 1989; LaGaccia, 1991; Talbert & Brown-Meyers, 1988; Thompson, 1987a, 1987b, 1988b, 1994). Hence, as Daniel (1992, p. 1) stated in a comprehensive review of writings on the quality of educational research, "our methods and machinery still could stand some refinement."

Prevalence of the Practicality Myth

Unfortunately, the practicality myth seems to be alive and kicking. In fact, even though educational research is probably more theory-driven than it has been in past years, the public's quest for accountability frequently demands that there be an immediate and measurable payoff when efforts and money are expended. As McEwen (1992) expressed it, "Researchers have tended to focus on accuracy while policy-makers are concerned primarily with utility" (p. 30). Hence, Kaestle (1993) bemoaned the fact that policy makers still criticize and often fail to adequately fund educational research and development because there is no immediate payoff. Elaborating on this point, Kaestle

noted, "If researchers' favorite complaint is lack of money, the most common complaint leveled against them is the lack of connection between their research and teachers' practice" (pp. 26-27).

Likewise, Cooper (1996, p. 31), noted a bias common to policymakers, namely that research cannot be practical and should not be trusted because it is too confusing:

> . . .public officials many times have seen research employed by opposite sides in the same advocacy debate. The statements "research can prove anything" and "a study can be found to support whatever position you like" roll easily off the tongues of experienced policymakers in reaction to any precipitating statement that begins "The research shows. . ."

Hence, the lure of practicality still serves as "a social norm, a rule of proper educational research behavior, that tends to force the scientist away from the really significant scientific problems in education" (Kerlinger, 1959, p. 286).

Prevalence of Statistics Myths I and II

According to Holmes (1990), statistics myth I, the basic misconception that statistical information is mysterious and difficult to understand (cf. Kerlinger, 1979), remains a problem. Speaking of typical attitudes toward statisticians, Holmes noted, "we, the general public, have the greatest respect for them, we are in awe of their capacities, and we are slightly afraid of

them" (p. 7). Interestingly, however, Holmes noted that this awe and fear of statisticians causes many to put blind faith in those who are (at least seemingly) expert in statistics, a contrast to Kerlinger's (1979) notion that a lack of understanding of statistics may prompt individuals to doubt the validity of statistical claims. Holmes' view seems to be typical of those educators or policy makers who are willing to read research reports, but who completely skip the design and analysis sections assuming that the researcher has done an appropriate job of analyzing and interpreting the data (Weed & Greenwald, 1973). Although Sprinthall (1990) acknowledged that math phobia may be a barrier to the understanding of statistics, he presented a viewpoint more consistent with the Kerlinger point of view in the introduction to his statistics text, citing the commonly-held beliefs that statistical analysis cannot be trusted and that statistics is too rife with technical jargon to be of any practical use.

There has no doubt been some progress made towards putting statistics myth II, the assumption that research design and selection of statistical procedures are unrelated processes, to rest, although there is still considerable room for improvement. As previously noted, this myth manifests itself via a lack of consistency between research design and statistical analysis or via other similar methodological problems. For example, studies of methodological practices employed in published research (e.g., Crandall, 1982; Eason, Daniel, & Thompson, 1990; Elmore &

Woehlke, 1988; Goodwin & Goodwin, 1985; Hall, Ward, & Comer, 1986; Swanson & Alford, 1987; Ward, Hall, & Schram, 1975; Willson, 1980) have indicated that the appropriate application of multivariate statistical methods has increased over time, a trend consistent with the methodological preferences noted by Kerlinger (1986; Kerlinger & Pedhazur, 1973), even though these studies have also identified other types of methodological problems that are still quite prevalent in research practice.

In addition to the ongoing problems with statistical significance testing that were previously noted, various other statistical procedures have received criticism based on their misuse and misinterpretation. These critiques have included arguments against certain misuses of stepwise variable entry methods (Huberty, 1989; Snyder, 1991), contingency table test statistics (Thompson, 1985), analysis of variance (McLean, 1989; Willson, 1982), covariate adjustments (Daniel, 1990a; Loftin & Madison, 1991), and interpretations of various statistical weights (Daniel, 1990b; Thompson & Borrello, 1985). Interpretive aids for understanding multiple regression and canonical correlation analyses have also been offered (e.g., Daniel, 1989; Thompson, 1988a; Thompson & Daniel, 1991). As a whole, these critics have not disavowed the use of these procedures, but have called for their appropriate use by more careful researchers.

Discussion

Despite Kerlinger's bright hopes for the future, he also foresaw the stalwart nature of the myths, noting that the

mythology of educational research "has an essentially mystical character which seems to be rooted to the past. To question the mythology amounts to heresy" (Kerlinger, 1960, p. 149). It is obvious that educational research in the 1990s is by no means "myth free"; however, it is also obvious that thoughtful researchers are willing to commit "heresy," working both individually and collectively to deal with the problems inherent to the presence of the myths.

The three myths discussed herein, though distinct, have at least one point in common. They all serve to prevent researchers and other interested parties (e.g., policymakers) from maintaining a unified viewpoint from which research is best conducted and interpreted. Perhaps, Kerlinger and Pedhazur (1973, p. 448) said it best:

> The various aspects of research go together. One is unthinkable without the others. . . . [D]esign is data discipline. . . . [A]nalysis is data reduction and clarification. The technical aspects of research are inextricably linked together because they all have the same purpose: to bring controlled evidence to bear on the relations of research.

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