INTRADIMENSIONAL VALIDITY AND INTERDIMENSIONAL COMPATIBILITY AS THEY RELATE TO MULTIDIMENSIONALITY

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SUMMARY

The recent proliferation of classroom observational systems creates a potential problem for educational researchers. For example, "how is a researcher to know if he has chosen an efficient system or systems for use in a particular design?" This paper assumes the position that to realize the greatest payoff when applying observational techniques certain conditions pertaining to the validity and scope of each system must be considered and met.

A multi-instrument approach, which is defined as the simultaneous use of more than one observational system, may best be served by utilizing only systems having "content," "differential," and "intradimensional (construct)" validity. In contrast, a multidimensional approach to be effective, must not only be concerned with the validity of the multidimensional system or unidimensional systems employed, but also with "interdimensional" compatibility. Unless these conditions are met, there may be serious questions regarding the degree of confidence that can be placed in the yielded data as well as the subsequent findings in studies using observational techniques.

INTRODUCTION

The use of observational systems as techniques to describe classroom behavior has had significant effects on educational research and teacher training programs. From Withall's work in the forties to the present there have been numerous studies and teacher program descriptions focusing on, or designed around, a given observational system. New systems and techniques are continually being developed and implemented in hopes of better describing the intricate dimensions and interactions of classroom behavior in a more efficient manner. In fact, the rate of development and implementation is so rapid that teachers as well as researchers are encountering a proliferation of observational systems and data.

One of the new ideas to emerge from research (Wood, 1969; Ober, Wood, Cunningham, 1970) in the systematic observation area is the concept of multidimensionality, a technique designed to measure two or more dimensions of behavior simultaneously. In its current stage of development, the theoretical validity of the concept of multidimensionality as proposed recently by Wood, Ober, and Cunningham (1970) is open to some question. As they used it, multidimensionality is the simultaneous use of more than one observational system to observe the same given classroom situation. This particular usage raises two basic questions. First, "Is the simultaneous use of more than one observational system to observe the same classroom situation a sufficient or even a necessary condition to achieve multidimensionality?" Second, "Is there not a distinction between a multi-instrument approach to classroom observation and a multidimensional approach?"

The position taken in this paper is that in order to define multidimensionality in a manner that will distinguish it from other techniques, one must first give thought and consideration to the construct or "intradimensional" validity of each dimension of behavior to be measured by an observational system as well as to the "interdimensional" compatibility of a system or systems selected to be used in a given research design. That is, "does a particular system that is supposedly designed to measure a given dimension (such as verbal behavior) actually measure that dimension?" And, similarly, "how much overlap or intersection is there between dimensions of behavior being measured by a given system or systems?" If several systems are being used, are they all actually measuring the same variables or are they measuring an array of different variables? The validity of an observational system or systems used in any observational technique may be the key as to whether one has an efficient research design or is just contributing to a proliferation of data. Without construct or intradimensional validity, interdimensional compatibility has no meaning; subsequently, the multidimensionality technique used in classroom observation may be an indefensible concept. The purpose of the following discussion is to present some thoughts on behavior, observational systems and techniques, and validity.

VALIDATION OF OBSERVATIONAL SYSTEMS

To analyze the complex phenomena of behavior is a formidable task requiring the use of a basic rationale or theoretical framework. In

essence, the rationale must attempt to describe or operationally define behavior in manageable terms according to some theoretical set of N dimensions. For example, Bloom's (1956) group in theorizing about behavior hypothesize three basic dimensions: cognitive, affective, and psychomotor. Others when analyzing behavior assume just two: verbal and nonverbal. Although the number of dimensions included in a rationale is arbitrary, the operational definitions and descriptions of the structure or subdimensions of each dimension are critical. The dimensions, as well as the subdimensions within a given dimension, should be by design discrete, yet interacting.

An observational system designed to measure some aspect of classroom behavior must be constructed upon some theoretical base similar to the one above. As Brown (1970) indicates, an instrument for the systematic observation of classroom behavior is simply a theory of instruction which has been put into useful and verifiable form.

Depending upon the rationale used, an observation instrument is designed to be unidimensional or multidimensional in nature. An examination of Mirrors for Behavior--An Anthology of Observation Instruments (Simon and Boyer, 1970) attests to the fact that a number of previously developed systems are classified as unidimensional while others as multidimensional. However, in either case, one must keep in mind that the dimensions are theoretical, and any system built upon theory is open to validation procedures. A bias of Soar's, which I share, is that an observation instrument, which has no validity data to support it, ought to be held in no better standing than a paper and pencil test, which has no validity evidence to support it.

In the past, validation procedures in the area of systematic observation have been somewhat overlooked as evidenced by the lack of validity data to support many existing observational systems. It is possible, however, that observational systems may be able to meet the standards of at least three types of validity: content validity, differential validity (a term coined for use in the systematic observation context), and construct or intradimensional validity.

Content validity of an observational system may be established by having qualified persons judge the appropriateness of the operational definitions and descriptions of a system's categories with respect to a given rationale. If data are collected showing the judges to be in agreement in verifying the legitimacy of the categories' descriptions, the content validity of the system may be assumed. It should be emphasized that the system is only evaluated in terms of the stated rationale.

Differential validity of an observational system may be achieved empirically. If two groups are judged to be different according to some predetermined set of relevant criteria observed under uniform conditions, and the resulting data support the differentiation, differential validity of the observational system used may be assumed.

As important as it is to establish the content and differential validity of an observational system, neither directly answers the basic question of what is the system actually measuring? In seeking an answer to this question one must consider construct or intradimensional validity.

The multi-instrument approach to classroom observation may provide a vehicle for studying the construct validity of a given dimension of behavior. Traditionally, this approach is employed to examine or classify several dimensions of behavior simultaneously. However, a multi-instrument approach need not always be multidimensional. Two or more unidimensional observational systems, each purporting to measure the same dimension of behavior (such as verbal behavior), could be used simultaneously to measure the same classroom situation. If a factor analysis of the resulting data indicates the various systems or parts of systems to be loading together under one factor or factors, it would appear that each is supporting the construct or intradimensional validity of the other. A validation procedure such as this could possibly be further controlled by (a) using only systems supported by both content and differential validity data and (b) only systems of the same type, for example, all sign or all category. The above procedure could also be used with a multidimensional system and a unidimensional system providing that each system purports to measure a common dimension of behavior.

CONCLUSIONS

Theoretically, interdimensional compatibility can best be achieved by measuring two or more nonoverlapping yet interacting dimensions of behavior. Thus, judgments concerning this principle necessitate knowing the actual dimensions of behavior being measured by a given system or systems. Hence, without intradimensional (or construct) validity, interdimensional compatibility has no meaning.

It should be emphasized that the validation procedures which have been presented are not thought to be a panacea for establishing the validity of observational systems, but rather are suggestions open to experimentation. The validation of measurement instruments is and will continue to be a major challenge confronting educational researchers.

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