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EVALUATION OF LEARNING ENVIRONMENTS*

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ABSTRACT

This paper discusses some approaches to the evaluation of social environments of learning that extend traditional evaluation beyond what intelligence and standardized achievement tests capture as the outcomes of schooling. Students can provide an important judgment or perspective on the suitability of the social environment as shaped by curriculum, instruction, and learning. This type of assessment of the learning environment holds promise for suggesting curriculum and instructional changes. A number of learning environment scales showing predictive validity from previous studies are utilized in four evaluation studies involving assessment of learning environments. The first two demonstrate instructional effects on the learning environment or classrooms, the third documents the assessment of a major curriculum change through measurement of changes in the learning environment, and the fourth illustrates the sensitivity and usefulness of learning environment data to changes brought about by racial integration. All studies were done in public schools to answer specific problems. One study suggests the impact of a noncompetitive learning environment on reading achievement. A second study indicates that an investigative teaching approach in mathematics has a positive effect on cohesiveness of the class. A third study reports the effects of an experimental curriculum on a school's environmental press. The fourth study uses data about the learning environment to guide policy and to give direction to future in-service work with teachers in a system undergoing racial integration of its students.

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General

The evaluation and accountability movements have made educators more aware that intelligence and standardized achievement tests do not capture all of the outcomes of schooling. Such goals as creativity, integrity, honesty, and democratic skills are espoused by school board members and advocated by educational staffs. Yet it is usually difficult to unequivocally translate such goals into either behavioral objectives or conventional items on psychometric tests. Rather than equating what has most often been measured with what is most important in education, evaluators are now enlarging the sphere of measurement to afford more comprehensive and sensitive assessments. This paper reviews one such technique -- the evaluation of social environments of learning (also sometimes termed "classroom climate", "atmosphere", "press", or "process evaluation") -- and illustrates its practical application in building and assessing educational programs.

Students as Judges

The adage "beauty is in the eye of the beholder" is close to the basis of learning environment assessment. Implicit in this basis is the assumption that the student can provide an important judgment or perspective on the suitability of the social environment of curriculum, instruction, and learning. Students are primary recipients of educational efforts, and as they move from grade to grade and are exposed to a greater variety of learning situations, they become more sophisticated, discerning educational clients or consumers. This is, of course, not to say that they are the only good judges or that they know best what sorts of curriculum and instruction are appropriate.

Dimensions of the learning environment may be assessed with the following kinds of sample items:

* Cohesiveness: Members of the class are personal friends.
* Apathy: Members of the class don't care what the class does.
* Satisfaction: Students are well satisfied with the work of the class.
* Cliqueness: Certain students work only with their close friends.

Students are asked to evaluate their class by choosing among four responses: Strongly Agree, Agree, Disagree, and Strongly Disagree. These items are from the Learning Environment Inventory (LEI) which assesses Cohesiveness, Diversity, Formality, Speed, Environment (Physical), Friction, Goal Direction, Favoritism, Difficulty, Apathy, Democratic, Cliqueness, Satisfaction, Disorganization, and Competitiveness (1). This instrument, which

has been used by more than 500 investigators and evaluators in various parts of the world, and a number of similar instruments are described in technical detail elsewhere (9). Such instruments may be used off the shelf or as the basis of new instruments tailor-made for a particular research or evaluation problem. For example, the My Class Inventory (MCI) is based on a selection of LEI scales but has more simple vocabulary suitable for young children. Another example is the Class Activities Questionnaire (CAQ) that measures students' perceptions of the emphasis given in their class to each of six levels of the Bloom taxonomy of cognitive objectives (6).

Before turning to examples of applications, two general points should be mentioned. First, an extensive series of studies in a variety of settings in the United States, Canada, and other parts of the world show that learning environment scales have considerable predictive validity -- that is, they predict the extent of cognitive and affective learning that takes place during instruction. Contrary to the results of many behavior assessments or sociological surveys of school effects, these studies show that variations in learning environment do indeed make a difference in student performance. Second, the scales are convenient to use and process and have been shown to sensitively reflect curriculum changes, new instructional forms, school integration programs, and other innovations that require evaluation. (For examples in addition to the ones described below, see various chapters in the Walberg reference cited earlier.)

Instructional Programs and the Classroom Environment

As mentioned above, recent studies confirm the importance of the social environment in enhancing achievement (a by-product of an instructional program). On the other hand, planning activities that engage students in the learning processes in particular ways change the learning environment. This section reports on both types of studies: effects of the classroom social environment on learning and effects of instructional approaches on social environment of the classroom.

Practical application in planning programs (8): A large midwestern school system undertook a full scale evaluation study to provide a broad data base for assisting school personnel in selecting a new reading series to serve as a curriculum for the system. The study explored four facets of the instructional program related to or possibly affected by the reading series: student achievement in reading, the social environment of learning during reading classes, teacher characteristics, and instructional characteristics.

After a first screening of many reading series, five were selected to field test in 60 classes, representing grades 1, 2, 3, and 6, in 12 schools. Reading tests were administered at the beginning and end of the school year so that achievement could be examined on a pre- and posttest basis. Data on the social learning

environment consisted of five scales in the My Class Inventory: Cohesiveness, Competitiveness, Difficulty, Friction, and Satisfaction. Data on teacher characteristics included years of teaching, number of reading courses completed, attitude toward the reading series, number of workshops attended in conjunction with the series being field tested, and an awareness of design score.

> Items were developed to measure the teachers' awareness of a reading series' philosophy, goals and objectives, and instructional approaches to teaching reading. The instrument included such items for all five series. The teachers identified those items related directly to their specific series being field tested. The score represented the level of teachers' awareness of the developer's intent (5).

The instructional variables included items on an observation schedule related to the following: a) the locus of instructional desisions (who makes the decisions: the teacher and/or instructional materials or the students); b) student behaviors (predetermined by the reading series or flexible); and, c) instructional materials (limited in modality and in student access or with variable modalities and open access). Analysis of the data assisted in answering a number of questions:

1. Do classes using one series obtain higher reading achievement scores (after adjusting for pretest scores) than classes using another series?

2. Do classes using one reading series perceive their learning environment differently from classes using another reading series?

3. Do teacher characteristics in conjunction with a particular reading series affect reading achievement?

4. Does instruction differ in classes using different reading series?

The answer to all four questions was negative. The single most significant predictor of reading achievement was the pretest score. After the effects of pretest reading scores were removed from the regression equation, only competitiveness, one of the many variables used in the study, affected posttest reading achievement scores. Neither a given reading series nor years of teaching, number of workshops attended or number of reading courses completed proved to be significant variables. Rather, the greater the competitiveness in learning environment as perceived by the students, the lower the reading achievement score.

In today's schools, reading assumes a primary role in children's early contact with formal instruction. Failure to learn to read hangs heavy over the young student. It determines much of

the reward and punishment that pervades the child's world, in school and at home. In looking for directions in planning a reading instructional program, the overall effects of a competitive learning environment on reading achievement should not be ignored.

Assessing Instruction (7): The other side of the coin focuses on changes in the learning environment as a possible by-product of the instructional plan. To sharpen their understanding of basic mathematics concepts and, in turn, to help their students acquire and internalize the concepts, 40 primary and intermediate teachers participating in a year-long National Science Foundation Mathematics Materials Implementation Program were instructed in the use of a variety of NSF developed mathematics materials. The design of the instructional program included an approach to teaching mathematics concepts labeled Investigative Teaching and Learning.

Fourteen characteristics were identified to describe investigative teaching and learning. Table 1 on page 6 includes an operational definition of the 14 characteristics. Near the beginning of the school year, the teachers administered the My Class Inventory to their class and to a control class during the mathematics period. This served as base-line data about the classroom environments. During the course of the school year the participants selected different combinations of investigation teaching and learning characteristics appropriate for introducing specific math concepts to their students. Instruction was designed around the selected characteristics. For example, the concept of one-half was taught to a second grade inner-city class using cuisinaire rods. The teacher built the lesson around five characteristics of investigative teaching in order to involve students in investigative learning: (a) Students confronted a problem; (b) the problem had potential for alternative solutions; (c) activities tended to be open ended; (d) students shared potential solutions; and, (e) solutions were self-verified.

At the close of the school year, the participants again administered the My Class Inventory to their class and also to the control class during the mathematics period. The results indicated a consistent pattern of change in the class learning environments. The mathematics classes conducted by the NSF participants showed a shift in cohesiveness, competitiveness, and friction. Students perceived their classes as more cohesive, less competitive, and friction was lower. There were no such discernible patterns of change in the control group. Satisfaction, however, was down at the end of the year in both groups, but the net drop was less in the experimental than in the control group. However, the differences were not significant.

TABLE 1

Investigative Teaching Characteristics

A Working Definition

Investigative teaching approaches involve the learner in varied activities for the purpose of exploring potential solutions to a problem in order to arrive at an understanding of a concept, rule, principle, generalization or mathematical proposition.

Characteristics

1. A problem is confronted.
2. There is potential for alternative solutions.
3. There is potential for learner input in developing a solution.
4. Learning activities tend to be open ended.
5. There is a choice of learning activities.
6. The learner can initiate activities that may lead to a solution.
7. Learning activities use varied modalities.
8. The learner shares ideas and potential solutions.
9. The learning environment is conducive to exploration.
10. There is an allowance for error.
11. Solutions can be self-verified.
12. Subsequent activities build on the initial solutions.
13. Variable time for learning is provided.
14. The learner collects, orders, and analyzes data.

By participating in evaluation research studies of this sort teachers can learn to use their own classroom learning environment as an index of the effects of their instructional planning.

Assessment in Curriculum Evaluation

Curriculum changes are implemented to effect differences in cognitive and affective structures of students. Historically, cognitive changes as represented in achievement scores have been focal in curriculum evaluation. Practitioners found these to exclude many important curriculum goals. Therefore, achievement measures by themselves have proved unsatisfactory indicators of curriculum effects. This section reports on two learning environment measures, Learning Environment Inventory and My Class (1), used in two curriculum evaluation programs (Clockville and Forrestville) to broaden the scope of measurement and to provide more definitive data on broader curriculum goals.

Clockville Model School Experiment (2): Clockville, a rapidly expanding suburban community, developed an experimental junior high school to meet the needs of a student pupulation who were experiencing difficulty in the traditional program. From a pool of 600 students, 300 were randomly selected to attend the Model School that had fashioned an experimental program thought to be more in line with these student needs. The goals of the curriculum were:

1. the Model School will secure and demonstrate greater community involvement.

2. the learning environment of the Model School will provide a more "humanized" setting for students.

3. over the course of the program year, Model School students will show at least as much growth in the cognitive domain as similar students in the traditional middle schools.

4. over the course of the program year, Model School students will show greater growth in the affective domain than students in traditional schools.

5. Model School Pupil Personnel Service efforts will be completely integrated with all other efforts of the total Model School team to approach a student's total educational environment as a whole.

6. the Model School will demonstrate that its program can raise the overall quality of education without an increase in cost per student.

As the goals imply a major consideration in the experimental curriculum was to redirect the curriculum emphasis and to increase the students' positive attitudes toward the goals of the school.

Two instruments were used in measuring students' affective reaction -- the Learning Environment Inventory and a self-concept measure (4). The self-concept measure has scales that gather students' self report data on: Teacher-School, Physical Appearance, Interpersonal Adequacy, Autonomy, and Academic Adequacy.

The learning environment measure proved to be a far more sensitive indicator of curriculum effects than the self-concept measure. In the first year (using pre- and posttests), the self-concept measure failed to detect any differences between the experimental and the control groups, while the learning environment measure had begun to detect changes between the groups on the following 8 of the 15 scales: Formality, Environment, Friction, Favoritism, Satisfaction, Difficulty, Democratic, and Competitiveness.

In the second year, the differences between the control and experimental groups on the learning environment scale were significant for 12 of the 15 scales: Formality, Speed, Environment, Friction, Goal Direction, Favoritism, Satisfaction, Disorganization, Difficulty, Apathy, Democratic, and Competitiveness. Moreover, all of these changes were in the direction of the goals of the Model School. Over the two year period, the experimental group showed a significant within the group change on: Cohesiveness, Speed, Friction, Favoritism, Cliqueness, Apathy, and Competitiveness. The control group showed only one significant change within the group on Cliqueness. All these scales relate to the Model School goals of a more humanized setting -- positive affects toward the students, the school, and self.

The self-concept measure in the second year for the experimental group showed a gain in two of the five scales over the control group (Teacher-School and Autonomy). However, overall significant gains within the experimental group occurred only on one scale, Autonomy, and in the control group only one significant gain --Teacher-School.

The investigators and school staff were particularly interested in the sensitivity of the learning environment measure to the different climates in the eight junior high schools where the control students were in attendance. In an analysis of the perceptions of the experimental students and their control peers, great differences in climate were found between these schools -- differences which had been intuited by the staff but not documented. Several of the control junior high schools had climates that fostered negative attitudes and were not conducive to stimulating student achievement or encouraging students to remain in school. However, the students in the Model School program did not reflect these attitudes, thus demonstrating that curriculum design does create a press that can foster positive or negative attitudes in students. Over the two-year life of the Model School, the learning

environment changed greatly, and these data provided valuable information to the faculty as they planned programs.

How does a measure of learning environment compare to a measure of self-concept over the two years of the study? The self-concept measure was far less sensitive to change showing no differences the first year and one small difference the second year. Compared with the learning environment measure it gave far less specific data that could be useful in program planning.

The learning environment measure proved to be a sensitive indicator of the effects of a major curriculum revision structured by broad goals. Evaluating these effects, which many educators firmly believe are desirable, has always posed a problem for evaluators. The instruments at hand -- achievement tests particularly -- have not had the curriculum validity to measure these changes. Similarly, self-concept measures have not been sensitive measures of change. By contrast, a careful measure of the learning environment based on students' perceptions did provide data within a short time frame (one and two years) on the accomplishment of broad curriculum goals as well as specific data that could be used to shape the curriculum in pursuit of these goals.

Forrestville, Curriculum Outcomes in School Integration (3): When the suburban school system of Forrestville was under a mandate to reassign the population of its elementary schools to reflect the same racial mix of 20 percent black and 80 percent white, the school staff decided to document the effect this structural shift of population was having on the learning environment for both groups. Over a two year period a series of learning environment measures (1) were administered. The results documented that the learning environment was improving or stabilizing, not worsening. Administrators and the school board were reassured that the learning environment was not deteriorating under integration. And when rumors struck the community about the instability of a school ("X school is flying apart with discipline problems"), the data on the learning environment of that school being no different from the central tendency of all schools laid this vicious rumor to rest.

Learning environment scores, a broader and more sensitive measure, have been useful in detecting the effects of in-service on the classroom. When grade 5 teachers in 1973-74 were the beneficiaries of in-service training, the fifth grade students perceived the 1973-74 learning environment as significantly more satisfying and as having more cohesiveness than did the 1972-73 students. In addition, the 1973-74 students perceived less difficulty and less friction. The math gain achievement scores showed an increase that is significantly different resulting from the in-service programs, but this is not always the case in all subjects. Learning environment scores have also been useful guides to the committees who plan the focus of the in-service program as

integration has heightened the importance of maintaining a classroom climate that fosters student satisfaction and achievement.

The broader social goals of a curriculum have been recognized as important but have been resistive to much conventional measurement and evaluation. The learning environment evaluation measures have been useful tools in obtaining data on complex phenomena involved in major curriculum changes and in social transformations of school population which occur under mandated integration.

Conclusion

Environmental press, long suspected of being a major determinate of behavior, shows clear indication of being a significant factor in shaping classroom learning. It is evident that a two-way relationship exists between the learning environment and curriculum, as well as between the learning environment and instruction. Data obtained about the classroom and school learning environments are valuable sources of information for clarifying and modifying curriculum goals and their implementation through the instructional program. In turn, shifts and changes in instruction are reflected in the students' perceptions of their learning environment. Evaluation instruments sensitive to learning environment variables have been instrumental in enlarging the focus of evaluation in curriculum and instruction.

The evaluation studies conducted through the Office of Evaluation Research at the University of Illinois at Chicago Circle have demonstrated the value of using learning environment instruments that are capable of evaluating a cluster of variates that enhance those subtle but important curriculum and instructional goals that bear on the affective development of students.

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