Decision-Making in Junior High School Mathematics:

Student-Classroom Discrepancy

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Abstract

Conceptualizing classroom decision-making within the framework of person-environment fit, it is hypothesized that students will report fewer decision-making opportunities than they think they should have in math classrooms, and that congruence on these "can decide" and "should decide" dimensions will be positively related to math value and enjoyment, and inversely related to school misbehavior. Student and teacher ratings were collected for 206 students in ten junior high school math classrooms. Consistent support for the hypotheses was found. The positive consequences of congruence include some which have been found to predict later involvement and achievement in mathematics.

Paper presented at the 92nd annual convention of the American Psychological Association, Toronto, Ontario, Canada, August 25, 1984.

This research was made possible by grants from the National Institute of Mental Health (MH31724) and the National Institute of Child Health and Human Development (HD17296). Address correspondence to: David A. Reuman, Achievement Research Lab, Room 6130, Institute for Social Research, University of Michigan, Ann Arbor, MI 48106.

In the late 1930's, Murray (1938) and Lewin (1935) proposed that an individual's behavior is jointly determined by characteristics of the person and properties of the immediate environment. This idea has given rise to person-environment fit theory, which states that when the needs or goals of an individual are congruent with opportunities afforded by the environment, favorable affective, cognitive, and behavioral outcomes should result for that individual. Conversely, when a discrepancy exists between the needs of the individual and opportunities available in that individual's environment, unfavorable outcomes should result (at least initially). The effects of person-environment congruence have been examined in work settings (French, Rogers, & Cobb, 1974; Veroff & Feld, 1970), and also in school settings (Feather, 1975; Getzels, 1969; Kulka, Mann, & Klingel, 1980).

The relationship between decision-making opportunities in the classroom and student motivation and behavior has been investigated extensively (deCharms, 1968, 1976; Epstein, 1981; Richter & Tjosvold, 1980; Wang & Stiles, 1976). In general, increased opportunity for decision-making is associated with more positive attitudes toward the self, teachers, and classrooms.

Studies of student dissatisfaction with decision-making opportunities (e.g., McPartland & McDill, 1974, 1977) and research on student feelings of powerlessness (e.g., Thomas, Kreps, & Cage, 1977) have shown that these perceptions are associated with student disruption, truancy, and vandalism. Although most of these studies have not been conceptualized explicitly in terms of person-environment fit, they tend to assume that students would prefer more decision-making opportunities.

Research which explicitly conceptualizes student decision-making and control in terms of opportunity and need confirms these findings (e.g., Kulka, 1976). Studies which have assessed student perceptions of the actual classroom environment and the ideal classroom environment indicate that students want more decision-making opportunities than they actually experience in their classrooms (Lee, Statuto, & Kedar-Voivodas, 1983; Moos, 1979). Fraser and his colleagues were interested in the effect of discrepancy between students' perceptions of their actual and preferred classroom environment (Fraser, 1981, Fraser & Fisher, in press). Students in 116 junior high school science classrooms completed a 29-item test measuring critical thinking in science, a 60-item scale measuring attitudes toward science, and both the Actual and Preferred forms of the Individualized Classroom Environment Questionnaire (ICEQ). Using hierarchical regression analysis, and controlling for pretest performance, general ability, and actual environment, actual-preferred congruence was related to increases in achievement and more positive attitudes toward science.

Hunt (1975) points out the importance of maintaining a developmental perspective in considering person-environment fit. As children mature their needs change. School environments must adapt to students' current needs and anticipate their future needs in order to facilitate growth. Patrick Lee and his colleagues have conducted a study which looks at student-environment fit from a developmental perspective (Lee, 1979; Lee et al., 1983). A total of 154 students in 2nd, 4th, and 6th grade classrooms were interviewed concerning their perceptions of their prerogatives and constraints in several areas of school experience. Lee was interested in the degree of congruence

between children's views of the way things are in school (the actual order) and the ways things ought to be (the ideal order). He also was interested in determining the developmental patterns that occur in children's perceptions of their actual and ideal constraints and prerogatives. Seventeen pairs of questions assessed perceptions of the way things are and the way things ought to be in respect to territoriality, privacy, and decision-making opportunities in the classroom. In the areas of territoriality and privacy, children reported relatively high levels of congruence between what they felt they could and should be allowed to do. However, for the decision-making area, they reported relatively low levels of congruence. Children perceived significantly more actual and ideal prerogatives with increasing grade level. However, there was a grade-related decrease in congruence due to a greater increase in children's perceptions of ideal prerogatives (I should) than actual prerogatives (I can). Lee suggests that

> Children's escalating assertion of ideal prerogatives with age is probably reflective of their developing sense of autonomy and personal competence, combined with an increasing familiarity with the school environment. The absence of concomitant increments in their actual prerogatives suggests that schools fail to support the child's emerging expression of competence. This pattern of decreasing congruence also suggests the possibility of increasing tension between children and schools in the upper elementary grades and might be an early precursor to the well-documented alienation, vandalism, truancy, and violence that emerge in the secondary

school. (Lee et al., 1983, p.845)

Our study is a logical outgrowth of previous research on the importance of student-environment fit concerning decision-making in the classroom. In this study we have focused, as Lee recommended, on junior high school classrooms and have examined the fit between the decision-making opportunities students perceive they do possess and those opportunities they believe they should possess. In contrast to earlier work, we have examined the relationship of student-environment fit in mathematics classrooms to a broad range of student values, beliefs, and behaviors assessed both by self-report and teacher report. A number of these outcomes have been shown to be highly predictive of achievement behavior in mathematics (Aiken, 1976; Brookover & Erickson, 1975; Eccles, Adler, Futterman, Goff, Kaczala, Meece, & Midgley, 1983; Parsons & Goff, 1978; Spenner & Featherman, 1978).

We examined two major hypotheses:

(1) A substantial percentage of junior high math students will report having fewer decision-making opportunities in their mathematics classrooms than they think they should possess.

(2) The amount of discrepancy which exists between a student's perceptions of these actual and ideal decision-making opportunities will be negatively related to valuing and enjoying math, and positively related to misbehavior in school.

METHOD

Sample

Our sample includes 206 students in ten junior high school math classrooms (nine seventh grades and one eighth grade). All students

participated on a voluntary basis; they comprise 75 percent (206/275) of the students enrolled in the ten classrooms. The classrooms were drawn from three public junior high schools in two school districts in southeastern Michigan.

Measures

Survey questionnaires were administered to students in their math classrooms. Because data on a large number of constructs were to be collected, three forms of the questionnaire were developed. Certain items appeared on all three forms; other items appeared on two or one of the forms. The forms were randomly distributed within each classroom, such that at least a third of each class responded to each item.

Four pairs of items measuring classroom decision-making in math were adapted from Lee et al. (1983). Each yoked pair of items assessed student perceptions of actual and ideal decision-making opportunities in their math classrooms. For example:

> Do you help to decide how much math homework you get?
>
> Do you think you should help to decide how much math homework you get?

These items asked students about decision-making opportunities with respect to where they sit in math class, how much math homework they receive, what math they work on during class, and what the rules are in their classroom. These items were included on all forms of the student questionnaire. For each yoked pair of items measuring a decision-making opportunity, students could be coded as congruent (1) or discrepant (0). Students were coded as congruent if they said they actually do and should have a decision-making prerogative, or if they said they do not and should not have that prerogative. Similarly, students were coded as

discrepant if they said they do not but should have a decision-making prerogative, or if they said they actually do but should not have the prerogative. Preliminary analyses considering each decision-making opportunity separately revealed remarkably consistent results across the different types of opportunities. Therefore, an unweighted sum of these four congruence scores (range = 0 to 4; mean = 2.04; standard deviation = 1.35) is the major independent variable used in the analyses reported below. The internal consistency reliability of this composite is moderate (Kuder-Richardson 20 = .61).

A broad set of values, beliefs, and behaviors were assessed in the student questionnaire. In the domain of affect and values, items were included regarding math enjoyment, math value, general school satisfaction, reasons for coming to school, and sports and social satisfactions. Another set of questionnaire items probed the frequency of school misbehaviors. Still another set of questions focused on self-concept of ability, frustration, effort, and achievement in math.

As a check on potential self-presentation biases in certain student self-report items (particularly self-reported misbehavior at school), teachers filled out an assessment of each participating student with respect to these student behaviors.

RESULTS

Varieties of student-environment fit

Overall, students perceive high levels of actual constraint with respect to decision-making in their math classrooms, and much lower levels of ideal constraint. Averaging over the four yoked pairs of items, 45.2 percent of the sample say they do not but should have decision-making prerogatives; 37.3 percent of the sample say they do not

and should not have such decision-making prerogatives; 13.8 percent say they do and should have decision-making prerogatives; and only 3.6 percent say they actually do but should not have prerogatives. Preliminary analyses that differentiated these four types of fit revealed consistent effects on student affect, cognitions, and behavior for both types of congruence, and for both types of discrepancy. Therefore, in the analyses reported below, we have defined students simply as congruent or discrepant.

Differential consensus on actual versus ideal prerogatives

Whereas students within a classroom readily agree among themselves concerning the decision-making prerogatives that actually do exist in that classroom, there is substantial disagreement among students concerning the decision-making prerogatives that should exist. Averaging over the four decision-making opportunities, 87 percent of the students are in agreement with their classmates on the actual presence of decision-making prerogatives in their math classroom. By contrast, only 67 percent of the students are in agreement as to what would be ideal decision-making prerogatives to have in their math classroom. This pattern suggests that the decision-making prerogatives that students view as ideal are not immediately redefined by their current classroom experiences. Instead, it is likely that such ideal prerogatives reflect individual differences among students that originate in the personal history of decision-making opportunities that students have experienced at home and in their previous classrooms.

Grade-related trends in decision-making congruence

Lee et al.'s (1983) findings show a continual drop in decision-making congruence throughout the elementary school grades. Our data

extends this trend through junior high school. In our junior high school sample, 51.1 percent of the students show decision-making congruence, compared to 55.6 percent of Lee's sixth grade sample, 64.1 percent of his fourth grade sample, and 67.1 percent of his second grade sample.

Effects of congruence between actual and ideal classroom prerogatives

A series of simple regression models show consistent positive effects of decision-making congruence on math enjoyment and math value. Congruent students are more likely to view math as interesting and useful, and the effort required to do well in math as worthwhile (see Table 1, lines 1 through 6). On the other hand, areas of student satisfaction that do not specifically involve math are unrelated to decision-making congruence in junior high school math classrooms (see Table 1, lines 7 through 9). Congruent students are more likely to cite interest in school subjects as a reason for coming to school, and are less likely to cite social relations at school or mandatory attendance as reasons for coming to school (see Table 1, lines 10 through 14).

To the extent that junior high school students report congruence between the actual and ideal decision-making prerogatives in their math classrooms, they are consistently less likely to misbehave at school. These relationships are evident both from student self-report data (see Table 2, lines 1 through 13) and from teacher assessments of students (see Table 2, lines 14 through 17). By documenting that the relationship between student decision-making congruence and teacher ratings of student misbehavior parallels the relationship between student decision-making congruence and student self-report of misbehavior, we have rendered a "response-bias" explanation of this

relationship implausible.[1]

Decision-making congruence in junior high school math classrooms is consistently related to a higher self-concept of ability in math (see Table 3, lines 1 through 3) and to a lower sense of frustration with math (see Table 3, lines 4 through 6). However, decision-making congruence is not systematically related to self-reported effort in math, nor to self-reported achievement (see Table 3, lines 7 through 10).

Simultaneous effects of congruence and actual decision-making prerogatives

One might expect a strong positive relationship between actual decision-making and decision-making congruence in one's math classroom. As teachers allow students to take an increasingly active role in classroom decision-making, students may increasingly shape the classroom environment to fit their needs or goals. In our sample, the number of actual decision-making prerogatives students report is positively related to the decision-making congruence they exhibit ($N=203$; $r=.347$; $p<.010$). Despite this positive relationship, multiple regression models which include both actual decision-making prerogatives and decision-making congruence as simultaneous predictors of the dependent variables listed in Tables 1 through 3 do not change the pattern of simple effects of decision-making congruence. In contrast to effects of decision-making congruence, effects of actual decision-making prerogatives occur about as often as would be expected by chance, given the number of dependent variables examined in Tables 1 through 3. This low incidence of effects for actual prerogatives occurs whether or not decision-making congruence is included as a predictor in regression analyses.

DISCUSSION

Both of our major hypotheses received strong support. When asked about decision-making opportunities in the classroom, students reported that they didn't have and should have the opportunities more than any other pattern. Thus, junior high school classrooms are failing to fit many of their students in an important way. Further, the amount of discrepancy between students' perceptions of actual and ideal decision-making opportunities in their math classrooms was positively related to school misbehavior and negatively related to valuing and enjoying math. Thus, discrepancy is associated with outcomes that are themselves highly predictive of poor student motivation and achievement in mathematics (Aiken, 1976; Brookover & Erickson, 1975; Eccles et al., 1983; Parsons & Goff, 1978; Spenner & Featherman, 1978).

Although causal hypotheses regarding these relationships cannot be tested with our cross-sectional data, person-environment fit theory would suggest that the discrepancy between actual and ideal decision-making opportunities is a cause of the negative behaviors and attitudes rather than being a consequence of them. Thus, an important next step is to test the causal status of these fit variables using causal modeling techniques in experiments and longitudinal field studies. For example, more evidence concerning causality could be obtained from intervention studies which manipulate actual decision-making opportunities in the classroom. By measuring changes in fit created by these manipulations and relating these changes to student outcomes, a test of the causal effects of decision-making discrepancy on students' behavior and attitudes could be made. Similarly, longitudinal field studies can help test the causal direction of such effects by allowing

one to relate changes in fit (e.g., the grade-related increase in discrepancy) to changes in student outcomes.

In addition to seeking tests of the causal impact of student-environment fit on students' school-related attitudes and behaviors, future research should address two issues. First, it should try to delineate the conditions under which the level of actual decision-making opportunities provided to students has a direct effect on student attitudes even after one controls for the level of students' decision-making congruence. In the present study, decision-making congruence predicted student outcomes much better than did the level of actual decision-making prerogatives. However, since the previous literature on decision-making in the classroom suggests that simple increases in the opportunity for decision-making is sometimes associated with more positive attitudes toward teachers and classrooms, future research should measure both the level of opportunities present and how well these opportunities fit student ideals. Second, future research should explore the possible impact of person-environment discrepancy on a person's beliefs concerning the self. The present study discovered a consistent negative relationship between decision-making discrepancy and students' self-assessments of their math abilities. This finding suggests the hypothesis that students may interpret their environment's failure to fit them in ways that reflect negatively on the self. Students who reported that they didn't have decision-making opportunities they should possess may believe their teacher's reluctance to provide these opportunities reflects a low teacher assessment of their ability.

If studies like those recommended here establish the causal path

from decision-making congruence to student outcomes, then educators should work toward increasing the fit between actual opportunities and the opportunities which students feel are justified. However, this poses a dilemma. Since students differ in what decision-making opportunities they believe they should have, a uniform decision-making policy within a classroom will result in some students' congruence and others' discrepancy. For example, allowing students to help decide how much math homework they will get may have a positive effect on students who believe they should have a say in this, but may have a negative effect on those who believe that the teacher should make this decision. For some types of decisions it might be possible to individualize the role given to students in order to bring them all into congruence. For other types of decisions, establishing a classroom-wide decision-making policy may be the only practical or equitable course of action.

When a classroom-wide decision-making policy is necessary, teachers could learn through class discussions what decisions a majority of their students believe they should be able to make. Prerogatives could then be established in specific domains of classroom activity. Teachers and students could monitor the success with which students handle these prerogatives, establish sanctions for misuse, and decide when a prerogative should be revoked. Even though some students' preferences will not be met, being involved in the process of establishing, monitoring, and evaluating opportunities for classroom decision-making should heighten students' feelings of congruence with the environment. Had the teachers in our sample requested input from students about their ideal prerogatives, they might have been able to avert the condition where so many of their students felt that they did not have decision-

making opportunities they ought to have.

One effect of involving students in the process of classroom decision-making may be to redefine their ideal prerogatives. Students who were part of a minority that voted to institute a prerogative would be aware of the reasoning of the majority. This might facilitate the re-examination of their position. That is, hearing their classmates' or their teacher's arguments against a particular prerogative may help these students understand the reasons for the prerogative's absence. If this helps them feel less strongly that they should have the prerogative, these students may suffer fewer of the negative consequences of lack of fit with the classroom environment. For students who continue to believe that they should have the prerogative, the experience of participating in a democratic process may reduce alienation in school.

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Footnote

[1]Several of the misbehavior items yield highly skewed response distributions (i.e., skewness coefficients greater than 2.0). When we include these skewed misbehavior items as dependent variables in regression analyses, we are violating normality assumptions that underlie the use of parametric statistics. For the small sample size analyzed here, it is not possible to determine an appropriate normalizing transformation that would eliminate skewness (Games, 1984). In any case, statistically significant regression coefficients are found both for skewed and for non-skewed misbehavior items.

Table 1

Effects of Decision-Making Congruence on Student Affect and Values

Dependent variable	N	beta
Math enjoyment and value		
1. Find working on math assignments interesting	70	.37**
2. Like doing math	70	.34**
3. In general, math is useful	135	.30***
4. Math will be useful after graduation	70	.08
5. Effort required to do well in math is worthwhile	135	.28***
6. For me being good at math is important	135	.15+
Other satisfactions		
7. Like playing sports	67	-.04
8. Like doing things with friends	61	.03
9. Like school this year	50	.18
Reasons for coming to school		
10. Like subjects we study there	49	.30*
11. Like to see my friends there	49	-.34*
12. Have to	47	-.27+
13. Like the special activities we do there, like band or art	49	.11
14. Like the sports we do there	49	-.10

Note. + $p \leq .100$; * $p \leq .050$; ** $p \leq .010$; *** $p \leq .001$.

N's vary, principally because particular dependent variables were not included on all forms of the questionnaire. Because forms were randomly distributed within each classroom, the reduced sample size in these analyses does not indicate sampling bias.

Table 2

Effects of Decision-Making Congruence on Student Misbehavior at School

Dependent variable	N	beta
School misbehavior (student self-report)		
1. Argue with a teacher	45	-.04
2. Smoke cigarettes	45	-.31*
3. Punch or push around another student	45	-.40**
4. Damage school property on purpose	45	-.31*
5. Write anything on the school building	45	-.35*
6. Wise off and disrupt a class	45	-.22
7. Refuse to work in class	45	-.36**
8. Make fun of another student	45	-.27+
9. Copy someone else's work	44	-.43**
10. Ignore another student who wanted to join me	44	-.18
11. Refuse to listen to or talk with a teacher	44	-.33*
12. Skip class	45	-.13
13. Skip school	43	-.41**
School misbehavior (teacher report)		
14. Fight with other students	97	-.14
15. Frequency of disciplinary action	97	-.17+
16. Days suspended	90	-.23*
17. Frequency of non-attendance	104	-.23*

Note. + $p \leq .100$; * $p \leq .050$; ** $p \leq .010$; *** $p \leq .001$.

N's vary, principally because particular dependent variables were not included on all forms of the questionnaire. Because forms were randomly distributed within each classroom, the reduced sample size in these analyses does not indicate sampling bias.

Table 3

Effects of Decision-Making Congruence on Student Ability Perceptions and Behavior in Math

Dependent variable	N	beta
Self-concept of math ability		
1. Good at math	203	.14*
2. Good at math compared to classmates	203	.15*
3. Good at math compared to other subjects	202	.22**
Math frustration		
4. Cannot understand math, no matter how hard I try	65	-.28*
5. Math makes me feel like I'm lost in a jungle of numbers	65	-.34**
6. Find working on math very frustrating	63	-.33**
Effort in math		
7. Time on math homework	68	.17
8. Work hard in math	68	.16
Math achievement		
9. Doing well in math this year	138	.11
10. Math grade last term	188	.13+

Note. + $p \leq .100$; * $p \leq .050$; ** $p \leq .010$; *** $p \leq .001$.

N's vary, principally because particular dependent variables were not included on all forms of the questionnaire. Because forms were randomly distributed within each classroom, the reduced sample size in these analyses does not indicate sampling bias.