

dualized instruction on mathematics achievement. *American Educational Research Journal*, 22, 351-367.

Slavin, R. E., Madden, N. A., & Leavey, M. B. (1984). Effects of team assisted individualization on the mathematics achievement of academically handicapped and non-handicapped students. *Journal of Educational Psychology*, 76, 813-819.

Stevens, R. J., Madden, N. A., Slavin, R. E., & Farnish, A. M. (1987). Cooperative integrated reading and composition: Two field experiments. *Reading Research Quarterly*, 22, 433-454.

Stoakes, D. W. (1964). *An educational experiment with the homogeneous grouping of mentally advanced and slow learning students in the junior*

high school. Unpublished doctoral dissertation, University of Colorado, Boulder.

Wheelock, A. (1992). *Crossing the tracks*. New York: New Press.

Wiatrowski, M., Hansell, S., Massey, C. R., & Wilson, D. L. (1982). Curriculum tracking and delinquency. *American Sociological Review*, 47, 151-160.

Wilcox, J. (1963). A search for the multiple effects of grouping upon the growth and behavior of junior high school pupils. *Dissertation Abstracts International*, 24, 205. (University Microfilms No. 63-4574)

Willcutt, R. E. (1969). Ability grouping by content topics in junior high school mathematics. *Journal of Educational Research*, 63, 152-156.

Negative Effects of Traditional Middle Schools on Students' Motivation

Jacquelynne S. Eccles

University of Michigan

Allan Wigfield

University of Maryland

Carol Midgley

University of Michigan

David Reuman

Trinity College

Douglas Mac Iver

Johns Hopkins University

Harriet Feldlaufer

*Connecticut State Department of Education,
Hartford*

Abstract

We discuss the decline in early adolescents' academic motivation after the transition to middle grade schools and review work on how school and classroom environments in traditional middle grade schools could be responsible for these declines. We suggest that there is often a mismatch between characteristics of the classroom environment in traditional middle grade schools and early adolescents' developmental level. We present results of a comprehensive longitudinal study examining the influence of school and classroom environmental factors such as teacher discipline and control practices, teacher-student relations, opportunities for student decision making, teachers' sense of efficacy, and between-classroom ability grouping on student motivation. In general, results indicated that middle grade school math teachers, in comparison to sixth-grade elementary school teachers, control students more, provide them fewer decision-making opportunities, and feel less efficacious. Between-classroom ability grouping also increased in middle grade schools. Many of these changes related to declines observed in students' motivation in middle school.

Different investigators have stressed how crucial the early adolescent years are for development (e.g., Eccles, Midgley, & Adler, 1984; Petersen, 1988). At the same time, many have bemoaned the quality of the middle grade school environment. For example, according to Silberman (1970, p. 324), "The junior high school, by almost unanimous agreement, is the wasteland—one is tempted to say cesspool—of American education." What happens when adolescents enter these "wastelands"? This question is the broad focus of this article. More specifically, we examine how school and classroom environmental factors in traditional middle grade schools relate to

changes in students' motivation that occur during early adolescence.

For some children, the early adolescent years mark the beginning of a downward spiral in school-related behaviors and motivation that often lead to academic failure and dropping out of school. A variety of explanations have been offered for these negative changes. Some experts have suggested that declines such as these result from the psychological upheaval assumed to be associated with early adolescent development (e.g., Bloss, 1965). Others have suggested that the coincidence of the timing of the middle school transition with pubertal development accounts for the decline (e.g., Blyth, Simmons, & Carlton-Ford, 1983; Simmons & Blyth, 1987). Eccles and her colleagues have suggested that the changing nature of the educational environments experienced by many early adolescents could be responsible for the declines associated with the transition to traditional middle grade schools (Eccles & Midgley, 1989; Eccles, Midgley, & Adler, 1984). Drawing on person-environment fit theory (see Hunt, 1975; Mitchell, 1969), Eccles and Midgley (1989) proposed that these motivational and behavioral declines could result from the fact that traditional middle grade schools are not providing appropriate educational environments for early adolescents. Because of their focus on a particular developmental period, Eccles and Midgley called this approach "stage-environment fit" theory. In this article, we elaborate this stage-environment fit explanation for the motivational changes at early adolescence.

We begin by describing the changes in early adolescents' motivation documented by various researchers. We then discuss differences between school and classroom environments of elementary schools and traditional middle grade schools. Next we discuss how these changes can create a mismatch between the needs of early adolescents and their school environments and describe a study testing aspects of this mismatch. We close by discussing methodo-

logical issues for the study of relations between school and classroom environments and student outcomes and implications of this work for reforming traditional middle grade schools.

Defining Student Motivation

There are a variety of important motivational constructs and theoretical perspectives on the nature of motivation; a complete review of this work is outside of the scope of this article (see Dweck & Elliott, 1983; Eccles et al., 1984; Eccles & Midgley, 1989; Harter, 1981; Stipek & Mac Iver, 1989; Wigfield & Eccles, in press, for reviews of this work). We focus here primarily on motivational constructs related to two broad questions students ask themselves: "Can I succeed on this task?" and "Do I want to succeed on this task?" (see Eccles & Wigfield, 1985). These questions capture many of the important motivational constructs in theoretical perspectives such as expectancy-value theory (e.g., Eccles et al., 1983; Wigfield & Eccles, in press), self-efficacy theory (e.g., Bandura, 1977; Schunk, 1981), and intrinsic motivation theory (e.g., Harter, 1981). Constructs relevant to the first question include students' self-concepts of ability, expectancies for success, efficacy beliefs, and perceived control. Constructs relevant to the second question include students' valuing of achievement, goals or purposes for achievement, and anticipated effort. In this article we primarily discuss work on these motivational constructs.

Student Motivation and Classroom Environments

Developmental Changes in Motivation

Several investigators have found general developmental declines in many of the important motivational constructs defined above, including interest in school (Epstein & McPartland, 1976), intrinsic motivation (Harter, 1981), self-concepts of ability (Eccles et al., 1983; Marsh, 1989), and self-esteem (Simmons & Blyth, 1987; Simmons,

Blyth, Van Cleave, & Bush, 1979); this work is reviewed in more detail by Eccles et al. (1984) and Eccles and Midgley (1989). Some of these changes vary across academic subjects. For instance, Eccles et al. (1983) studied fifth- through twelfth-grade students' beliefs and attitudes regarding mathematics and English and found that middle and high school students' ability beliefs and valuing of math were much lower than those of elementary school students. However, high school students' ability beliefs and values for English were higher than younger students'.

Declines Associated with the Transition to Traditional Middle Grade Schools

Some of these changes in motivation are particularly likely to occur in conjunction with the middle school transition, leading researchers to suggest that school transitions at this period of life may have especially negative consequences for at least some early adolescents. For example, in Eccles et al.'s (1983) study of children's beliefs and values regarding math and English, the largest grade differences occurred between sixth and seventh grades, when these students moved from elementary school to middle school. Similar discontinuities are evident in Harter's (1981) work on intrinsic motivation. She developed a scale to measure different aspects of intrinsic motivation and found a sharp drop in students' preference for challenge and for independent mastery between the sixth and seventh grades. The students in her study moved from elementary to middle grade schools after sixth grade.

The possible negative effects of school transition at this period are illustrated best by the work of Simmons and her colleagues (e.g., Blyth et al., 1983; Simmons et al., 1979; Simmons & Blyth, 1987). They compared students moving from sixth to seventh grade in a K-8 system to students making the same transition in a K-6, 7-9, 10-12 school system. This work allows the

separation of conjoint effects of age and transition that operate in most developmental studies of this age period. These researchers found clear evidence of school transition effects, but the exact nature of these effects, and the groups of students most affected, varied somewhat across studies. In general, however, girls seem more at risk for negative consequences of the middle school transition than boys. For example, Simmons and Blyth (1987) found that girls moving into a traditional middle school showed a more marked decline in their self-esteem than girls who remained in the same school building; no comparable school transition effect was found for boys' self-esteem.

We have conducted a comprehensive longitudinal study of how students' ability beliefs and achievement values change as they make the transition from elementary to middle grade schools (e.g., Eccles et al., 1989; Wigfield, Eccles, Mac Iver, Reuman, & Midgley, 1991). In this study, approximately 2,500 students completed questionnaires in the fall and spring of sixth grade in elementary school and the fall and spring of seventh grade in middle grade school. The questionnaires measured students' self-concepts of ability and valuing of academic activities, sports, and social activities; general self-esteem (using Harter's [1982] general self-worth scale); and many other constructs. Sample items are provided in Appendix A.

We found many transition-related effects on the motivational measures used in this study (see Eccles et al., 1989; Wigfield et al., 1991). Students' general self-esteem was lowest in the fall of the seventh-grade year, immediately after the school transition. Students' ability beliefs regarding English and social activities showed the largest decreases between the spring of the sixth-grade year and fall of the seventh-grade year. Children's liking of math was similar in the fall and spring of sixth grade but declined across the transition. Students' liking of English and social activities was highest

in the spring of their sixth-grade year but declined across the transition. Children's ratings of the importance of these activities also decreased between sixth and seventh grades, with the largest differences for English and social activities occurring across the transition to middle grade schools.

These studies suggest that something unique may be going on during early adolescence and that it interacts with the nature of school transitions in affecting the motivation of early adolescents. Several investigators have suggested just such a link between these motivational declines and the middle school transition (Blyth et al., 1983; Eccles et al., 1984; Eccles & Midgley, 1989; Simmons & Blyth, 1987). Simmons and her colleagues proposed the first such hypothesis and focused on the timing of the transition. They suggested that declines in motivation result from the fact that adolescents making the transition to middle school at the end of grade 6 must cope with two major transitions: pubertal change and school change. Because girls reach puberty earlier than boys, the problem of facing two transitions happens to girls more often. Simmons and her colleagues argued that coping with multiple transitions is more difficult than coping with only one; thus, these adolescents (especially girls) are at greater risk of negative outcomes than adolescents who only have to cope with pubertal change during this developmental period. A similar transition a few years later "after the individual has developed a more mature sense of who he or she is" (Blyth et al., 1983, p. 106) should pose fewer problems.

If the timing of the transition is the critical factor, then when is the timing good or bad and for whom? Investigators who have sought to replicate and extend Simmons's work have compared the effects of school transitions at different grades. The results of these studies are largely inconsistent and inconclusive. Thornburg and Jones (1982) compared students who moved up a grade within the same school to students who entered a new school. Students who moved

to a new school at sixth grade had lower self-esteem than sixth-grade students who did not make a school transition, whereas at seventh grade there were no significant differences in self-esteem for groups that did or did not make a school transition. The researchers concluded that school transitions occurring at lower grades are more likely to affect early adolescents' self-esteem than school transitions at higher grades.

Nottelmann (1987) conducted a longitudinal study comparing the effects on self-esteem of movement from grades 5 to 6 and grades 6 to 7 in both transition and non-transition groups. She predicted that there would be less disturbance following the earlier school transition because the students would not be experiencing the simultaneous stress of physical development and movement to a new school. Not only was this hypothesis not substantiated, but in contrast to the Simmons and Blyth (1987) findings, Nottelmann found that self-esteem was higher in transition than in non-transition students. Petersen, Ebata, and Graber (1987) uncovered the remarkable finding that students who made two consecutive school transitions experienced greater long-term gains in self-image than students who made a single transition from fifth to sixth or sixth to seventh grade.

One reason these findings are so inconsistent may be the use of general self-esteem as the major dependent variable in these studies. General self-esteem is determined by many factors, some related to school experiences and others not. Thus, changes in self-esteem may reflect changes in students' beliefs about school or about other aspects of their lives. Theorists and researchers (e.g., Eccles et al., 1989; Marsh, 1989; Wigfield et al., 1991) now suggest that examining more specific self-perceptions about particular domains provides a better indication of the nature of children's and adolescents' self-beliefs and also gives more sensitive tests of issues such as how school transition influences students' self-beliefs.

Another important reason for the inconsistent findings is that many of these investigators did not take into account the nature of the school environment before and after the transition. For example, how did the middle-grade school environments in the Simmons and Blyth (1987) study compare to the school environments in the Nottelmann (1987) study? Was something about the school environment in the Simmons and Blyth study particularly detrimental to pubertal girls? Perhaps an increase in competition or ability assessment in the schools in this study that was not present in the Nottelmann study contributed to the different effects. Although questions such as these are not answerable at this point, they are critical to an understanding of the impact of educational transitions on early adolescents.

We believe that the nature of the transition, as well as the timing, must be considered. In addition, the kinds of changes that students typically experience during the transition to middle grade schools must be viewed from at least two perspectives: the standard environmental influences approach and a developmental variant on the person-environment fit paradigm, or, as we have termed it, the stage-environment fit approach (see Eccles & Midgley, 1989). We discuss each of these in turn.

General Classroom and School Environmental Influences

Researchers have documented the effects of classroom and school environmental characteristics on motivation. For example, the big school/small school literature has demonstrated the motivational advantages of small schools, especially for marginal students (Barker & Gump, 1964). Similarly, the teacher efficacy literature has documented the positive student motivational consequences of high teacher efficacy (Ashton & Webb, 1986; Brookover, Beady, Flood, Schweitzer, & Wisenbaker, 1979). Finally, work in motivational psychology has demonstrated the

importance of participation and self-determination for motivation (e.g., Deci & Ryan, 1987). The possible list of such influences is long, and discussing them all is beyond the scope of this article. The point is that there may be systematic differences between typical elementary classrooms and schools and typical middle school classrooms and schools, and these differences may account for some of the motivational changes in early adolescents as they make the transition. If so, then some of the motivational problems at early adolescence may be a consequence of the types of school environment changes students must adapt to rather than to characteristics of the developmental period per se.

Stage-Environment Fit

According to theorists interested in person-environment fit, there are negative motivational consequences of being in an environment that does not fit well with one's needs (Hunt, 1975; Mitchell, 1969). At the most basic level, this perspective suggests that we look at the fit between the needs of early adolescent students and the opportunities afforded them in the traditional junior high school environment. A poor fit would help explain declines in motivation associated with the transition to junior high school.

An even more interesting way to use the person-environment fit perspective is to put it into a developmental framework. Hunt (1975) argued for the importance of adopting a developmental perspective on person-environment fit in the classroom. He stressed the need for teachers to provide the optimal level of structure for students' current levels of maturity. This optimal level would pull students along a developmental path toward higher levels of cognitive maturity. He further argued that the type of structure needed would differ for different age groups. If we accept this notion that different educational environments may be needed for different age groups in order to meet developmental needs and to foster

continued developmental growth, then some changes in educational environments may be especially inappropriate at certain stages of development, for example, the early adolescent period. Exposure to such changes at this age could lead to a particularly poor person-environment fit, and this lack of fit could account for some of the declines in motivation at this developmental period.

In applying this perspective to the early adolescent period, Eccles and Midgley (1989) used the term "stage-environment fit" to argue that the fit between the developmental needs of the adolescent and the educational environment is crucial. When the environment both is responsive to the changing needs of the early adolescent and offers the kinds of stimulation that promote continued positive growth, there will be positive motivational consequences. In other words, transition to a facilitative and developmentally appropriate environment, even at this vulnerable age, should have a positive effect on students' perceptions of themselves and their educational environment. In contrast, transition into a developmentally inappropriate educational environment should result in the motivational declines that have been identified as occurring with the transition into junior high. This should be particularly true if the environment is developmentally regressive, that is, if it affords students fewer opportunities for continued growth than previous environments.

Unfortunately, few empirical studies have focused on differences in classroom or school environments across grades or schools. Research on the education of middle school students has been dominated by a concern for determining the best combination of grades for this age group and comparing the effects of middle versus junior high schools. In most cases, no attempt is made to assess the school and classroom environment. It is assumed that many sixth- to eighth-grade middle grade schools differ from more traditional seventh- to ninth-

grade middle grade schools, even though there is increasing evidence that these differences are primarily in name (junior high schools have become middle schools) and grade organization (Eccles, Lord, & Midgley, 1991). For example, in a recent analysis of data from the National Educational Longitudinal Study (NELS), Eccles et al. (1991) found few differences in teachers' and students' reports of their schools' environments between middle grade schools with a seventh- through ninth-grade configuration and middle grade schools with a fifth- or sixth- through eighth-grade configuration. Not surprisingly, students' motivation also did not differ across these two types of middle grade schools.

Differences between Elementary and Middle School Environments

Beginning with school differences, traditional middle grade schools are typically larger, less personal, and more formal than elementary schools. Middle grade teachers are often subject-matter specialists and typically instruct a much larger number of students than do elementary teachers in self-contained classrooms, making it less likely they will come to know students well, to believe students are trustworthy, and to grant them autonomy (see Brophy & Evertson, 1978, and Eccles & Midgley, 1989, for more detailed discussion of these changes). Indeed, middle grade teachers may believe that it is difficult to affect the achievement of a large number of students, especially since they see them for a relatively small proportion of the school day, making it difficult to sustain feelings of efficacy (Midgley, Feldlaufer, & Eccles, 1989a).

Regarding classroom differences between traditional middle grade and elementary schools, traditional middle grade school classrooms, as compared to elementary school classrooms, are characterized by a greater emphasis on teacher control and discipline (e.g., Brophy & Evertson, 1978; Hoy, 1968; Moos, 1979); a less personal and

positive teacher/student relationship (Midgley, Feldlaufer, & Eccles, 1989; Moore, 1983); and fewer opportunities for student decision making, choice, and self-management (Lee, 1979; Ward et al., 1982). Second, the shift to traditional middle grade schools is associated with an increase in practices such as whole-class task organization (Rounds & Osaki, 1982) and public evaluation of the correctness of work (Gullickson, 1985; Harter, Whitesell, & Kowalski, 1987), each of which may encourage the use of social comparison and ability self-assessment. There also are increases in between-classroom ability grouping (Oakes, 1981, 1985). Once students have been assigned to classrooms on the basis of ability, mobility to another ability level is infrequent (Metz, 1978; Oakes, 1981). Third, in traditional middle grade schools, teachers often believe it is time to get serious about instruction and performance evaluation (Blyth, Simmons, & Bush, 1978; Kavrell & Petersen, 1984; Schulenberg, Asp, & Petersen, 1984). Fourth, there is even some evidence that classwork during the first year of middle grade school, particularly in general math classes, requires lower-level cognitive skills than classwork at the elementary level (Rounds & Osaki, 1982; Walberg, House, & Steele, 1973). Finally, cultural stereotypes about early adolescence may flourish in schools that serve only this age group. There is evidence that early adolescence is viewed by society as a particularly difficult and unproductive stage of life (Holmbeck & Hill, 1986; Lavigne, 1977; Miller, Eccles, Flanagan, Feldlaufer, & Goldsmith, 1990; Offer, Ostrov, & Howard, 1981). These societal views are not likely to engender feelings of efficacy or trust in those who work with early adolescents.

These school and classroom environmental changes are likely to be particularly harmful at early adolescence given the developmental characteristics associated with this period of life. Although a complete review of early adolescent development is well beyond the scope of this article, we

must briefly note the many important changes that occur during this period. Along with the biological changes associated with puberty, early adolescents undergo many social and psychological changes. Early adolescents have an increasing desire for autonomy, particularly autonomy from adults such as parents and teachers (Steinberg, 1990). They become increasingly focused on their peers and very concerned about social acceptance and developing sexual relationships (Brown, 1990; Katchadourian, 1990). Many early adolescents are concerned about identity issues (Erikson, 1968), and, as a result, they often show increased self-focus and self-consciousness (Simmons & Blyth, 1987). Certain of their cognitive abilities increase as well, in particular, their capability to engage in more abstract cognitive activities (Keating, 1990).

These student changes are related to the changes in school and classroom environments just discussed in several ways. Simmons and Blyth (1987) argued that adolescents need a reasonably safe and intellectually challenging environment to meet these developmental tasks—an environment that provides a "zone of comfort" as well as challenging new opportunities for growth. In light of these needs, we believe that the most common changes in the academic environment following the transition to traditional middle grade schools are developmentally inappropriate for many early adolescents. We also believe this mismatch between adolescents' needs and traditional middle grade school and classroom environments results in a deterioration in academic motivation and performance of these early adolescents. More specifically, the environmental changes often associated with transition to traditional middle grade schools are likely to be especially harmful since they emphasize competition, social comparison, and ability self-assessment at a time of heightened self-focus; they decrease decision making and choice at a time when the desire for autonomy is growing;

they emphasize lower-level cognitive strategies at a time when the ability to use higher-level strategies is increasing; and they disrupt social networks and decrease the opportunity for close adult-child relationships to develop at a time when adolescents are especially concerned with peer relationships and may be in special need of close adult relationships outside of the home. Furthermore, the fact that most traditional middle grade schools are larger and less personal, and that teachers must interact with so many more students, make it more likely that emerging motivational problems will go unnoticed and students will be allowed to slide onto negative developmental trajectories.

The Michigan Adolescence Study

To test these hypotheses regarding the influence of changes in classroom environments on students' motivation during the middle grade school years, we conducted a large-scale 2-year, four-wave longitudinal study of the effects of changes in school and classroom environments on early adolescents' achievement-related beliefs, motives, values, and behaviors. Some of the results regarding change in early adolescents' achievement-related beliefs and motivation were discussed earlier. In this section, we first present more information about the study and then discuss results on how changes in environments and teachers' beliefs in the elementary to middle grade school transition relate to changes in student motivation.

Sample

The student and teacher samples were drawn from 12 school districts in middle- and lower-middle-income communities in southeastern Michigan. Because in our earlier work the motivational declines were most marked in mathematics (Eccles et al., 1983), we focused on this subject. Mathematics teachers and their students were recruited: 95% of the eligible teachers and 79% ($N = 3,248$) of their students agreed

to participate. Most but not all ($N = 2,500$) of these students made a transition from sixth grade in elementary school to seventh grade in junior high school during the course of the study. These students came from 117 elementary school classrooms, and we followed them in year 2 of the study into 134 seventh-grade junior high school classrooms. The teachers in these classrooms also participated by completing questionnaires about their teaching beliefs and how they structure their classroom environments.

Measures

Student questionnaire (SQ). Questionnaires were administered to students during the regular period for mathematics instruction for 2 consecutive days each wave (fall and spring of students' sixth-grade year and fall and spring of students' seventh-grade year). As mentioned earlier, these questionnaires measured students' achievement-related beliefs and values regarding math, English, social activities, and sports; general self-worth, using Harter's (1982) scale; perceptions of their mathematics classroom environment; and a variety of other constructs. Representative items assessing the motivational and achievement belief constructs are presented in Appendix A (see Eccles et al., 1989 and Wigfield et al., 1991, for more detailed information about this measure).

Teacher questionnaire (TQ). Based on the work of Ashton and Webb (1986), Brookover et al. (1979), Brophy and Evertson (1978), and Willower, Eidell, and Hoy (1967), we developed a battery to measure teachers' beliefs and attitudes. The items measured the teachers' trust and respect for students, their beliefs about the need to control and discipline students, their views of ability as a modifiable or unmodifiable trait, and their feelings of personal teaching efficacy. The year 1 and year 2 teachers completed this questionnaire. Factor analyses of the data from year 1 and year 2 teachers showed that these four factors are

differentiated. Representative items from each factor are presented in Appendix B (see Midgley et al., 1988, for more detailed information about this questionnaire).

Classroom environment measures. We developed a set of classroom measures of both formal and informal classroom characteristics associated with different classroom environmental dimensions, including teacher control, teacher warmth, evaluation practices, opportunities for student interaction, and practices that focus students' attention on self-evaluation rather than on task mastery. These dimensions were derived from previous research on the kinds of classroom environment variables that relate to student outcomes. Three versions of this measure were developed, one for students called the Student Classroom Environment Measure (SCEM), one for teachers called the Teacher Classroom Environment Measure (TCEM), and one for observers called the Observer Classroom Environment Measure (OCEM) (see Feldlaufer, Midgley, & Eccles, 1988, for more detailed descriptions of these measures).

The SCEM was given as part of the student questionnaire at each wave. It consists of items eliciting information about students' perceptions of their teacher's fairness and friendliness, competition and social comparison among students, the opportunity for cooperative learning among students, and their teacher's interest in mathematics. Factor analyses of these items suggested a five-factor solution. Sample items from each factor are presented in Appendix C.

The TCEM was designed to assess teaching and grading practices, discipline techniques, reward strategies, and opportunities for student autonomy and cooperation. Year 1 and year 2 teachers completed this measure. We used factor analysis to create scales, and a four-factor solution best described the data. The factors reflect differentiated task structures in the classroom that promote student autonomy, an emphasis on grades by teachers, student in-

teraction and cooperation, and student involvement in instruction. Representative items from these factors are presented in Appendix C.

A field staff, blind to our hypotheses, observed and rated classrooms using the OCEM. The same people observed classrooms in both year 1 and year 2. All members of the field staff participated in an extensive training program during year 1 and in a refresher program in year 2 and achieved an interrater reliability score on the OCEM in two classrooms averaging at least .76 both years.

At wave 1, 116 elementary classrooms were observed during mathematics instruction for 5 consecutive days. Although each junior high math teacher instructed a number of math classrooms, it did not seem necessary to observe all the math sections for each teacher. Therefore, at wave 3, a sample of 82 classrooms was selected from the participating posttransition seventh-grade math classrooms. The sample was selected so that all teachers were included at least once and, in the case of ability-grouped classrooms, at least one classroom from each ability level taught by a teacher was included.

The OCEM consists of low- and high-inference items measuring teaching practices, informal characteristics of the classroom climate, student interaction patterns, and teacher attitudes. Seven factors were extracted, and scales based on the factor analyses reflect teacher unfriendliness, criticalness, and unfairness; classroom processes that encourage student involvement; teacher control over procedure, form, and task organization; competition among students; opportunities to negotiate a contract for math work and grade; and teacher valuing of student ideas. Representative items are shown in Appendix C.

Student/teacher classroom decision making. To measure stage-environment fit for decision-making opportunities in math classes, five pairs of items were adapted from Lee (1979) for both students and

teachers. Each yoked pair asks whether a particular form of student decision-making opportunity exists in the classroom and whether such an opportunity ought to exist. For example:

For students: Do you help decide what math you work on during class?

Should you have a say about this?

For teachers: Do your students have a say about what math they work on during class?

Do you think students *should* have a say in this?

The five areas asked about were math classwork (the above example), where students sit during math class, what the class rules are, what to do next after finishing their math assignment, and how much math homework is assigned.

The responses to each yoked pair of items can be coded as congruent or discrepant. Responses are coded as congruent if they say they actually do and should have a decision-making prerogative or if they say they do not and should not have that prerogative. Similarly, responses are coded as discrepant if they say they do not but should have a decision-making prerogative or if they say they actually do but should not have the prerogative.

Differences between Classroom Environments

In this section, we describe several different sets of findings regarding teachers' beliefs, school and classroom environments, and their effects on student motivational outcomes. We do not present detailed statistical information for all of these findings; all differences presented are significant at the .01 level.

Teachers' beliefs about students. Our first goal was to determine if there were differences in the beliefs and behaviors of the teachers students have for mathematics before and after the transition to junior high (see Midgley et al., 1988, for a full description of this study). The sample included 107 sixth-grade elementary teachers and 64 sev-

enth-grade middle grade teachers. There are fewer seventh- than sixth-grade teachers because, at the middle grade school, each teacher instructs several sections of math. Analyses of variance (ANOVAs) were done on the TQ scales described previously. As predicted, seventh-grade teachers believed students needed to be disciplined and controlled significantly more than did sixth-grade teachers. Similarly, seventh-grade teachers rated students as significantly less trustworthy than did sixth-grade teachers. Finally, seventh-grade teachers felt significantly less efficacious than did sixth-grade teachers. The efficacy difference was the largest one found between the beliefs of the sixth- and seventh-grade teachers.

Perceptions of teacher-student relationships. Analyses of the factor scales from the SCEM and OCEM showed that similar patterns emerged for students' and observers' perceptions of the quality of student-teacher relationships before and after the transition (see Feldlaufer et al., 1988, for a more complete description of differences in the classroom environment before and after the transition based on students', teachers', and observers' reports). Paired *t* tests (on the student data) and ANOVAs (on teacher and observer data) showed that both observers and students saw seventh-grade (posttransition) math teachers as less supportive, friendly, and fair than sixth-grade (pretransition) teachers. In addition, students, teachers, and observers reported an increase, after the transition, in between-classroom ability grouping, whole-class instruction, and social comparison of grades, all of which may promote a focus on ability self-perceptions more than a focus on mastering the task.

Effects of Changes in Beliefs and Environment on Student Motivation

Our next goal was to assess the effects of these types of changes on students' academic motivation, in particular, on the motivational constructs associated with the questions: "Can I succeed?" and "Do I want to succeed?" To accomplish this goal, we used the following analytic strategy: We se-

lected three prominent teacher belief and classroom environment variables (teacher efficacy, teacher-student relationship [using the teacher fairness/friendliness scales], and between-classroom ability grouping) that were measured in this study and also that have been shown in previous research to be important predictors of various student outcomes. We then used the four waves of data on each classroom environment variable to classify students into four groups: A group that experienced relatively positive environments with regard to the construct under consideration during both sixth and seventh grades, a group that experienced relatively negative environments during both sixth and seventh grades, a group that experienced a positive environment during the sixth-grade school year but moved into a relatively more negative environment during the seventh-grade year, and a group that experienced a relatively more negative environment during the sixth-grade school year but moved to a more positive environment for the seventh-grade year. We then plotted the change in student motivational constructs over the four waves of our study (two waves in the sixth grade and two waves in the seventh grade). If our hypotheses were correct, we should have seen a decline on the student motivational construct only for students who moved from a relatively positive environment to a relatively more negative environment as they made the transition to junior high.

Teacher efficacy. Several researchers have documented a relationship between teacher efficacy and student motivation. For example, Brookover et al. (1979), using schools as the unit of analysis, found negative correlations between teachers' sense of academic futility and students' self-concepts of ability and self-reliance. A number of other researchers have also reported positive relations between teachers' efficacy beliefs and student achievement (e.g., Armor et al., 1976; Ashton & Webb, 1986; Tracz & Gibson, 1987). These results suggest that

the differences we obtained between sixth- and seventh-grade teachers' sense of efficacy could contribute to the decline in students' beliefs about their academic competency and potential. Furthermore, given the group of students with whom teachers are likely to feel least efficacious, lower-achieving students should be most at risk for this effect. Finally, the student motivational constructs most likely to be influenced by this change should be those associated with the question "Can I succeed?" such as beliefs about ability and expectancies for success.

To test these hypotheses, we divided students into four groups based on median splits of their math teachers' ratings of their personal teaching efficacy (see Midgley et al., 1989a, for full details). The largest group of students (559 out of 1,329 included in these analyses) moved from a high-efficacy sixth-grade math teacher to a low-efficacy seventh-grade math teacher. Another 474 students had low-efficacy teachers both years, 117 moved from low- to high-efficacy teachers, and 179 had high-efficacy teachers both years. Thus, 78% of these students moved to a low teacher efficacy math classroom in the seventh grade.

Repeated-measures ANOVAs showed, as predicted, that students who moved from high- to low-efficacy teachers during the transition (the most common pattern) had significantly lower expectancies for success in math, lower perceptions of their performance in math, and higher perceptions of the difficulty of math at the end of their first year in junior high school than students either who had experienced no change in teacher efficacy or who had moved from low- to high-efficacy teachers. Also as predicted, teachers' efficacy beliefs had a stronger effect on changes in low-achieving students' beliefs than on changes in high-achieving students' beliefs. By the end of the seventh-grade year, low-achieving students who moved from high- to low-efficacy teachers showed dramatic declines in

their beliefs about how well they were performing in math.

Student/teacher relations. As reported earlier, we found that student/teacher relationships deteriorate after the transition to junior high school (Midgley, Feldlaufer, & Eccles, 1989b). Research on the effects of classroom climate indicates that the quality of student/teacher relationships is associated with students' academic motivation and attitudes toward school (e.g., Berndt & Hawkins, 1985; Fraser & Fisher, 1982; Moos, 1979, 1980; Trickett & Moos, 1974). We predicted that this decline would have its most powerful effect on students' valuing of math. We also predicted that this effect would be most evident among the lower-achieving students since they have fewer intrinsic reasons to enjoy mathematics than higher achievers. Finally, we predicted that changes in student/teacher relationships would be most likely to affect those motivational constructs linked to the question "Do I want to succeed on this task?"—the subjective value of constructs.

A total of 1,301 students fell into one of the four change groups for this classroom-level environmental characteristic (see Midgley et al., 1989b, for full details). A total of 607 students had teachers high in support (based on their students' ratings of their teachers' friendliness and fairness) both years; 230 students had teachers low in support both years; 274 students moved from high- to low-support teachers; and 190 moved from low- to high-support teachers. Repeated-measures ANOVAs showed, as predicted, that students who moved from sixth-grade elementary teachers they perceived to be low in support to seventh-grade middle school teachers they perceived to be high in support showed an increase in their ratings of the intrinsic value of math in middle grade schools. In contrast, the students who moved from sixth-grade teachers they perceived to be high in support to seventh-grade teachers they perceived to be low in support showed a decline in their ratings of the intrinsic value,

perceived usefulness, and importance of math. Again the low-achieving students were particularly at risk for declining motivation when they moved to less facilitative seventh-grade classroom environments.

Between-class ability grouping. As noted earlier, we also found an increase in the extent to which students are tracked by ability in different math classes. It is not entirely clear what effect this increase would have on students' motivation. On the one hand, because it makes ability salient and because there is greater value attached to having high rather than low ability, one might predict that between-class ability grouping would have a positive effect on the motivation of higher-ability students and a negative effect on the motivation of lower-ability students. On the other hand, social comparison theorists (e.g., Suls & Sanders, 1982) suggest the opposite prediction. Since between-class ability grouping narrows the range of the ability of students in a class, one might expect an initial decline in the self-evaluations of high-ability students and an initial increase in the self-evaluations of lower-ability students. Over time, however, as the fact of being labeled as relatively good or bad in math by the kind of math class to which one is assigned becomes clearer, these initial changes might reverse, especially if lower-ability students are given the impression that teachers do not think they can learn complex math. In addition, several studies have suggested that there is a difference in the quality of teaching as well as the level of instruction between low- and high-ability math classrooms (e.g., Oakes, 1981, 1985; see Slavin, 1993, this issue, for a review of research on middle-grades tracking), with students in low-ability math classrooms receiving inferior teaching. If this is true, then over time, the students in low-ability math classes should fall further and further behind in terms of their mastery of content and should become increasingly less confident in their ability to learn mathematics.

To test these hypotheses, we selected four groups from our sample based on their experience with ability grouping in the sixth and seventh grades (see Reuman, Mac Iver, Eccles, & Wigfield, 1987, for details). All four groups of students were in heterogeneously grouped sixth-grade math classes. In the seventh grade, one group was placed in a high-ability math class, one group in a regular-ability math class, one group in a low-ability math class, and the final group was placed in a heterogeneously grouped class. The data were analyzed using repeated-measures ANOVAs. Results for students' ratings of their math ability are shown in Figure 1. As social comparison theorists would predict, being placed in a high-ability class led to an initial lowering of students' self-concepts of math ability. In contrast, being placed in a low-ability class led to an initial increase in students' self-concepts of math ability. Being placed in a regular-ability class or in a heterogeneously grouped class had no effect on students' self-concepts of math ability.

These results suggest that being segregated into different math classrooms according to one's relative competence does not have a negative effect on the self-concept of math ability of students placed in low-ability classrooms. But what happens over time? We have now followed these students into high school (see Fuligni, Eccles, & Barber, 1991, for details). By the tenth grade, the students placed in the low-ability math classrooms in grade 7 performed significantly lower on the standardized test of mathematics than students with that same competence at grade 7 who had been placed in heterogeneously grouped math classrooms. Tenth graders placed in low-ability classes at grade 7 were also more likely to exhibit problem behavior than students of comparable ability who had been placed in heterogeneously grouped math classrooms at grade 7. Clearly, over time, negative consequences are associated with being assigned to low-ability math classes rather

than heterogeneously grouped math classrooms in the seventh grade. We have used labeling theory and social comparison theory to explain these findings; clearly there are other possible interpretations, such as differences in teaching style of teachers in low- and high-ability classrooms. We currently are exploring these differences and other classroom environment differences in these kinds of classrooms (see also Slavin, 1993, in this issue) to see how they affect students' math ability perceptions.

Each of these analyses shows that it is not inevitable that students suffer a decline in their motivational orientation to math when they make the junior high school transition; rather, classroom environment factors such as the quality of the student-teacher relationship influence changes in students' beliefs and self-perceptions. These analyses clearly indicate that, to the extent that middle school classrooms can be designed appropriately, the declines often seen in early adolescents' academic motivation can be avoided. The analyses, however, do not directly test our stage-environment fit hypothesis. Two sets of analyses of the Michigan data relevant to this hypothesis are summarized in the next section.

Stage-Environment Fit

We have analyzed the stage-environment fit more explicitly (see Mac Iver, Klingel, & Reuman, 1986, and Midgley & Feldlaufer, 1987, for a full description of these studies). In a subsample of 2,210 students and their teachers in 117 pretransition and 137 posttransition classrooms from the Michigan study, Midgley and Feldlaufer (1987) assessed students' and teachers' perceptions of actual decision-making opportunities in the classroom and those they thought students ought to have, using the items on decision making developed by Lee and his colleagues (Lee, Statuto, & Kedar-Voivodas, 1983) that were described earlier.

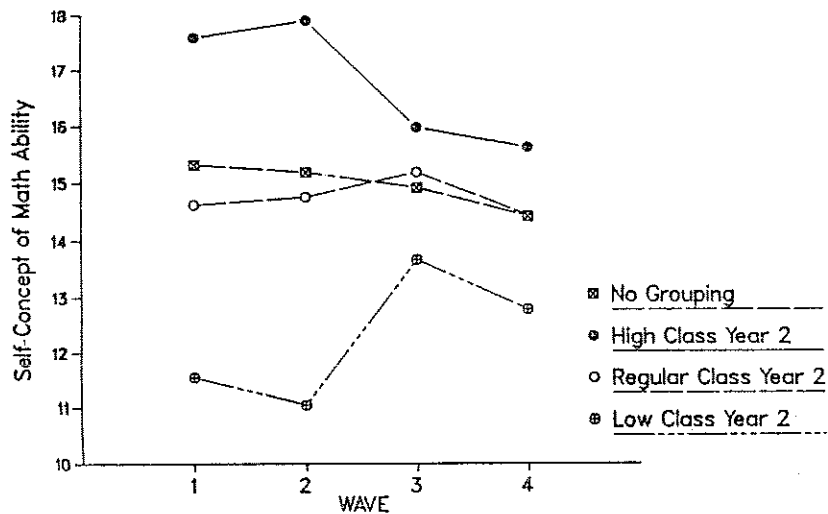


Fig. 1.—Changes in students' ratings of own math ability as a function of pattern of change in sixth- and seventh-grade ability grouping experience.

They used paired *t* tests to analyze the student data and ANOVAs on the teacher data.

As expected, students expressed a desire to have more decision-making opportunities in four of the five areas after they moved to middle grade schools. Unfortunately, both students and teachers said that students had fewer decision-making opportunities after the transition than before; thus, there is a growing lack of congruence between students' desires and the opportunities afforded in classrooms.

As outlined earlier, stage-environment fit theory suggests that this increasing mismatch between students' desires and classroom opportunities will result in a decline in motivation and engagement. More specifically, given the general developmental progression toward desire for greater independence and autonomy during the early adolescent period (Lee et al., 1983), we predicted that students experiencing a decrease in opportunities for participation in classroom decision making, coupled with an increasing desire for such opportunities,

should evidence a greater decline in interest in the subject being studied than other students (Eccles et al., 1984; Eccles & Midgley, 1989; Mac Iver et al., 1986). In a longitudinal analysis of the Lee et al. (1983) items, Mac Iver and Reuman (1988) tested this prediction. Using repeated-measures ANOVAs, they compared the changes in intrinsic interest in math of students who had different patterns of change in their responses to the actual and preferred decision-making items across the junior high school transition. Consistent with our prediction, students who perceived their seventh-grade math classrooms as putting greater constraints on their preferred level of participation in classroom decision making than their sixth-grade math classrooms showed the largest and most consistent declines in their interest in math between the sixth and seventh grade. These are precisely the students who are experiencing the type of developmental mismatch we outlined earlier.

MAY 1993

Summary and Conclusion

The work summarized here has begun to provide an in-depth description of the types of classroom environmental changes experienced by large numbers of students as they move from elementary to junior high school. In general, we have found evidence of the types of changes we had predicted; namely, an increase in teacher control, a decrease in teacher efficacy and in the quality of teacher/student relationships, and an increase in between-classroom ability grouping. We have also begun to assess the effects of these changes on students' motivation. These results both confirm the negative consequences of these changes and provide evidence that a different type of change would produce positive motivational changes at this developmental period. Together, these two outcomes support our suggestion that the declines in motivation often assumed to be characteristic of the early adolescent period are less a consequence of students' developmental stage than of the mismatch between students' needs and the opportunities afforded them in traditional middle grade schools. It is clear that much more work needs to be done to provide solid support for this hypothesis. More research is also needed to examine individual differences in appropriate fit. That is, researchers need to determine which school and classroom environments are most appropriate for different groups of early adolescents. In the next section, we outline a number of methodological concerns that investigators need to take into account if studies are to move this line of inquiry forward.

Methodological Considerations

First, to understand fully environmental effects on motivation, it is important to seek out schools and classrooms that vary on key environmental characteristics. This is not always possible to do. Although it was our goal to select school districts that varied in classroom practices such as method of evaluation, task organization, and opportunities

for student involvement, ability grouping was the only characteristic that provided any systematic variation between schools. Unfortunately, there is very little actual variation among schools on many of the classroom environmental characteristics we have suggested as important. We must not only understand the effects of what is most prevalent in classrooms but also try to determine what the most facilitative environments are, even if they are uncommon. Having identified possible examples of the most facilitative classroom environments, it will be important to use the type of longitudinal approach used in the teacher efficacy and teacher relations studies to test the effects of these environments on the nature of change in student motivation. Then researchers can begin to understand not only the effects of the most prevalent environmental changes (e.g., moving to a less positive student/teacher relationship during the transition to middle grade school) but also the effects of less frequently occurring changes (e.g., moving to a more positive teacher/student relationship, which positively affects student values).

Second, we recommend that investigators assess both the actual environment and the preferred environment in developmental studies, as we did in the decision-making studies (Mac Iver et al., 1986; Mac Iver & Reuman, 1988; Midgley & Feldlaufer, 1987). This will enable researchers to chart developmental changes in students' preferences and to assess changes in the fit between the actual environment and the preferred environment over time. Fraser's (1981) Individualized Classroom Environment Questionnaire (ICEQ) that measures students' and teachers' perceptions of actual and preferred classroom learning environments could be used for this purpose, and it would be particularly useful in more longitudinal studies of changes in students' preferences in conjunction with changes in classroom environments.

Third, to characterize classroom environments adequately, it is important to use

multiple sources of information in measuring them. We used observers' ratings as well as students' and teachers' perceptions of the classroom environment, for several reasons. Although some researchers believe that "neutral" observers provide a more objective assessment of the classroom environment, others believe that classroom participants (students and/or teacher) are more sensitive to long-standing attributes of the environment (e.g., Fraser & Walberg, 1981; Moos, 1980). We included observers' perceptions for the following reasons: First, our students were undergoing both physiological and social role changes that might affect their perceptions. It could be argued that students' perceptions are affected by these changes rather than "real" changes in the classroom environment. Second, the pre-transition teachers were a different group of teachers than the posttransition teachers. Elementary and junior high school teachers might perceive similar classrooms differently. For both of these reasons, we thought it was important to have independent observer ratings to compare with our student and teacher ratings. Both students' and teachers' perceptions were included because classroom assessments by these two groups have been found to differ in systematic ways (e.g., Fisher & Fraser, 1983; Fraser & O'Brien, 1985; Moos, 1979, 1980), and we considered it important to obtain both perspectives. However, we agree in general with those who place high value on students' perceptions, particularly in studies that link the classroom environment to student outcomes. Finally, we also used multiple sources because some questions are asked more appropriately of one source than another. For example, teachers and students are better sources than observers of information about semester-long grading practices. Likewise, observers and students are better sources than teachers for information about the warmth, friendliness, and fairness of teachers.

Having used all of these sources, we can now reflect on the need for gathering in-

formation from different sources. Although we felt it was essential to have observers' ratings, our findings suggest that they are not necessary. We obtained comparable results using teacher and student reports, and these data are much less expensive to gather than are observational data. We do, however, think it is critical to include both student and teacher measures.

In addition to perceptions of the classroom environment, measures of teachers' beliefs can give insight into the belief systems that underlie teachers' behaviors. In our studies, sixth- and seventh-grade teachers' beliefs clearly differ, and these differences affect student motivation. Do other belief systems underlie these perceptions? We have become interested in the effects of teacher stereotypes about adolescence (see Miller et al., 1990, for a discussion of this issue). Seventh-grade teachers believe that early adolescence is a difficult time of life for students and their teachers, and those with the most teaching experience endorse this belief most strongly (Miller et al., 1990). It may be that negative stereotypes flourish in schools that are exclusively for early adolescents and influence other teacher beliefs and behaviors. This may account for some of the motivational differences found between seventh graders in K-8 systems as compared to seventh graders in traditional middle grade schools.

Our study focused on mathematics teachers and instruction. We believe that some of the classroom environment changes that are counter to healthy adolescent development occur first in math classes. However, this is yet to be documented. Studies similar to ours should be conducted in other subjects, and careful comparisons should be made across subject areas. In any studies comparing elementary and junior high school classrooms or examining the transition to junior high school, it is important to focus on specific subjects for both motivational and environmental variables since most junior high schools are departmentalized.

Implications for Designing Middle-Level Education

Research on the effects of school transitions during early adolescence can and should affect educational policy. Several of the most recent transition studies provide information about which students are most vulnerable to negative transition effects; these results should help educators or provide those students with resources that will help them cope with the change. We hope that there will also be an emphasis on identifying the kinds of changes in the school and classroom environment that are facilitative or debilitating at this stage of life, particularly to high-risk children, in order to make recommendations for change to school people. In addition, studies that look at the role of peer relations in moderating transition effects provide useful information (e.g., Berndt & Hawkins, 1985), but we hope that, if positive peer relationships provide a buffer, attention will be paid to how peer interactions can flourish in schools for early adolescents.

Over the last several years there have been different calls for restructuring traditional middle grade schools; the Carnegie Council on Adolescent Development's (1989) *Turning Points* report has been particularly influential. In that report, the council made several important suggestions for restructuring middle grade education, including creating smaller communities for learning within middle schools, eliminating tracking, empowering teachers and administrators to have more responsibility over their own schools' programs, using teaming and cooperative learning, and others. These suggestions are all worthwhile and, if they are implemented, will go a long way towards improving students' motivation in middle grade schools. In particular, based on results of our studies, we recommend that efforts be made to improve student/teacher relationships in schools that serve early adolescents, regardless of the grades included in the schools. We also recommend that attention be given to providing

an environment that will increase the efficacy beliefs of teachers of early adolescents. Creating small learning communities and empowering teachers are ways to accomplish these goals.

One of the main reasons the Carnegie Council's report is so powerful is that it deals with changes in school and classroom structure and organization rather than with more cosmetic changes in things such as the grades served by middle schools. These more fundamental structural and organizational changes are essential if we are to improve middle grade schools. Implementing these changes, however, can be difficult, because school administrators, teachers, and parents often resist them (see Maehr & Midgley, 1991, for a description of the promises and perils of instigating major structural change in a middle grade school). As our studies continue, we will make other recommendations regarding ability grouping, opportunities for decision making, decision-making congruence, standards for grading, and other classroom and teacher characteristics appropriate for early adolescents.

Appendix A Sample Items from the Student Motivation Questionnaires

Self-Concept of Ability (3 Items)

1. How good at math are you?
2. Compared to most of your other school subjects, how good are you at math?

Perceived Performance in Math (2 Items)

1. What mark do you think you'll get in math this year?
2. When taking a math test I have studied for, I do _____.

Expectancies for Success (2 Items)

1. How well do you think you will do in math this year?
2. How successful do you think you'd be in a career that required mathematical ability?

Task Difficulty (3 Items)

1. In general, how hard is math for you?
2. Compared to most other school subjects you have taken or are taking, how hard is math for you?

Achievement Values (9 Items)

1. How much do you like doing math?
2. How important is it for you to do well in math?
3. In general, how useful is what you learn in math?
4. Would you take more math if you didn't have to?

NOTE.—For the student self-perceptions, mathematics items are used as exemplars; identical items were used in the other activity domains. Scales are based on factor analyses of all items; number of items on the scales is shown in parentheses.

Appendix B

Sample Items from the Teacher Beliefs Questionnaire

Teacher Efficacy (5 items)

1. If I really try hard I can get through to even the most difficult or unmotivated student.
2. There is really very little I can do to ensure that most of my students achieve at a high level.
3. I am certain I am making a difference in the lives of my students.

Beliefs about Discipline and Control (7 items)

1. It is often necessary to remind students that their status in school differs from that of teachers.
2. Students should not be permitted to contradict the statements of teachers in class.
3. A few students are just troublemakers and should be treated accordingly.

Beliefs about Trusting Students (4 items)

1. Most students will waste free time if they're not given something to do.
2. Students cannot be trusted to correct their own tests.
3. Students can be trusted to work together without supervision.

Beliefs about Students' Ability (3 items)

1. How much a student learns about math in my class depends more on a student's natural ability than on my teaching strategies.
2. Some of my students were born with more math potential than other students.

NOTE.—Mathematics teachers completed these questionnaires. Scales are based on factor analyses of all items. The number of items in each scale is shown in parentheses.

Appendix C

Student, Teacher, and Observer Perceptions of the Classroom Environment

Student Classroom Environment Measure*Teacher Fairness, Friendliness (6 items)*

1. The teacher is friendly to us.
2. The teacher grades our math work fairly.

Competition among Students (2 items)

1. Some kids try to be the first ones done in math.
2. Some kids try to be the first ones to answer math questions the teacher asks.

Social Comparison (2 items)

1. When math papers are handed back, we show each other how we did.
2. When report cards come out, we tell each other what we got in math.

Cooperation and Interaction (5 items)

1. We get to work with each other in small groups when we do math.
2. We help each other with math work.

Teacher's Interest in Math (3 items)

1. The teacher tries to make math interesting in this class.
2. The teacher likes math.

Teacher Classroom Environment Measure*Task Structure (4 items)*

1. Most students in this class use the same math textbooks and materials.
2. Students work on a variety of different math activities and assignments at the same time in this class.

Grades (2 items)

1. I give grades on math homework assignments.
2. I give grades on math classwork.

Student Interaction and Cooperation (2 items)

1. Students are allowed to talk to other students while they work on their math.
2. Students are allowed to ask other students to help them with their math work.

Student Input (3 items)

1. I ask students what they want to learn about in math.
2. Students can work on math projects that they think up completely on their own.

Observer Classroom Environment Measure*Teacher Friendliness, Fairness (7 items)*

1. The teacher is warm and supportive.
2. The teacher uses sarcasm.

Student Input (3 items)

1. Students suggest projects or topics to study in math.
2. Students help choose the instructional materials they use in math.

Task Organization (3 items)

1. Most students do the same math homework.
2. Students work on the same math lesson at the same time.

Procedure and Form (4 items)

1. The teacher expresses concern when students do things their own way.
2. The teacher is very concerned about procedure and form.

Student Competition (4 items)

1. Some students compete with each other to answer questions in math.
2. The teacher encourages students to compete with each other in math.

Contracts (3 items)

1. Some students' grades in math are based on fulfilling a contract.
2. Students sometimes negotiate written contracts with the teacher regarding math work.

Teacher Expectations and Valuing of Math (5 items)

1. The teacher has high expectations of most of the students in math.
2. The teacher emphasizes doing math for its own sake (because it is interesting or valuable).

NOTE.—All questions concerned mathematics classrooms. Scales were derived from factor analyses of all the items. The number of items in each scale is shown in parentheses.

Note

The research reported in this article was made possible by grants from the National Institute of Child Health and Human Development, National Institute of Mental Health, and the Spencer Foundation to the first author and from the National Science Foundation to the first and second authors. Address correspondence to Jacquelynne S. Eccles, 5271 Institute for Social Research, P.O. Box 1248, Ann Arbor, MI 48106-1248.

References

- Armor, D., Conry-Oseguera, P., Cox, M., King, N., McDonnell, L., Pascal, A., Pauly, E., & Zeilman, G. (1976). *Analysis of the school preferred reading program in selected Los Angeles minority schools* (Report No. R-2007). Santa Monica, CA: Rand. (ERIC Document Reproduction Service No. ED 140 432)

Ashton, P. T., & Webb, R. B. (1986). *Making a difference: Teachers' sense of efficacy and student achievement*. New York: Longman.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191-215.

Barker, R., & Gump, P. (1964). *Big school, small school: High school size and student behavior*. Stanford, CA: Stanford University Press.

Berndt, T. J., & Hawkins, J. A. (1985). *Adjustment following the transition to junior high school*. Unpublished manuscript.

Blos, P. (1965). The initial stage of male adolescence. *Psychoanalytic Study of the Child*, 20, 145-164.

Blyth, D. A., Simmons, R. G., & Bush, D. (1978). The transition into early adolescence: A longitudinal comparison of youth in two educational contexts. *Sociology of Education*, 51, 149-162.

Blyth, D. A., Simmons, R. G., & Carlton-Ford, S. (1983). The adjustment of early adolescents to school transitions. *Journal of Early Adolescence*, 3, 105-120.

Brookover, W., Beady, C., Flood, P., Schweitzer, J., & Wisenbaker, J. (1979). *School social systems and student achievement: Schools can make a difference*. New York: Praeger.

Brophy, J. E., & Everson, C. M. (1978). Context variables in teaching. *Educational Psychologist*, 12, 310-316.

Brown, B. B. (1990). Peer groups and peer cultures. In S. S. Feldman & G. R. Elliott (Eds.), *At the threshold: The developing adolescent* (pp. 171-196). Cambridge, MA: Harvard University Press.

Carnegie Council on Adolescent Development. (1989). *Turning points: Preparing American youth for the 21st century*. Washington, DC: Carnegie Council on Adolescent Development.

Deci, E. L., & Ryan, R. M. (1987). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Dweck, C. S., & Elliott, E. S. (1983). Achievement motivation. In E. M. Hetherington (Ed.), P. H. Mussen (Series Ed.), *Handbook of child psychology: Vol. 4. Socialization, personality, and social development* (3d ed., pp. 643-691). New York: Wiley.

Eccles, J., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J. L., & Midgley, C. (1983). Expectancies, values, and academic behaviors. In J. T. Spence (Ed.), *Achievement and achievement motivation* (pp. 75-146). San Francisco: W. H. Freeman.

Eccles, J. S., Lord, S., & Midgley, C. M. (1991). What are we doing to adolescents? The impact of educational contexts on early adoles-

- cents. *American Journal of Education*, 99, 521-542.
- Eccles, J. S., & Midgley, C. (1989). Stage/environment fit: Developmentally appropriate classrooms for early adolescents. In R. E. Ames & C. Ames (Eds.), *Research on motivation in education* (Vol. 3, pp. 139-186). New York: Academic Press.
- Eccles, J., Midgley, C., & Adler, T. (1984). Grade-related changes in the school environment: Effects on achievement motivation. In J. G. Nicholls (Ed.), *The development of achievement motivation* (pp. 283-331). Greenwich, CT: JAI.
- Eccles, J., & Wigfield, A. (1985). Teacher expectations and student motivation. In J. Dusek (Ed.), *Teacher expectancies* (pp. 185-217). Hillsdale, NJ: Erlbaum.
- Eccles, J. S., Wigfield, A., Flanagan, C., Miller, C., Reuman, D., & Yee, D. (1989). Self-concepts, domain values, and self-esteem: Relations and changes at early adolescence. *Journal of Personality*, 57, 283-310.
- Epstein, J. L., & McPartland, J. M. (1976). The concept and measurement of the quality of school life. *American Educational Research Journal*, 13, 15-30.
- Erikson, E. (1968). *Identity, youth, and crisis*. New York: Norton.
- Feldlaufer, H., Midgley, C., & Eccles, J. S. (1988). Student, teacher, and observer perceptions of the classroom environment before and after the transition to junior high school. *Journal of Early Adolescence*, 8, 133-156.
- Fisher, D. L., & Fraser, B. J. (1983). A comparison of actual and preferred classroom environments as perceived by science teachers and students. *Journal of Research in Science Teaching*, 20, 55-61.
- Fraser, B. J. (1981, April). *Validity and use of Individualized Classroom Environment Questionnaire*. Paper presented at the annual meeting of the American Educational Research Association, Los Angeles.
- Fraser, B. J., & Fisher, D. L. (1982). Predicting students' outcomes from their perceptions of classroom psychosocial environment. *American Educational Research Journal*, 19, 498-518.
- Fraser, B. J., & O'Brien, P. (1985). Student and teacher perceptions of the environment of elementary school classrooms. *Elementary School Journal*, 85, 567-580.
- Fraser, B. J., & Walberg, H. J. (1981). Psychosocial learning environments in science classrooms: A review of research. *Studies in Science Education*, 8, 67-92.
- Fulgini, A. J., Eccles, J. S., & Barber, B. L. (1991). *The long-term effects of seventh-grade ability grouping in mathematics*. Manuscript submitted for publication. Ann Arbor: University of Michigan.
- Gullickson, A. R. (1985). Student evaluation techniques and their relationship to grade and curriculum. *Journal of Educational Research*, 79, 96-100.
- Harter, S. (1981). A new self-report scale of intrinsic versus extrinsic orientation in the classroom: Motivational and informational components. *Developmental Psychology*, 17, 300-312.
- Harter, S. (1982). The Perceived Competence Scale for Children. *Child Development*, 53, 87-97.
- Harter, S., Whitesell, N., & Kowalski, P. (1987). *The effects of educational transitions on children's perceptions of competence and motivational orientation*. Unpublished manuscript, University of Denver.
- Holmbeck, G. N., & Hill, J. P. (1986, March). *Beliefs in storm and stress notions of adolescence: Prevalence and developmental antecedents*. Paper presented at the biennial meeting of the Society for Research on Adolescence, Madison, WI.
- Hoy, W. K. (1968). The influence of experience on the beginning teacher. *School Review*, 76, 312-323.
- Hunt, D. E. (1975). Person-environment interaction: A challenge found wanting before it was tried. *Review of Educational Research*, 45, 209-230.
- Katchadourian, H. (1990). Sexuality. In S. S. Feldman & G. R. Elliott (Eds.), *At the threshold: The developing adolescent* (pp. 330-351). Cambridge, MA: Harvard University Press.
- Kavrell, S. M., & Petersen, A. C. (1984). Patterns of achievement in early adolescence. In M. L. Maehr (Ed.), *Advances in motivation and achievement* (Vol. 4, pp. 1-35). Greenwich, CT: JAI.
- Keating, D. P. (1990). Adolescent thinking. In S. S. Feldman & G. R. Elliott (Eds.), *At the threshold: The developing adolescent* (pp. 54-89). Cambridge, MA: Harvard University Press.
- Lavigne, J. V. (1977). The pediatric hospital staff's knowledge of normal adolescent development. *Journal of Pediatric Psychology*, 2, 98-100.
- Lee, P. (1979). *A developmental study of children's prerogatives and constraints in several domains of school experience* (Report to the National Institute of Education [NIE]). Washington, DC: NIE.
- Lee, P., Statuto, C., & Kedar-Voivodas, G. (1983). Elementary school children's perceptions of their actual and ideal school experience: A developmental study. *Journal of Educational Psychology*, 75, 838-847.
- Mac Iver, D., Klingel, D. M., & Reuman, D. A. (1986, April). *Students' decision-making congruence in mathematics classrooms: A person-environment fit analysis*. Paper presented at the annual meeting of the American Educational Research Association, San Francisco.
- Mac Iver, D., & Reuman, D. A. (1988, April). *Decision-making in the classroom and early adolescents' valuing of mathematics*. Paper presented at the annual meeting of the American Educational Research Association, New Orleans.
- Maehr, M. L., & Midgley, C. (1991). Enhancing student motivation: A schoolwide approach. *Educational Psychologist*, 26, 399-427.
- Marsh, H. W. (1989). Age and sex effects in multiple dimensions of self-concept: Preadolescence to early adulthood. *Journal of Educational Psychology*, 81, 417-430.
- Metz, M. H. (1978). *Classrooms and corridors: The crisis of authority in desegregated secondary schools*. Berkeley: University of California Press.
- Midgley, C. M., & Feldlaufer, H. (1987). Students' and teachers' decision-making fit before and after the transition to junior high school. *Journal of Early Adolescence*, 7, 225-241.
- Midgley, C. M., Feldlaufer, H., & Eccles, J. S. (1988). The transition to junior high school: Beliefs of pre- and post-transition teachers. *Journal of Youth and Adolescence*, 17, 543-562.
- Midgley, C. M., Feldlaufer, H., & Eccles, J. S. (1989a). Change in teacher efficacy and student self- and task-related beliefs during the transition to junior high school. *Journal of Educational Psychology*, 81, 247-258.
- Midgley, C. M., Feldlaufer, H., & Eccles, J. S. (1989b). Student/teacher relations and attitudes toward mathematics before and after the transition to junior high school. *Child Development*, 60, 981-992.
- Miller, C. L., Eccles, J. S., Flanagan, C., Midgley, C., Feldlaufer, H., & Goldsmith, R. (1990). Parents' and teachers' beliefs about adolescence: Effects of sex and experience. *Journal of Youth and Adolescence*, 19, 363-394.
- Mitchell, J. V. (1969). Education's challenge to psychology: The prediction of behavior from person-environment interactions. *Review of Educational Research*, 39, 695-721.
- Moore, D. W. (1983, April). *Impact of school grade-organization patterns on seventh and eighth grade students in k-8 and junior high school*. Paper presented at the annual meeting of the New England Research Association, Rockport, ME.
- Moos, R. H. (1979). *Evaluating educational environments*. San Francisco: Jossey-Bass.
- Moos, R. H. (1980). Evaluating classroom learning environments. *Studies in Educational Evaluation*, 6, 239-252.
- Nottelmann, E. D. (1987). Competence and self-esteem during the transition from childhood to adolescence. *Developmental Psychology*, 23, 441-450.
- Oakes, J. (1981). Tracking policies and practices: School by school summaries. *A study of schooling* (Tech. Rep. No. 25). Los Angeles: University of California, Graduate School of Education.
- Oakes, J. (1985). *Keeping track: How schools structure inequality*. New Haven, CT: Yale University Press.
- Offer, D., Ostrov, E., & Howard, K. I. (1981). The mental health professional's concept of the normal adolescent. *Archives of General Psychiatry*, 38, 149-153.
- Petersen, A. (1988). Adolescent development. *Annual Review of Psychology*, 39, 583-607.
- Petersen, A., Ebata, A., & Graber, J. (1987, April). *Responses to developmental and family changes in early adolescence*. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.
- Reuman, D., Mac Iver, D., Eccles, J., & Wigfield, A. (1987, April). *Change in students' mathematics motivation and behavior at the transition to junior high school*. Symposium paper presented at the biennial meeting of the Society for Research on Child Development, Baltimore, MD.
- Rounds, T. S., & Osaki, S. Y. (1982). *The social organization of classrooms: An analysis of sixth and seventh grade activity structures* (Report No. EPSSP-82-5). San Francisco: Far West Laboratory for Educational Research and Development.
- Schulenberg, J. E., Asp, C. E., & Petersen, A. C. (1984). School from the young adolescent's perspective: A descriptive report. *Journal of Early Adolescence*, 4, 107-130.
- Schunk, D. H. (1991). Self-efficacy and academic motivation. *Educational Psychologist*, 26, 207-232.
- Silberman, C. E. (1970). *Crisis in the classroom*. New York: Random House.
- Simmons, R. G., & Blyth, D. A. (1987). *Moving into adolescence: The impact of pubertal change and school context*. Hawthorn, NY: Aldine de Gruyter.
- Simmons, R. G., Blyth, D. A., Van Cleave, E. F., & Bush, D. (1979). Entry into early adolescence: The impact of school structure, pu-

- berly, and early dating on self-esteem. *American Sociological Review*, 44, 948-967.
- Slavin, R. E. (1993). Ability grouping in the middle grades: Achievement effects and alternatives. *Elementary School Journal*, 93, 535-552.
- Steinberg, L. (1990). Autonomy, conflict, and harmony in the family relationship. In S. S. Feldman & G. R. Elliott (Eds.), *At the threshold: The developing adolescent* (pp. 255-276). Cambridge, MA: Harvard University Press.
- Stipek, D. J., & Mac Iver, D. (1989). Developmental change in children's assessment of intellectual competence. *Child Development*, 60, 521-538.
- Suls, J. M., & Sanders, G. S. (1982). Self-evaluation theory through social comparison: A developmental analysis. In L. Wheeler (Ed.), *Review of personality and social psychology* (Vol. 3, pp. 171-197). Beverly Hills, CA: Sage.
- Thornburg, H. D., & Jones, R. M. (1982). Social characteristics of early adolescents: Age versus grade. *Journal of Early Adolescence*, 2, 229-239.
- Tracz, S. M., & Gibson, S. (1987, April). *Teacher efficacy: Its relationship to teacher time allocation, student engagement and student achievements*. Paper presented at the annual meeting of the American Educational Research Association, Washington, DC.
- Trickett, E. J., & Moos, R. H. (1974). Personal correlates of contrasting environments: Student satisfactions in high school classrooms. *American Journal of Community Psychology*, 2, 1-12.
- Walberg, H. J., House, E. R., & Steele, J. M. (1973). Grade level, cognition, and affect: A cross-section of classroom perceptions. *Journal of Educational Psychology*, 64, 142-146.
- Ward, B. A., Mergendoller, J. R., Tikunoff, W. J., Rounds, T. S., Dadey, G. J., & Mitman, A. L. (1982). *Junior high transition study: Executive summary*. San Francisco: Far West Laboratory for Educational Research and Development.
- Wigfield, A., & Eccles, J. S. (in press). The development of achievement task values: A theoretical analysis. *Developmental Review*.
- Wigfield, A., Eccles, J. S., Mac Iver, D., Reuman, D. A., & Midgley, C. (1991). Transitions during early adolescence: Changes in children's domain-specific self-perceptions and general self-esteem across the transition to junior high school. *Developmental Psychology*, 27, 552-565.
- Willower, D. J., Eidell, T. L., & Hoy, W. K. (1967). The school and pupil control ideology. *Pennsylvania State Studies Monograph* (No. 24). University Park: Pennsylvania State University Press.

Promoting Independent Learning in the Middle Grades: The Role of Instructional Support Practices

John W. Thomas

Beryl Buck Institute for Education
Novato, CA

Abstract

Developmental characteristics of students and existing institutional arrangements present an opportunity at the middle grades level to promote student proficiency at independent learning. Recent recommendations for school reform that stress the importance of laboratories, homework, testing, and study skills may make independent learning even more salient at the middle grades level. This article reviews the opportunities for and obstacles to promoting independent learning in light of recent research on the effects of features of secondary school courses on adolescents' study practices. A paradox is described involving the simultaneous presence of course features that encourage and those that discourage productive independent learning. A resolution to this paradox is proposed that involves substituting compensatory practices that discourage self-directed learning activities (e.g., test review handouts) with instructional practices (e.g., extensive performance feedback, challenging practice exercises, opportunities to improve study skills) that support students' engagement in independent-learning activities. Evidence for the effect of these support features on students' study activities and achievement is also provided.

A paradox seems to exist in the middle grades regarding certain traditional instructional practices, namely, practices that require students to process information and to acquire and practice skills on their own. Courses at the middle grades level are designed, either explicitly or implicitly, to prompt students to engage in independent-learning activities; that is, in contrast to the lower-elementary grades, many middle grade courses include the administration of reading assignments, laboratory exercises, homework worksheets, quizzes, and curriculum-embedded tests as central elements.