Classroom and Individual Differences in Early Adolescents' Motivation and Self-Regulated Learning

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The relations between classroom experience and individual differences in motivation and self-regulated learning were examined in a correlational study of seventh graders (N = 100, mean age = 12.3 years) from a middle school in the midwest. Motivational beliefs (intrinsic value, self-efficacy, and test anxiety) and self-regulated learning (cognitive strategy use and self-regulation) were assessed in the fall and spring of the school year using a reliable and valid self-report measure, the Motivated Strategies for Learning Questionnaire. Classroom experience was measured with students' perceptions of productive classroom work, teacher effectiveness, and cooperative work. Results showed that positive motivational beliefs were positively related to higher levels of self-regulated learning. Classroom differences also were related to motivation and self-regulated learning. Intrinsic value later in the year was more strongly related to classroom experience than intrinsic value early in the year, whereas test anxiety was more traitlike, showing a stronger relation to earlier anxiety than to classroom experience. Self-efficacy, cognitive strategy use, and self-regulation were related to both early individual difference measures as well as classroom experience. Results are discussed in terms of the reciprocal relations between motivation and self-regulated learning as well as the implications for education.

Current research on early adolescence and schooling has examined the relations between biological changes and schooling (e.g., Simmons & Blyth, 1987), cognitive development and schooling (e.g., Entwisle, 1990; Keating,

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1990), and social and motivational development and schooling (e.g., Eccles et al., 1993). Although this research has begun to provide us with excellent descriptions of how different characteristics of junior high and senior high schools influence the course of adolescent development, there has not been much integration across the different domains of development. In fact, Keating (1990) suggests the need for models that "open the gate of our typically closed-system models of thinking, learning, and instruction" (p. 76) to include motivational, cognitive, and contextual dimensions. The purpose of this article is to explicitly integrate the motivational and cognitive domains of adolescent development and examine their interrelations in the classroom context of middle schools.

One hallmark of adolescent thinking is the ability to monitor and regulate one's thinking and learning (Keating, 1990). Although there has been research on the development of adolescents' ability to regulate their learning (Sternberg & Powell, 1983), there has been very little research on how this ability is related to students' motivational beliefs, goals, and values. In fact, Keating (1990) noted that "tracking the development of these motivational aspects that relate to cognitive performance remains a key topic for future research" (p. 76). In the classroom context, the use of cognitive and self-regulatory strategies has been shown to be an important component of student performance and achievement in the classroom (Pintrich & De Groot, 1990; Zimmerman & Martinez-Pons, 1986). This research has shown that students who use cognitive strategies such as elaboration (e.g., summarizing, paraphrasing) and organization (making outlines, drawing up tables or charts) engage the content at a deeper level of processing and are more likely to recall the information and be able to use it at a later date. In contrast, students who do not use any strategies to help them encode the information or rely only on rote rehearsal strategies seem to process the information at a more superficial or surface level and do not perform as well on memory and transfer tasks (Weinstein & Mayer, 1986).

Besides these basic cognitive strategies, research has shown that metacognitive control and self-regulatory strategies also are important for learning (Brown, Bransford, Campione, & Ferrara, 1983; Keating, 1990). Metacognitive control strategies include planning (e.g., setting goals), monitoring (e.g., tracking attention and comprehension, self-testing for understanding), and regulating (e.g., rereading, adjusting reading speed) strategies that help guide and direct students' cognition. Besides these metacognitive control strategies, there are a variety of other self-regulatory strategies that are important for performance (Corno, 1986, 1993). In the classroom context, students' ability to manage and regulate their effort (i.e., persist with difficult tasks, maintain attention with uninteresting tasks) seems to be an important com-

ponent of self-regulated learning (Pintrich & De Groot, 1990; Zimmerman & Martinez-Pons, 1986). For the most part, however, cognitive development research has not focused on how students are motivated to use these cognitive and self-regulatory strategies.

Nevertheless, it does appear that certain motivational beliefs and affective reactions are related to how adolescents approach and become cognitively involved in different classroom academic tasks (Graham & Golan, 1991; Nolen, 1988; Pintrich, 1989; Pintrich & De Groot, 1990; Pintrich & Schrauben, 1992). In our research, we have focused on three motivational components—value, expectancy, and affect. As in all motivational theories, these motivational beliefs and reactions are assumed to lead to three general types of motivated behavior including choice (i.e., choosing to do some tasks and not others), level of activity or engagement (i.e., engaging the task at a sustained and deep level), and persistence (i.e., continued effort in the face of difficulty). However, motivational research does not usually examine the use of different strategies or resources through which the learner would enact these motivational beliefs. Given that the use of different cognitive and self-regulatory strategies represents motivated behavior in terms of a sustained and deeper level of cognitive engagement, we have focused on the relations between the motivational and cognitive components thereby describing a motivated and self-regulating learner.

In our model, we have defined value components in terms of two constructs—goal orientation and task value beliefs (Pintrich, 1989; Pintrich & Garcia, 1991; Pintrich & Schrauben, 1992; Pintrich, Smith, Garcia, & McKeachie, 1993). Goal orientation refers to two general approaches to academic tasks in line with a more qualitative view of motivation (Ames, 1992) whereby the different goal orientations can lead students in qualitatively different directions as they perform an academic task. The two dimensions are an intrinsic goal orientation where the student focuses on mastery and learning and an extrinsic goal orientation where the student approaches the task with a concern about grades, pleasing others, or besting others (cf. Dweck & Leggett, 1988; Harter, 1981). In contrast, task value beliefs reflect a more quantitative approach to motivation where higher levels of task value should result in more motivated behavior. Following Eccles (1983), we have proposed that there are three general aspects of task value beliefs—interest, utility, and importance. Interest refers to students' personal interest and liking of the course material. Utility is students' perceptions of how useful the course material is to them. Importance concerns students' beliefs about how significant the course content is for them and their future goals (Pintrich, 1989).

Conceptually, we propose that goal orientation and task value are separate motivational components. However, although we have found that intrinsic

goal orientation, extrinsic goal orientation, and task value beliefs are separate factors with college age adolescents (Pintrich & Garcia, 1991; Pintrich et al., 1993), in our work with middle school adolescents (Pintrich & De Groot, 1990), we have found that these beliefs are less differentiated and form a general value factor that reflects intrinsic goal orientation and high levels of interest, utility, and importance beliefs. In this article, we focus on this general factor that we have labeled intrinsic value in line with our earlier work (Pintrich & De Groot, 1990).

The second component in our research on motivational beliefs includes the expectancy component, self-efficacy. Self-efficacy beliefs are defined as students' judgments of their capability to accomplish a task in a specific situation and have been linked to a number of positive performance and achievement outcomes (Bandura, 1986; Schunk, 1985). In our work, we have operationalized self-efficacy beliefs at a slightly more global level to include adolescents' judgments of their capabilities to learn and succeed in a specific course (Pintrich & De Groot, 1990).

The third motivational component in our model is the affective construct of test anxiety. There seems to be two aspects of test anxiety—a worry component and an emotionality component (Liebert & Morris, 1967). The worry component is more cognitive in nature and refers to negative thoughts and self-talk that interfere with effective performance. The emotionality component includes the experience of negative emotions and physiological arousal. There are a large number of studies that show that high levels of test anxiety disrupt performance and have detrimental effects on student achievement (Hill & Wigfield, 1984).

Following the Keating (1990) call for more integrative research on motivation and self-regulation, the first research question in this study concerns the relations between these three motivational components (intrinsic value, self-efficacy, and test anxiety) and adolescents' use of cognitive and self-regulatory strategies. In a previous study (Pintrich & De Groot, 1990), we found that higher levels of intrinsic value and self-efficacy were positively related to the use of cognitive and self-regulatory strategies for middle school adolescents. These findings parallel other studies (e.g., Ames & Archer, 1988; Graham & Golan, 1991; Nolen, 1988) that have shown that adopting an intrinsic, mastery, and task-involved orientation to a learning task results in deeper levels of cognitive processing and that higher levels of self-efficacy lead to more strategy use and self-regulated learning (Pintrich & Schrauben, 1992; Schunk, 1989). In addition, we found in the previous study that test anxiety was not related to cognitive strategy use but was negatively related to adolescents' self-regulation (Pintrich & De Groot, 1990) as has been found in other studies (e.g., Benjamin, McKeachie, & Lin, 1987). In our earlier

study, however, we only had measures of students' motivation and cognition at one point in time that limited our ability to examine the development of the relations over time. In the present study, we have measures of both motivation and self-regulated learning at two points in time. One purpose of the present study is to provide a partial replication of the results from our earlier study. In addition, we go beyond those results by describing the relations between motivation and self-regulation over the course of a school year in middle school classrooms.

Many of the studies that have directly investigated the relations between motivation and cognition have not examined classroom context effects. Accordingly, our second general research question concerns how adolescents' classroom experiences are related to their motivation and self-regulated learning. As Eccles et al. (1993) have suggested, there are a number of dimensions of classrooms that can have a positive or negative influence on the course of adolescent development, especially adolescents' motivation. In this article, we focus on three general aspects of middle school adolescents' classroom experience—the nature of academic work, the teacher's instructional style, and cooperative goal structure.

In research on the influence of classroom characteristics on adolescent development, there is an important conceptual and methodological issue concerning the nature and measurement of the classroom characteristics. Ames (1992) and others (e.g., Ryan & Grolnick, 1986; Weinstein, 1989; Winne & Marx, 1982) have argued strongly for the inclusion of students' perceptions of classroom experience as an important mediator of actual classroom experience. Research on classroom climate in general (e.g., Moos, 1979) and specific research on how individuals construct meaning regarding the "functional significance" (Ryan & Grolnick, 1986) of context or how they create a "psychological climate" (Maehr, 1984) of a particular environment suggests the importance of student perceptions of the classroom. We follow in this tradition and use student perceptions of the classroom as our measure of the classroom characteristics.

At the same time, following the analyses used by Ryan and Grolnick (1986), we examine the relative effects of the classroom as a whole by including an overall classroom mean as one measure of the environment as well as a measure of the disparity in an individual's perceptions of the classroom by including a deviation measure that subtracts the individual's scale score from the classroom mean. By including both these measures, we can examine questions regarding overall classroom influences as well as the individual-within-a-context questions thereby shedding some light on the relative importance of classroom and individual differences effects. In addition, many of these studies of students' perceptions of the classroom environ-

ment (e.g., Ames & Archer, 1988; Ryan & Grolnick, 1986) do not examine or factor out students' entering individual characteristics before measuring their classroom perceptions. For example, both Ames and Archer (1988) and Ryan and Grolnick (1986) used the more common design of giving a classroom perception measure followed at some later point in time by measures of outcomes (e.g., individual differences in perceived competence, goal orientation, self-efficacy, intrinsic motivation, strategy use). This type of design does not control for preexisting individual differences. In this study, we have a pretest measure of students' motivation and cognition followed by a measure of classroom perceptions and a posttest on student motivation and cognition. This design allows us to examine the relative influence of entering both individual differences and classroom perceptions on students' motivation and cognition.

In terms of the classroom dimensions, academic work has been shown to influence learners by focusing their attention on particular aspects of the content, specifying ways to process information, and promoting interest (Doyle, 1983). Blumenfeld, Mergendoller, and Swarthout (1987) also have argued that features of academic classroom work can influence students' motivation and cognition. In addition, motivation researchers have suggested that providing students with some choice and control over their learning will result in higher levels of motivation and interest (Ames, 1992; Deci & Ryan, 1985). Eccles et al. (1993) have found that there is usually a decline in the amount of autonomy, choice, and control over academic work as adolescents enter middle school with concomitant declines in their motivation. Accordingly, our measure of academic work included students' perceptions of how much interest is generated by the work, the amount of choice they have, and whether the work helps them learn the course content. It was expected that perceptions of the classroom work as productive would be related to higher levels of student motivation, especially more positive intrinsic value beliefs, as well as more frequent use of cognitive and self-regulatory strategies.

The second dimension of classroom experience includes students' perceptions of the teacher's instructional behavior. Students' perceptions of their teachers and their instructional behavior have been shown to be related to motivational beliefs (Eccles, 1983) as well as actual academic performance (Brophy & Good, 1986). The research from the process-product paradigm suggests that both management behavior (e.g., maintaining control and order) as well as instructional behavior (e.g., providing clear explanations) are important characteristics of good teachers (Brophy & Good, 1986). More recently, Blumenfeld, Puro, and Mergendoller (1992) have suggested that teachers need to combine instructional strategies to facilitate student motivation (i.e., enhancing student interest and value for the course material; cf.

Brophy, 1983) with instructional strategies that enhance cognitive engagement (i.e., clear explanations, pressing for understanding through questioning and feedback). We included students' perceptions of these instructional behaviors and expected that students who perceived more frequent use of these behaviors would report more positive motivational beliefs and higher levels of cognitive and self-regulatory strategy use.

Finally, cooperative goal structures in the classroom have been shown to enhance student motivation including attributions, interest and value beliefs, and self-efficacy and perceptions of competence (Slavin, 1980). In addition, students' perceptions of classroom mastery and cooperative goal structures are related to their use of cognitive strategies (Ames & Archer, 1988) as well as their overall academic achievement (Slavin, 1980). Although there are many studies of cooperative goal structures in classrooms, very few classroom studies have examined the relative contributions of the opportunity to work together with other aspects of the classroom. It may be that the nature of the academic work or the teacher's instructional behavior may have an influence on students' motivation and cognition over and above any effect from cooperative learning opportunities. We expected that students' perceptions of the opportunity to work with other students would be positively correlated with students' motivational beliefs and their use of cognitive and self-regulatory strategies. However, we also were interested in examining the relative strength of the three classroom variables as predictors of students' motivation and self-regulated learning.

The third general research question concerns the relations between the individual student characteristics of motivation and self-regulated learning and the three classroom characteristics. Many motivational models tend to emphasize the strength of individual differences as predictors of students' achievement (Corno & Snow, 1986), whereas classroom research on tasks (Blumenfeld et al., 1991; Doyle, 1983) and more recent work on situated cognition (Brown, Collins, & Duguid, 1989) suggest that the situational features of the classroom have a powerful influence on students' motivation and cognition. Given the design of the study, which includes measures of students' motivation and self-regulated learning at the beginning of the school year and at the end, we can examine the relative strength of individual differences versus classroom characteristics as predictors of end-of-the-year student motivation and self-regulated learning.

In summary, three main research questions were investigated: (a) What is the relation between adolescents' motivational beliefs (intrinsic value, self-efficacy, and test anxiety) and self-regulated learning (use of cognitive strategies, use of metacognitive control strategies) over the course of a school year? (b) What is the relation between characteristics of the classroom

environment and adolescents' motivation and self-regulated learning? and (c) What is the relative strength of adolescent personal characteristics and perceptions of classroom experience as predictors of motivation and self-regulated learning at the end of the school year?

METHOD

Subjects

The sample included 100 seventh-grade students from 14 classrooms in two middle schools. The subjects were predominantly White, middle-class adolescents from a small city in southeastern Michigan. There were 55 girls and 45 boys in the sample. The mean age was 12 years, 3 months.

Measures

The students responded twice to a self-report questionnaire, the Motivated Strategies for Learning Questionnaire (MSLQ) (see Pintrich & De Groot, 1990; Pintrich et al., 1993) that included 56 items on student motivation, cognitive strategy use, and self-regulation that formed the scales for the motivational and self-regulatory variables. Administration of the questionnaire took place during the fall semester (October, Time 1) and again in the spring of the following year (May, Time 2). During the spring administration, students answered a version of the MSLQ that included, in addition to the same 56 items on the first questionnaire, 12 items that asked students about the class work, their teacher, and the opportunities to work with other students in that class. These 12 items were adapted from classroom climate scales Moos (1979), and formed the scales for the classroom experience variables.

Scale construction for the motivational and self-regulation variables was guided by previous work done with the MSLQ with this age group (Pintrich & De Groot, 1990). Three motivation scales were formed. The Intrinsic Value scale (Time 1 alpha = .87, Time 2 alpha = .90) was constructed by taking the average of the students' responses to the nine items concerning intrinsic interest ("I think what we are learning in this Science class is interesting.") and perceived importance of course work ("It is important for me to learn what is being taught in this Social Studies class."), as well as preference for challenge and mastery goals ("I prefer class work that is challenging so I can learn new things."). It should be noted that the items were keyed in terms of the class in which the students took the questionnaire; that is, if they were in a science class, the items referred to science. The Self-Efficacy scale (alphas =

.91, .92) consisted of nine items regarding perceived competence and confidence in performance of class work (e.g., "I expect to do very well in this class." "I am sure that I can do an excellent job on the problems and tasks assigned for this class."). Finally, four items constituted the Test Anxiety scale (alphas = .75, .84), including items concerning worry and cognitive interference on tests ("I am so nervous during a test I cannot remember facts I have learned." "When I take a test I think about how poorly I am doing.").

In addition to the three motivation scales, two cognitive scales, Cognitive Strategy Use and Self-Regulation, were constructed. The Cognitive Strategy Use scale (alphas = .83, .88) consisted of 13 items averaged to form the scale score. Items pertained to the use of rehearsal strategies (e.g., "When I read material for science class, I say the words over and over to myself to help me remember."), elaboration strategies such as summarizing and paraphrasing (e.g., "When I study for this English class, I put important ideas into my own words."), and organizational strategies (e.g., "I outline the chapters in my book to help me study."). The Self-Regulation scale (alphas = .63, .71) was constructed from nine items that asked about metacognitive strategies such as planning, skimming, and comprehension monitoring (e.g., "I ask myself questions to make sure I know the material I have been studying," "I find that when the teacher is talking I think of other things and don't really listen to what is being said," and "I often find that I have been reading for class but don't know what it is all about," with the latter two items reflected before scale construction). In addition, students' strategies for managing their effort such as persistence at difficult or boring tasks and working diligently were included in the self-regulation scale (e.g., "Even when study materials are dull and uninteresting, I keep working until I finish," and "When work is hard, I either give up or study only the easy parts," with the latter reflected before scale construction).

Factor analysis was used as a guide to create three classroom perception scales. A varimax rotated solution generated three interpretable factors that accounted for 67% of the variance. The first scale, the Productive Classroom Work scale (alpha = .83) consisted of five items concerned with how the student perceived the class assignments in terms of utility and interest, choice of work, and subject matter in general (e.g., "Students have some choice over the topics for class reports."). The Teacher Effectiveness scale (alpha = .85) was constructed by taking the mean of five items regarding the teacher's treatment of the subject matter in a clear and interesting manner, good classroom management, and fair grading procedures (e.g., "The teacher explains the material well." "The teacher has good control of this class."). Finally, the Cooperative Work scale comprised two items (alpha = .79). Items asked whether or not the teacher encouraged students to work together on

assignments or provided opportunities to do so (e.g., "The teacher encourages us to work on assignments together," and "I had the opportunity to work with other students in this class."). Three different versions of these three scales were created, following Ryan and Grolnick (1986). First, an individual difference perception score was created that represented the individual's mean score on the scale regardless of classroom. Second, these scales were then aggregated to the classroom level to create social consensus scores for perceptions of work, teacher, and opportunities to work cooperatively with every student in the same classroom assigned the classroom mean. Finally, an individual student deviation score for these three class perceptions was computed by subtracting the classroom mean from his or her individual score on the same scale.

RESULTS

Gender differences were examined in preliminary analyses on all of the motivational and cognitive variables and revealed only one significant difference for boys and girls on the self-efficacy measure. Accordingly, in all analyses except those including self-efficacy, gender was not included in the analyses. The first question of the study concerned the relations between the motivational and self-regulated learning components, and the results generally replicated our previous findings. Table 1 displays the zero-order correlations and summary statistics for the motivational and self-regulated learning variables at Time 1 and Time 2. The autocorrelations of the motivational and cognitive scales at Times 1 and 2 were moderately large, ranging from .47 to .61. As predicted and paralleling our earlier results (Pintrich & De Groot, 1990), at both Time 1 and Time 2, higher levels of intrinsic value ($r = .66$, $r = .76$) and self-efficacy ($r = .41$, $r = .61$) were correlated with high levels of cognitive strategy use. Test anxiety was not significantly related to cognitive strategy use. Similar to the cognitive strategy use results, higher levels of intrinsic value ($r = .69$, $r = .73$) and self-efficacy ($r = .50$, $r = .67$) were related to higher levels of self-regulation. Test anxiety was negatively related to self-regulation at both Time 1 and Time 2 ($r = -.25$, $r = -.29$).

In terms of the relations between the motivational beliefs and self-regulated learning variables over time, five separate regressions were run. Each of the Time 2 variables was predicted by the five Time 1 variables, and the results are presented in Table 2. In general, the dependent measure was predicted most strongly by the parallel measure at Time 1. For self-efficacy, test anxiety, and cognitive strategy use at Time 2, the strongest and only significant predictors were self-efficacy at Time 1 (beta = .47), test anxiety

TABLE 1: Summary Statistics and Zero-Order Correlations for Motivation and Self-Regulated Learning Variables at Time 1 and Time 2

Variable	*Time*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1. Intrinsic value	1	—									
2. Intrinsic value	2	.47***	—								
3. Self-efficacy	1	.53***	.41***	—							
4. Self-efficacy	2	.35***	.72***	.57***	—						
5. Test anxiety	1	−.14	−.17*	−.40***	−.30***	—					
6. Test anxiety	2	−.01	−.25**	−.32***	−.41***	.60***	—				
7. Strategy use	1	.66***	.51***	.41***	.43***	−.08	.01	—			
8. Strategy use	2	.48***	.76***	.26**	.61***	−.05	−.09	.61***	—		
9. Self-regulation	1	.69***	.38***	.50***	.47***	−.25**	−.11	.73***	.49***	—	
10. Self-regulation	2	.38***	.73***	.29***	.67***	−.14	−.29**	.50***	.73***	.49***	—
Mean		5.41	5.41	5.45	5.56	3.42	3.23	4.99	5.08	4.84	4.88
Standard deviation		1.03	1.10	1.01	1.10	1.49	1.63	0.92	0.96	1.00	1.07

NOTE: $N = 100$.
*$p < .05$; **$p < .01$; ***$p < .001$.

TABLE 2: Standardized Regression Effects of Time 1 Motivation and Self-Regulated Learning Variables on Time 2 Motivation and Self-Regulated Learning Variables

Predictors[a]	*Intrinsic Value*[b]	*Self-Efficacy*[b]	*Test Anxiety*[b]	*Strategy Use*[b]	*Self-Regulation*[b]
Intrinsic value	.20	−.17	.16	.11	−.02
Self-efficacy[c]	.19	.47***	−.20	.07	.03
Test anxiety	−.07	.08	.54***	.14	−.05
Strategy use	.42**	.21	.05	.48***	.31*
Self-regulation	−.17	.19	−.03	.09	.26
Total adjusted R^2	.30***	.36***	.36***	.37***	.25***

NOTE: $N = 100$.
a. Time I variables.
b. Time 2 variables.
c. For self-efficacy, there was a significant gender difference, so gender was added as the first term in the regression equation. The standardized regression coefficient for gender on self-efficacy at Time 2 was $\beta = -.01$ ($p = .94$).
*$p < .05$; **$p < .01$; ***$p < .001$.

at Time 1 (beta = .54) and cognitive strategy use at Time 1 (beta = .48), respectively. These variables accounted for about 36% of the variance in self-efficacy, test anxiety, and cognitive strategy use at the end of the year.

A different pattern of results was found for intrinsic value and self-regulation at Time 2. The strongest predictor of intrinsic value at the end of the year was cognitive strategy use at Time 1 (beta = .42). Time 1 level of intrinsic value had a positive, but nonsignificant effect on intrinsic value at the end of the year (beta = .20, $p = .13$). For self-regulation at the end of the year, students' reported use of cognitive strategies was the best predictor (beta = .31), with prior levels of self-regulation having a positive effect that was not significant (beta = .26, $p = .08$). The cognitive and motivation variables at Time 1 accounted for 30% of the variance in students' intrinsic value and 25% of their self-regulation at the end of the year.

The second research question addressed the relations of these motivational and cognitive variables to children's perceptions of their classrooms. The productive classroom work and teacher effectiveness perception scales shared modest correlations with the cooperative work scale ($r = .38$, $r = .37$, respectively), whereas perceptions of productive work and teacher effectiveness had a fairly high intercorrelation ($r = .69$). From these original scales, we constructed two additional measures of the classroom environment. First, we aggregated student perceptions to the class level yielding a social consensus measure for each of the three scales. Next, an individual deviation score was calculated for each of the three class perceptions by subtracting the

classroom mean from individual student perceptions. *T* tests were run on the classroom mean and deviations perceptions, and one significant gender difference was found. Boys viewed their teachers' instructional and management styles more favorably than did girls. This difference was manifest in the deviation teacher perception scores, with boys being above the classroom mean and girls below the classroom mean on the average across all classrooms. Because of this difference, gender was used as a control in the regression analyses in the final section.

Table 3 presents the zero-order correlations and summary statistics for the classroom perception variables and the motivational and self-regulated learning variables at Time 1 and Time 2. Table 3 includes the original scales, the social consensus measures, and the deviation scores for each of the classroom perceptions. In general, the results for the deviation scores mirrored the results for the original scales, so only the results for the deviation and classroom-level perceptions will be discussed here. Recall that correlations involving the deviation scores represent the relationship of the motivation and cognition variables with a student's perception of the classroom as more or less than the class average on a given construct.

Table 3 shows significant relationships between intrinsic value and the deviation perceptions of productive class work (r = .44, r = .70), teacher effectiveness (r = .26, r = .50), and cooperative work (r = .24, r = .32), with the larger magnitude relations occurring at Time 2. The same pattern emerged for self-efficacy and cognitive strategy use. To the extent that students perceived their teacher as more effective, their work as interesting and productive, and opportunities to work together more than did their classmates, they also reported higher levels of self-efficacy and strategy use, with stronger effects at Time 2. Students who showed lower levels of test anxiety at both time 1 and 2 (r = .20, r = .21) percieved their teachers as more effective than did their classmates. Finally, higher levels of self-regulation were related to favorable perceptions of productive work at Time 1 and Time 2, and of the teacher's effectiveness at the end of the year.

Table 3 also displays the correlations among the motivation, cognitive strategy variables and the social consensus measures of the classroom environment. No significant correlations between the social consensus measures and students' Time 1 motivation or cognition emerged. At Time 2, however, higher classroom level perceptions of a teacher's effectiveness, as well as productive work were related to increased levels of intrinsic value, self-efficacy, strategy use, and self-regulation. In addition, higher classroom perceptions of cooperative work were related to increased levels of students' self-efficacy, strategy use, and self-regulation and decreased levels of students' test anxiety at the end of the year.

TABLE 3: Summary Statistics and Zero-Order Correlations for Classroom Perception Variables[a] With Motivation and Self-Regulated Learning at Time 1 and Time 2

		Individual Difference Class Perceptions of			*Classroom-Level Aggregate Perceptions of*			*Student Deviation Scores for Classroom Perceptions of*[b]		
Student Motivation	*Time*	*Productive Work*	*Teacher*	*Cooperative Work*	*Productive Work*	*Teacher*	*Cooperative Work*	*Productive Work*	*Teacher*	*Cooperative Work*
Intrinsic value	1	.38***	.19*	.15	.01	−.02	−.15	.44***	.26**	.24*
Self-efficacy	1	.26**	.30**	.17	.13	.07	.11	.23**	.33***	.13
Test anxiety	1	−.11	−.12	.01	−.01	.07	−.06	−.12	−.21*	.04
Strategy use	1	.40***	.18*	.21*	.06	.02	−.14	.43***	.22*	.30**
Self-regulation	1	.33***	.10	.05	.13	.06	−.05	.30**	.09	.08
Intrinsic value	2	.82***	.60***	.33***	.43***	.34***	.11	.70***	.50***	.32***
Self-efficacy	2	.56***	.40***	.32***	.39***	.22*	.24**	.42***	.34***	.24*
Test anxiety	2	−.21*	−.18*	−.06	−.11	−.03	−.28**	−.18	−.20*	.06
Strategy use	2	.69***	.47***	.32***	.40***	.32***	.19*	.56***	.35***	.27**
Self-regulation	2	.60***	.41***	.26**	.37***	.29**	.25**	.48***	.29**	.16
Mean		4.79	5.52	5.55	4.79	5.52	5.55	0.00	0.00	0.00
Standard deviation		1.33	1.19	1.25	0.70	0.76	0.54	1.13	0.91	1.13

NOTE: $N = 89$.

a. Classroom perceptions variables are presented in three forms. In the first column are individual difference classroom perceptions, the second column presents within-classroom averages of student perceptions, and the third column presents individual difference scores minus the classroom average.

b. Because these are deviation scores from classroom means, a positive correlation indicates the extent to which a student's individual perception score being higher than the class average is related to increased levels of a motivation or strategy variable.

*$p < .05$; **$p < .01$; ***$p < .001$.

The third research question was concerned with what predicts a student's motivation and self-regulated learning at the end of the school year. In order to assess the relative impact of the student's entry-level characteristics (Time 1 measures of intrinsic value, self-efficacy, strategy use, etc.) and their classroom experiences as measured by their perceptions (productive work, teacher effectiveness, cooperative work) on these motivational and cognitive components, regression analyses were used. Five separate regression analyses were run, each examining how an initial level of a motivational belief or self-regulatory learning strategy and the student's classroom experience predicted the end-of-the-year measure of the same motivational or cognitive variable. Both the social consensus and deviation class perception variables were included in these analyses. The results are summarized in Table 4. These regressions also were done with multiplicative interaction terms included, and no significant interactions emerged between the entry characteristics and classroom perceptions on Time 2 variables.

In general, Table 4 shows, as one would expect, that the Time 1 estimates of the student's motivational and self-regulatory characteristics had large, positive effects on the Time 2 measures of the same construct. The one exception to this is for intrinsic value, where the initial level had only a small effect on value at the end of the year (beta = .17). In addition, these results suggest that both class-level environmental variables, as well as individual difference perceptions of the classroom affect students' year-end motivation and self-regulatory learning. Specifically, classroom-level assessments of productive work were related positively to Time 2 measures of intrinsic value (beta = .52), self-efficacy (beta = .53), and cognitive strategy use (beta = .30). In addition, the extent to which a student perceived the work as more productive than did his or her classmates also had positive effects on value, self- efficacy, and strategy use and self-regulation above and beyond those effects due to the general consensus of what tasks were like in a class. Test anxiety at Time 2 was the only variable for which perceptions of productive work was not significantly predictive. Two other significant effects emerged. First, to the extent a student perceived fewer opportunities to work cooperatively, high levels of test anxiety were reported. Finally, higher levels of self-efficacy were related to lower classroom-level perceptions of a teacher's effectiveness.

With the exceptions of test anxiety and self-regulation, initial personal levels of these motivational and cognitive constructs, as well as perceptions of productive work, accounted for large proportions in Time 2 levels of intrinsic value (r^2_{adj} = .69), self-efficacy (r^2_{adj} = .54), and strategy use (r^2_{adj} = .61). Favorable perceptions of productive classroom work and Time 1 measures of self-regulation have equal effects on end-of-the-year self-regulation,

TABLE 4: Standardized Regression Effects of Time 1 Motivation, Self-Regulated Learning, and Class Perception Variables on Time 2 Motivation and Self-Regulated Learning Variables

Predictors	*Intrinsic Value*[a]	*Self-Efficacy*[a]	*Test Anxiety*[a]	*Strategy Use*[a]	*Self-Regulation*[a]
Intrinsic value[b]	.17*				
Self-efficacy[b]	—	.46***			
Test anxiety[b]	—	—	.52***		
Strategy use[b]	—	—	—	.45***	
Self-regulation[b]	—	—	—	—	.37***
Gender	−.01	−.08	.17	−.03	.04
Class perception of productive work	.52***	.53***	.02	.30*	.22
Class perception of teacher	−.08	−.27*	−.01	.03	.04
Class perception of cooperative work	−.07	.05	−.27**	.13	.16
Deviation perception of productive work	.54***	.31***	−.13	.36***	.33**
Deviation perception of teacher	.11	−.05	−.02	.03	.07
Deviation perception of cooperative work	.04	.07	.13	−.01	.00
Adjusted R^2	.69***	.54***	.39***	.61***	.44***

NOTE: $N = 89$.
a. Time 2 variables.
b. Time 1 variables.
*$p < .05$; **$p < .01$; ***$p < .001$.

accounting for a fair amount of the variance ($r^2_{adj} = .44$). Finally, modest levels of the variance in year-end test anxiety are accounted for by opportunities for students to work cooperatively and initial levels of test anxiety ($r^2_{adj} = .39$).

DISCUSSION

In terms of our first research question on the relations between motivation and cognition, the results replicated our earlier results (Pintrich & De Groot, 1990) with a different sample of early adolescents. In fact, the direction and magnitude of the correlations were very similar over the two studies. Students who had positive motivational beliefs, which included a general intrinsic orientation focused on learning and mastery, positive perceptions of interest and value regarding course material, and high self-efficacy beliefs, were more

likely to report using cognitive and self-regulated learning strategies that will result in deeper processing of the material and better understanding. At the same time, students who reported higher levels of test anxiety were less likely to be self-regulating. This finding is in line with a general information processing and social cognitive view of anxiety (Bandura, 1986; Benjamin et al., 1987) that highlights the interfering effects of anxiety on cognitive processing. This overall pattern of results for the three motivational components and self-regulated learning components has been found in a number of other experimental and correlational studies (e.g., Graham & Golan, 1991; Nolen, 1988; see review by Pintrich & Schrauben, 1992) and seems to represent a fairly reliable and valid set of findings.

The fact that motivational beliefs and self-regulated learning variables were linked to each other usually begs the question of causality. That is, do positive motivational beliefs drive or power cognitive engagement and self-regulation, or does being self-regulating and cognitively skilled result in more positive motivational beliefs? The regression results predicting Time 2 motivation and self-regulated learning from Time 1 variables without the classroom perceptions included showed, for the most part, that the best predictor of later motivation or cognition was earlier motivation or cognition. The main exception to this general finding was that use of cognitive strategies earlier in the year was the best predictor of later intrinsic orientation, suggesting that students who are more cognitively engaged report more mastery goals and higher levels of interest and value later in the year. This finding of deeper processing leading to qualitatively better motivation is the reverse of the usual suggested path of mastery goals leading to better cognitive engagement (cf. Ames, 1992; Graham & Golan, 1991; Nolen, 1988). However, considered with the zero-order correlations, this finding suggests that the relations between motivation and cognition are reciprocal, especially in the classroom setting, as suggested by social cognitive theory (Bandura, 1986). Accordingly, although goal theory usually assumes a unidirectional influence from motivational goals to cognitive engagement, the results here begin to specify the nature of the reciprocal relations between motivation and cognitive self-regulation as suggested by Keating (1990). It may be more useful for future research to focus on describing in more detail the reciprocal nature of the relations between motivation and self-regulated learning rather than trying to define the one correct causal sequence in a deterministic fashion.

More important, it appears that the functional significance of the classroom context influenced the motivational and self-regulated learning variables over time. In terms of the second general question, students' motivational beliefs were positively related to positive features of the classroom as would be predicted from Eccles et al. (1993). Students reported that they were

more likely to be focused on learning and mastery and have higher levels of interest and value for the course material when the classes they were in provided them with some choice of tasks, the teacher made the work interesting, provided good explanations, and allowed them to work with others. In addition, these same features of the classroom were related to higher levels of self-efficacy and lower levels of test anxiety. Students also reported that they were more likely to use cognitive strategies for learning and to regulate their own thinking and effort in classrooms that had these positive features.

These findings are interesting, but given that the classroom features were measured by students' perceptions, it was important to control for initial levels of students' motivation and self-regulated learning as well as examine both general classroom effects and individual perceptions of the classroom. By examining students' entry characteristics and later classroom perceptions together (as in Table 4), we attempted to determine the relative contribution of entry characteristics and classroom features to students' end-of-the-year motivation and self-regulated learning. In general, the results showed that both entry characteristics and classroom features contributed very significantly to student outcomes with high levels of variance accounted for by the predictors, but the relative strength varied depending on the outcome.

First, in terms of the relative strength of the different classroom variables, both between-classroom and within-classroom variables were significantly related to motivation and cognition. In terms of the motivational beliefs, intrinsic value was strongly influenced by both between- and within-classroom features of classroom academic work. In fact, perceptions of productive classroom work was more than three times more important for end-of-the-year intrinsic value than was students' entry level of intrinsic value. Students who were in classrooms that allowed task choice and had interesting tasks showed higher levels of intrinsic motivation in general; students who perceived more within-classroom choice and interest were more intrinsically motivated later in the year, regardless of their initial levels of intrinsic value. This suggests that intrinsic value may be more context dependent and that teachers can influence students' general orientation to the academic work and facilitate students' interest, value, and focus on mastery and learning.

In contrast, entry level of test anxiety was a much stronger predictor of later test anxiety than any of the classroom perception variables, suggesting that test anxiety is a more traitlike characteristic of students, this is brought with them to the classroom situation, at least in terms of these three dimensions of the classroom. In fact, test anxiety had the lowest overall variance accounted for by the predictors. However, in classrooms, where there was more opportunity to work collaboratively, test anxiety was lower, regardless of initial levels of anxiety or within-classroom perceptions, suggesting one

general classroom strategy that all teachers can use to help students become less anxious (cf. Hill & Wigfield, 1984).

Self-efficacy, in contrast to the more situational intrinsic value and more traitlike anxiety, was predicted by both initial self-efficacy levels and between-classroom work equally. In addition, students that perceived their classroom work as more productive than their classmates felt more efficacious. Accordingly, classroom work that provided more choice and was more interesting was related to higher self-efficacy levels, regardless of initial levels of efficacy. Interestingly and unexpectedly, in classrooms where the teachers were perceived as more effective overall, students had lower self-efficacy. This may be due to the perception that these teachers are so effective at management and instruction that students are less willing to attribute their success at learning to themselves and hence have somewhat lower self-efficacy for learning. At the same time, it is important to note that the perceptions of efficacy were not so low as to have any detrimental effect on cognitive engagement. Students who perceived their teacher as effective were still cognitively engaged (see Table 3). Future research will have to examine this question more carefully by including attributional and control belief scales about responsibility for learning.

The same basic pattern that was shown in the self-efficacy results held for cognitive strategy use and self-regulation; entry levels on these cognitive variables accounted for approximately equal proportions of the variance in outcome levels as classroom work perceptions. In terms of cognitive strategy use, there was both an overall between-classroom effect as well as a within-classroom effect. Students were more likely to use cognitive strategies if they were in classrooms that had task choice and interesting tasks overall as well as if they perceived more choice and interest within their class. For self-regulation, only the within-classroom perception was significantly related to use of regulatory strategies.

Accordingly, it appears that both student entry characteristics and between- and within-classroom characteristics have an influence on adolescents' motivational beliefs and their self-regulated learning. Adolescents bring with them to the classroom certain motivational beliefs and levels of strategy use and self-regulation that influence their later motivation and self-regulated learning. These individual differences are important and do relate to future achievement (cf. Corno & Snow, 1986). At the same time, classroom features, particularly the nature of the classroom work, can influence these student outcomes as well (Eccles et al., 1993). In earlier studies (e.g., Ryan & Grolnick, 1986), the within-classroom differences seemed to be more important than the social consensus between classroom differences as predictors of student motivation. Our results show both may be important, even after initial

individual differences are taken into consideration. Accordingly, there may be two levels of the functional significance of the classroom: an overall between-classroom level that represents a social consensus regarding adolescents' perceptions and a within-classroom level that reflects adolescents' differing perceptions of the classroom. Both levels of these classroom features can provide the context in which individual differences in student motivation and self-regulation operate, demonstrating the interplay between not only adolescent motivation and cognition but also the classroom context in middle schools.

Finally, in terms of the educational implications of this research, there are several important suggestions for teachers in middle schools. First, motivational beliefs in adolescents, particularly their interest, value, and intrinsic goals for classwork, are not stable traits that imply that middle school students are either motivated or not. It appears that the nature of the classroom work can influence these motivational beliefs. If students are given work that is interesting, allows some choice, and provides opportunities to work cooperatively with one another, then they will be more likely to be motivated and cognitively engaged. Second, it may not be that difficult to implement some of these changes in classroom work. Although Lepper and his colleagues (Lepper & Malone, 1987; Malone & Lepper, 1987) have provided suggestions to improve intrinsic motivation through the use of choice and control options in fantasy and simulation situations, the simple provision of choice for the timing of when tasks are completed offers students some control over their learning but does not usurp the teacher's responsibility for curriculum management nor does it require the use of nontraditional tasks. Others have shown that teachers can use somewhat traditional tasks and still increase motivation and cognition. For example, Blumenfeld (1992) has shown that instructional activities that are based on children's experience and real-life events and that ask students to apply their knowledge can foster both motivation and cognitive engagement.

This highlights a third important implication of our work: the need for teachers to consider both motivation and cognition simultaneously, and not simply focus on motivating the students without considering the cognitive consequences of motivational enhancement. For example, whereas cooperative groups may be more motivating, they can lead to less cognitive engagement due to group distractions. Blumenfeld (1992) has suggested that not only do teachers need to "bring the task to the students" by making the tasks more motivating, interesting, and relevant, but they also need to "bring the student to the task" (p. 110) by making the students accountable for deeper levels of cognitive engagement through evaluation and assessment proce-

dures. Not only should tasks be interesting, but there should be a press for deeper cognitive engagement through the use of higher level questioning during class instruction and requests for written work that requires this type of thinking. By considering both student motivation and cognition and how they are influenced by the nature of classroom instruction and tasks, teachers will be able to create classrooms that are both motivating and thoughtful, a context that can only benefit the development of young adolescents in middle schools.

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