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ABSTRACT

This paper presents results of a study that examined the effect of different levels of autonomy upon intrinsic goal orientation, task value, self-efficacy, test anxiety, use of metacognitive strategies, and performance in the college classroom. Study participants were 365 college students from 4 institutions in 10 classrooms: 3 biology (n=162); 3 English (n=79); and 4 social science classes (n=124). Study findings revealed clear differences between the three types of classrooms on end-of-term mean levels of intrinsic goal orientation, task value, and self-efficacy, with autonomy showing a facilitative effect on these constructs. Metacognition was only slightly, but positively related to autonomy. Neither test anxiety nor performance seemed to be related to classroom experiences of autonomy. Both intrinsic goal orientation and autonomy were significant main effects on end-of-term task value; and intrinsic goal orientation and autonomy seemed to have an additive relationship with regard to task value. Intrinsic goal orientation, but not autonomy, was related to differences in end-of-term levels of metacognition and self-efficacy. The results indicate that the effects of autonomy are more closely related to motivation than to actual performance. Contains 17 references. (Author/GLR)

The effects of autonomy on motivation, use of learning strategies, and performance in the college classroom

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Abstract

This paper examined the effect of different levels of autonomy upon intrinsic goal orientation, task value, self-efficacy, test anxiety, use of metacognitive strategies, and performance. Ten college classrooms from four institutions were identified as being low, mid, or high in autonomy and self-determination. Clear differences between the three types of classrooms were found on end-of-term mean levels of intrinsic goal orientation, task value, and self-efficacy, with autonomy showing a facilitative effect on these constructs. Metacognition was only slightly, but positively related to autonomy. Neither test anxiety nor performance seemed to be related to classroom experiences of autonomy. We also examined the bivariate effects of different levels of intrinsic goal orientation and different levels of autonomy on task value, self-efficacy, test anxiety, metacognition, and performance. Both intrinsic goal orientation and autonomy were significant main effects on end-of-term task value; intrinsic goal orientation and autonomy seemed to have an additive relationship with regard to task value. Intrinsic goal orientation, but not autonomy, was related to differences in end-of-term levels of metacognition and self-efficacy. Again, performance and test anxiety were unrelated to either intrinsic goal orientation or autonomy. These results indicate that the effects of autonomy are more closely related to motivation than to actual performance; while the immediate experience of autonomy may not be facilitative of high course grades, autonomy seems to foster intrinsic goal orientation and task value, and in this manner may promote future engagement and persistence.

The effects of autonomy on motivation, use of learning strategies, and performance in the college classroom

Teresa Garcia and Paul R. Pintrich

Learning in the college classroom has been conceived of as a dynamic interplay between motivation and cognition: the former referring to constructs such as goal orientation and value; the latter to the use of learning strategies such as metacognition, elaboration, and rehearsal (Pintrich, 1989). Motivation can be seen as what determines initiation and engagement in a learning task, while the appropriate use of learning strategies allows for effective learning and successful performance. Successful performance, in turn, promotes feelings of competence; competence then feeds into motivation (Corno & Rohrkemper, 1985).

Motivation, cognition, and their interaction are themselves affected by the characteristics of and the procedures used in the classroom. These include reward structure, task structure, feedback procedures, and grouping procedures (Ames & Ames, 1984; Blumenfeld, Mergendoller & Swarthout, 1987; Brophy, 1983; Brophy & Good, 1986; Marshall & Weinstein, 1984; Rosenholtz & Simpson, 1984; Rosenholtz & Wilson, 1980). Additionally, the use of controlling strategies on the part of the instructor and the degree of autonomy or self-determination (these terms will be used interchangeably in this paper) students perceive have been shown to impact upon motivation and performance (Deci & Ryan, 1985; Deci, Spiegel, Ryan, Koestner, & Kauffman, 1982; Flink, Boggiano, & Barrett, 1990; Ryan, Connell, & Deci, 1985; Ryan & Grolnick, 1986). These researchers have shown that autonomy has positive motivational effects with regard to mastery learning, interest, persistence, perceived self-competence, and effort.

This paper focuses on the effects of autonomy on intrinsic goal orientation, task value, self-efficacy, test anxiety, and use of metacognitive learning strategies in the college classroom. The research cited above examined the relationship between autonomy, motivation and performance in elementary school age children, and measures of performance were generally children's success at solving anagrams or puzzles. This study sought to discover the effects of autonomy on adult learners, using similar motivational constructs as outcomes. In addition, a more ecologically valid measure of performance was employed: final course grade, standardized within class to control for instructor grading differences.

Therefore, this study attempted to answer the general question, "Does autonomy have the same consequences in adult as in young learners?" I.e., would self-determination also have positive effects on mastery orientation and perceptions of self-competence? How do students' intrinsic goal orientation and classroom autonomy interact to affect levels of task value, self-efficacy, test anxiety, and metacognitive strategy use? Given our measure of performance was course grade, would performance increments also be found in this more ecologically valid index? As a function of autonomy?

Method

Subjects

Participants in this study were 365 college students in ten classrooms: three biology classes (N=162), three English classes (N=79) and four social science classes (N=124). These courses were sampled from four midwestern institutions: a community college; a small private four-year college; and two large public four-year universities. The gender breakdown was 151 males

(41.4%) and 214 females (58.6%). No differences were found in gender distribution by discipline.

These data were collected on a volunteer basis during the Winter 1987 term. Subjects received no monetary compensation for their participation. The classes were visited twice, once within the first two weeks of the semester (time 1) and again towards the last two weeks of the semester (time 2). The Motivated Strategies for Learning Questionnaire (Pintrich, McKeachie, Smith, Doljanac, Lin, Naveh-Benjamin, Crooks & Karabenick, 1987) was administered at each visit.

Measures

The Motivated Strategies for Learning Questionnaire (MSLQ) is a self-report, Likert-scaled (1=not true of me, to 7=very true of me) instrument designed to measure student motivational beliefs and strategy use. The 1987 version of the MSLQ consisted of 55 motivation and 55 cognitive strategy items. The five MSLQ scales used were: intrinsic goal orientation (intrins1, intrins2), task value (tskval1, tskval2), self-efficacy (slfeff1, slfeff2), test anxiety (testanx1, testanx2), and metacognition(mcog1, mcog2). The posttest administration of the MSLQ included 22 questions geared toward measuring students' classroom experiences. We ran a factor analysis on these classroom perception items and created a factor variable from three items in this set of probes to construct an autonomy scale (autonom). Subjects' mean scores on these scales were computed and used for the following analyses. Our measure of performance was simply students' final course grade standardized within classes to control for instructor grading differences (zfinal).

Intrinsic goal orientation (4 items: pretest alpha = .57; posttest alpha = .67) is a measure of the degree to which the individual perceives herself to be

participating in a task for reasons such as challenge, curiosity, or mastery, as opposed to participating in a task for reasons such as grades, rewards, or evaluation by others (e.g., "Even when I do poorly on an exam I try to learn from my mistakes"). Task value (9 items: pretest alpha = .92; posttest alpha = .94) differs from intrinsic goal orientation in that task value refers to the student's evaluation of how interesting, how important, and how useful the task itself is (e.g., "Understanding the subject matter of this course is important to me."). Self-efficacy (5 items: pretest alpha = .74; posttest alpha = .82) is an evaluation of one's ability to master a task (e.g., "I'm certain I can understand the ideas and concepts taught in this course."). Test anxiety (8 items: pretest alpha = .92; posttest alpha = .94) is an index of worry and concern students report about examinations (e.g., "I worry a great deal about tests."). Metacognition (13 items: pretest alpha = .80; posttest alpha = .62) is a measure of the three general processes that constitute metacognitive self-regulatory activities: planning, monitoring, and regulating (e.g., "I try to think through a topic and decide what I'm supposed to learn from it rather than just read it over when studying."). Autonomy (3 items: alpha = .62) is an index of the level of self-determination and autonomy students experience during a school semester (e.g., "Students can negotiate with the instructor over the nature of the course requirements.").

Grouping variables

In order to classify the ten classrooms as low-, mid-, and high-autonomy, we simply ranked in ascending order the classroom means for the autonomy factor variable. There were clear breaks in the distribution of the means and we were able to identify three low-autonomy classes (-.52, -.24, -.13), three mid-autonomy classes (-.05, -.01, .02), and four high-autonomy

classes (.28, .37, .40, .57). The three disciplines, biology, English, and social science were well-distributed among the three levels of autonomy. The low-autonomy classes (N=130) included two biology and one English; the mid-autonomy courses (N= 108) included two social sciences and one English; and the high-autonomy classes (N=127) included one English, one biology, and two social sciences.

Intrinsic goal orientation at time 1 and time 2 were trichotomized into the bottom 25%, middle 50%, and top 25%. The distribution of posttest intrinsic goal orientation was more negatively skewed than at the pretest. The 25th and 50th percentiles were identical for the pretest and posttest distributions. However, the 75th percentile was slightly higher at the posttest (6.25 as opposed to 6.00 at the pretest). The three-way divisions were done by making cuts at the 25th and 75th percentiles: thus these three levels reflect relative rankings given the overall sample distributions.

Results

Relationships between variables

Table 2 presents the correlations between measures and descriptive statistics calculated on the entire sample. The highest correlations were naturally between pretest and posttest pairs of the same variable (r's ranged from .58 to .70). Aside from these autocorrelations, the strongest positive relationships were found between intrinsic goal orientation, task value, self-efficacy, and metacognition. Test anxiety was generally negatively related to the other variables. Autonomy was positively related to all the other measures, and most strongly with intrinsic goal orientation and task value. Performance was only weakly related to autonomy, positively related to

intrinsic goal orientation, task value, self-efficacy, and metacognition, and negatively related to test anxiety. Self-efficacy was most strongly related to performance.

Insert Table 1 about here

Mean differences in MSLQ scales between the three types of classrooms

Simple univariate analyses of variance were performed on pretest and posttest measures (intrinsic goal orientation, task value, self-efficacy, test anxiety, and metacognition) by the three-level autonomy variable. In addition, we also computed change scores and looked for significant differences in mean changes in these variables by low-, mid- and high-autonomy. These change scores were computed by subtracting the pretest score from the posttest score: intrins2 - intrins1 = ch.intr; tskval2 - tskval1 = ch.tval; slfeff2 - slfeff1 = ch.eff; testanx2 - testanx1 = ch.tanx; metacog2 - metacog1 = ch.mcog. Thus a positive value would indicate an increase from time 1 to time 2, and a negative value a decrease from time 1 to time 2.

As the univariate analyses of variance summarized in table 2 show, students in the low-, mid-, and high-autonomy classrooms were not significantly different in their incoming levels of intrinsic goal orientation and test anxiety. Time 2 measures showed no differences in test anxiety, but significant differences did emerge in posttest intrinsic goal orientation by level of autonomy, with greater autonomy related to greater intrinsic goal orientation. In terms of task value, students in the high-autonomy classrooms were significantly higher on this measure than their low- and

mid-autonomy counterparts, both at time 1 and at time 2. Students in the mid-autonomy classes were lowest in self-efficacy at the pretest, and no significant differences between the three types of classes were found in posttest efficacy. Similarly, mid-autonomy classes were lowest in time 1 metacognitive strategy use, but no significant differences between classes were found in the time 2 measure of this variable. Differences in change scores by low-, mid- and high-autonomy are discussed below. Finally, since course grade was standardized within class (means were all zero and standard deviations all 1.0), we ran an analysis of variance on the raw course grades and found no statistically significant differences in performance by the three-level autonomy variable.

Insert Table 2 about here

Changes in motivation and cognition during a semester

In order to obtain a picture of how motivation and use of learning strategies change over a school term, we ran paired t-tests on the pretest and posttest measures of intrinsic goal orientation, task value, self-efficacy, test anxiety, and metacognition. These analyses revealed that in general (without taking into account differences in autonomy), students increased in intrinsic goal orientation and in metacognitive strategy use, and decreased in task value, self-efficacy, and test anxiety. As Figure 1 indicates, intrinsic goal orientation increased slightly (+.06, $t = 1.53$, n.s.) and metacognitive strategy use significantly increased (+.09, $t = 2.58$, $p < .01$) from time 1 to time 2. Task

value (-.21, t = 4.56, p < .001) and test anxiety (-.15, t = 2.47, p < .01) decreased significantly, while self-efficacy decreased slightly (-.02, t= .40, n.s).

Since the experience of classroom autonomy and self-determination was hypothesized to be related to students' motivation and cognitive strategy use, we then ran one-way analyses of variance on change scores for these five MSLQ scales. The one-way analyses of variance on these change scores by the three-level autonomy variable demonstrated clear differences between the low-, mid-, and high-autonomy classrooms (see Figure 1).

Insert Figure 1 about here

The main effect of autonomy was significant for change in intrinsic goal orientation (F (2,364) = 4.26, p < .05). Intrinsic goal orientation decreased in the low-autonomy group (-.10), while the mid- and high-autonomy classes showed increases (.18 and .12, respectively). Post hoc tests using the Scheffe procedure showed that with regard to change in intrinsic goal orientation, the low-autonomy classes were significantly different from the mid- autonomy classes when alpha was set to .05, and significantly different from the mid- and high-autonomy classes at alpha = .10. Recall that no significant differences in time 1 intrinsic goal orientation were found between the three levels of autonomy: at the onset of the semester, students in the low-, mid-, and high-autonomy classrooms were similar in levels of intrinsic goal orientation. Significant differences between the three levels of autonomy did appear at the time 2 measure (see Table 2), with increasing levels of autonomy associated with increasing levels of intrinsic goal orientation

(means were 5.35, 5.55, and 5.67 for the low, mid, and high autonomy classes respectively), and this is reflected in the change scores reported above. This lends support for the positive relationship between self-determination and intrinsic goal orientation.

The main effect of autonomy was also significant for change in self-efficacy ($F(2,364) = 5.84$, $p < .01$). Self-efficacy decreased from pretest to posttest in the low-autonomy classrooms (-.22); increased in the mid-autonomy classrooms (.15); and remained at about the same level in high-autonomy classrooms (.04). Post hoc tests on change in self-efficacy showed the same pattern as in intrinsic goal orientation: the low-autonomy classes were significantly different from the mid-autonomy classes at alpha = .05, and significantly different from both the mid- and high-autonomy classes when alpha was set to .10. There were significant differences between the three types of classrooms in pretest levels of self-efficacy ($F(2,364) = 8.03$, $p < .001$), with the low-autonomy classes reporting the highest level of self-efficacy (mean = 5.18), followed by the high- (5.06) and mid- autonomy (4.79) classes. No significant differences were found between the three levels of autonomy in posttest self-efficacy; however, as discussed previously, the change in efficacy between these three types of classes was significant. Since the pretest means of self-efficacy were so similar for the low- and high-autonomy classes, the pattern of change scores is more meaningful. The fact that low- and high-autonomy classes looked very similar at the beginning of the semester in terms of self-efficacy (5.18 and 5.06, difference not statistically significant) and the low-autonomy classes decreased in efficacy (change = -.22 pretest to posttest) while the high-autonomy classes maintained efficacy (change = .04 pretest to posttest) argues against a ceiling effect and lends support for the

positive motivational effects of autonomy and self-determination in the classroom.

No significant differences in change in task value, test anxiety, or metacognition were found between levels of autonomy. However, the patterns of mean changes from time 1 to time 2 is noteworthy.

Task value from time 1 to time 2 decreased for all three types of classes, but note that the greatest decrease in value was in the low-autonomy courses (-.28) and the least decrease in value was found in the high-autonomy classes (-.11). Task value at time 1 and time 2 showed significant differences between classrooms, with value positively related to degree of autonomy: means at time 1 were 5.60, 5.74, and 6.11 for low-, mid- and high-autonomy classrooms, and 5.32, 5.49, and 6.00 at time 2 for the low-, mid- and high-autonomy classrooms (see Table 2). A ceiling effect may certainly be argued in this case, accounting for the consistent decrease across the three types of classrooms. Nevertheless, the high-autonomy classes having the highest mean at time 1 should intuitively have shown the greatest decrease: in fact, the high-autonomy classes showed the least decrease. One could argue that the experience of self-determination may have buffered that pretest to posttest decrease.

Anxiety levels decreased at about the same levels in the low- and mid-autonomy classes (-.21 and -.25 respectively), but did not change in the high-autonomy classes (.00). It may be that while self-determination is related positively to levels of intrinsic goal orientation and self-efficacy, autonomy in the classroom may inject a degree of ambiguity and looseness in classroom structure that does not support decreases in test anxiety. These data indicate that high self-determination is not related to change in test anxiety, while less choice and less autonomy is related to decreased anxiety about performance.

A similar pattern of changes was found in metacognitive strategy use. Metacognitive strategy use increased in low- and mid-autonomy classrooms (.10 and .19 respectively), and did not change in the high-autonomy classrooms (.00). Low- and high-autonomy classes did not significantly differ from one another at the pretest (4.66 vs. 4.82) or the posttest (4.76 vs. 4.82). This pattern of changes (albeit not statistically significant), where low-autonomy classes showed a slight increase and high-autonomy classes showing no change in metacognitive strategy use may lend additional support for the rationale given for the results in test anxiety presented above. If low-autonomy classes provide greater structure and less choice, metacognitive learning strategies may be easier to implement, and therefore we witness a slight increase in the use of monitoring, regulating, and planning strategies. The tasks in low-autonomy classrooms are predefined and delineated by the instructor. The goals of the course are set and the students work to meet the requirements: metacognitive self-regulation may be easier to engage in when an individual knows exactly what she is expected to do. If high-autonomy classrooms make tasks slightly more ambiguous and less well-defined, then metacognitive learning strategies may be more difficult to implement, and we witness no net change from time 1 to time 2.

Posttest MSLQ scales and performance by change in intrinsic goal orientation and level of classroom autonomy

The next set of analyses were four two-way ANOVAs, running time 2 measures of task value, self-efficacy, test anxiety, and metacognition by the three-level autonomy measure and by a three-level change in intrinsic goal orientation measure. Pretest levels of the time 2 measures were used as covariates. We were interested in examining how changes in motivation and

different levels of autonomy were related to end-of-term value, efficacy, anxiety, and use of higher-order learning strategies. By using task value, self-efficacy, test anxiety, and metacognitive learning strategies as our dependent variables and intrinsic goal orientation and experience of self-determination as our independent variables, we are implicitly adopting the stance that motivation (intrinsic goal orientation) temporally precedes individuals' task value, beliefs about competence, anxiety about performance, and use of learning strategies. As was shown above, intrinsic goal orientation was most clearly related to levels of classroom autonomy: thus we proposed that change in intrinsic goal orientation, relative to degree of self-determination experienced in the classroom, would have positive effects on end-of-term task value, self-efficacy, test anxiety, and metacognition. We also chose to present change in intrinsic goal orientation with autonomy as our independent variables instead of pretest or posttest levels of intrinsic goal orientation with autonomy because change (increased, decreased, or maintained were our three categories) incorporates both time 1 and time 2 levels. We did run these other bivariate ANOVAs and found the same patterns of results as the ones discussed below.

Therefore, we created a change in intrinsic goal orientation measure by first creating a three-level pretest and a three-level posttest measure (cuts were made at the 25th and 75th percentiles for each; see above). A crosstabulation of these categorical variables allowed us to identify 200 students who, from time 1 to time 2, maintained their levels of intrinsic goal orientation (i.e., were at the bottom 25%, middle 50%, or top 25% at time 1 and time 2); 74 students who increased in intrinsic goal orientation (i.e., who moved from the bottom 25% to the middle 50% or top 25%); and 91 students who decreased in intrinsic goal orientation (i.e., who moved from the top

25% to the middle 50% or bottom 25%, or who moved from the middle 50% to the bottom 25%). A chi-squared analysis of this three-level change in intrinsic goal orientation by the three-level autonomy variable showed that the differences between counts in the nine cells approached significance (X^2 (4, 365) = 9.41, p = .052). The percentage of students who increased in intrinsic goal orientation in the low-autonomy classes was markedly lower than in the mid- or high-autonomy classes (13%, vs. 26.9% and 22% respectively). Conversely, the percentage of students who decreased in intrinsic goal orientation in the low-autonomy classes was markedly higher than in the mid- or high-autonomy classes (30.8% vs. 23.1% and 20.5% respectively). The percentages of students who remained at the same levels of intrinsic goal orientation from pretest to posttest were similar across the three levels of autonomy (low-autonomy = 56.2%; mid-autonomy = 50%; high-autonomy = 57.5%).

The results of the two-way ANOVAs using these two categorical variables, change in intrinsic goal orientation and autonomy, are presented in Table 3. No significant interactions were found in these analyses, and all the pretest variables used as covariates were, not surprisingly, highly statistically significant.

The main effects of change in intrinsic goal orientation and autonomy were significant for posttest levels of task value (with pretest task value used as a covariate). Figure 2 indicates that students who increased in intrinsic goal orientation were very similar with respect to task value, across the three levels of classroom autonomy (6.07, 5.68, and 6.06 for the low, mid, and high autonomy classes respectively). Reading Figure 2 left to right reveals that students who maintained their levels of intrinsic goal orientation or who decreased in intrinsic goal orientation showed more disparate levels of task

value, according to the level of classroom autonomy. Students in the high- and mid-autonomy classrooms seemed to hold their levels of task value fairly static across changes in intrinsic goal orientation: means were 6.06 (increased intrinsic goal orientation), 6.01 (maintained level of intrinsic goal orientation), and 5.94 (decreased intrinsic goal orientation) for the high-autonomy classes, and 5.68 (increased), 5.43 (maintained), and 5.42 (decreased) for the mid-autonomy classes.

Insert Table 3 about here

Insert Figure 2 about here

Change in intrinsic goal orientation, but not level of classroom autonomy was a significant main effect for posttest levels of self-efficacy and metacognition. With regard to self-efficacy, students who increased in intrinsic goal orientation looked more similar to students who decreased in intrinsic goal orientation than to students who maintained their levels of intrinsic goal orientation. The mean for self-efficacy was lower for the maintainers (mean = 4.89) than for the increasers (mean = 5.25) or decreasers (mean = 5.00). However, in terms of metacognition, the highest mean was found in the maintainer group (4.80), while the increasers and decreasers looked very similar (means were 4.71 and 4.72 respectively). Neither time 2 test anxiety nor final course grade (finalgrd, the raw measure, and zfinal, the

standardized measure, were both tested) seemed to vary according to change in intrinsic goal orientation or level of classroom self-determination.

Discussion

These results indicate that the effects of autonomy are more closely related to motivational constructs such as intrinsic goal orientation, task value, and self-efficacy, than to actual performance (i.e., final course grade). This was a consistent finding in the one-way and two-way ANOVAs presented above. Intrinsic goal orientation and classroom autonomy both had significant main effects upon time 2 task value. The facilitative relationship of these factors on task value seemed to be additive, with higher levels of task value related to combinations of higher intrinsic goal orientation and greater autonomy. Self-efficacy was more closely related to intrinsic goal orientation than to autonomy; however, since autonomy showed such clear effects upon intrinsic goal orientation, we may conjecture that autonomy may have an indirect facilitative effect upon self-efficacy through its relationship with intrinsic goal orientation.

Moreover, it is clear from the data presented in Table 1 that intrinsic goal orientation and task value are positively correlated with metacognition (r's range from .21 to .45) and performance (r's range from .13 to .27). Related work done by our colleagues (e.g., Garcia & Pintrich, 1991; Pintrich, 1989; Pintrich & De Groot, 1990) has shown that positive motivational beliefs like intrinsic goal orientation and task value are related to cognitive engagement variables like metacognition and use of learning strategies. It appears that classrooms that allow students autonomy and self-determination will promote more motivated students: that is, students who will approach the

work with a goal of learning and mastery and who believe that the work is interesting and significant. These motivational beliefs, in turn, will lead to deeper levels of cognitive engagement and then improved academic performance. Accordingly, changing the classroom structure to increase autonomy and self-determination will not have a direct influence on students' performance, but rather an indirect effect by having a positive impact upon students' motivational beliefs.

These data indicate that while the immediate experience of autonomy may not be directly facilitative of high course grades, autonomy seems to foster intrinsic goal orientation and task value. Intrinsic goal orientation and task value are crucial components of continuing motivation. By promoting autonomy and self-determination in the classroom, instructors may not see clear, immediate improvements in performance. What they may find may include students electing additional courses in the subject area; greater student interest in the material; and persistence in the face of difficulty. These are not insubstantial consequences, and we should not neglect factors that promote intrinsic goal orientation and task value in a single-minded search for factors related to higher grades and better performance.

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Table 1. MSLQ scales: descriptive statistics and zero-order correlations.

	intrins1	intrins2	tskval1	tskval2	slfeff1	slfeff2	testanx1	testanx2	mcog1	mcog2	autonom	zfinal
intrins1	1.0											
intrins2	.58	1.0										
tskval1	.37	.37	1.0									
tskval2	.28	.48	.67	1.0								
slfeff1	.36	.28	.31	.28	1.0							
slfeff2	.24	.35	.27	.44	.60	1.0						
testanx1	-.05	-.03	.10	.01	-.14	-.10	1.0					
testanx2	-.04	-.05	.04	-.02	-.17	-.25	.70	1.0				
mcog1	.45	.31	.26	.21	.36	.18	-.07	-.01	1.0			
mcog2	.38	.44	.39	.38	.42	.41	-.08	-.15	.64	1.0		
autonom	.14	.23	.13	.27	.04	.13	.09	.11	.07	.05	1.0	
zfinal	.14	.18	.13	.27	.22	.50	-.16	-.25	.15	.24	-.01	1.0
MEAN	5.45	5.52	5.82	5.61	5.01	4.99	3.81	3.66	4.67	4.76	-.02	0.00
SD	.87	.89	.98	1.15	.91	1.05	1.49	1.52	.82	.80	.98	1.0

Table 2. Mean differences between low, mid, and high autonomy classrooms in MSLQ scales. Means with different subscripts are significantly different from one another at alpha = .05 (Scheffe procedure).

	low autonomy (N=130)	mid autonomy (N=108)	high autonomy (N=127)	F (2,364)
intrins1	5.45	5.36	5.54	1.29, n.s.
intrins2	5.35 a	5.55 ab	5.67 b	4.22, p < .05
ch.intr	-.10 a	.19 b	.13 ab	4.26, p < .05
tskval1	5.50 a	5.74 a	6.11 b	9.72, p < .001
tskval2	5.31 a	5.49 a	6.00 b	13.29, p < .001
ch.tval	-.29	-.25	-.11	1.45, n.s.
slfeff1	5.18 b	4.73 a	5.06 b	8.03, p < .001
slfeff2	4.96	4.88	5.10	1.34, n.s.
ch.eff	-.22 a	.15 b	.04a b	5.84, p < .01
testanx1	3.75	3.77	3.89	.34, n.s.
testanx2	3.54	3.52	3.89	2.40, n.s.
ch.tanx	-.21	-.25	.00	1.67, n.s.
metacog1	4.66 ab	4.50 a	4.82 b	4.43, p < .05
metacog2	4.76	4.69	4.82	.79, n.s.
ch.mcog	.10	.19	.00	2.24, n.s.
final grade (raw)	2.89	2.90	2.65	2.67, n.s.

Table 3. Mean levels of posttest MSLQ variables (with pretest variables used as covariates), by change in intrinsic goal orientation and level of classroom autonomy.

level of classroom autonomy	change in intrinsic goal orientation	tskval2	slfeff2	testanx2	metacog2	zfinal/finalgrd
low autonomy (N=130)	increased (N=17)	6.07	5.48	3.43	4.95	.45/3.18
	maintained (N=73)	5.25	4.82	3.57	4.78	-.14/2.79
	decreased (N=40)	5.11	5.00	3.52	4.64	.07/2.97
mid autonomy (N=108)	increased (N=29)	5.68	5.11	3.83	4.55	-.11/2.90
	maintained (N=54)	5.43	4.83	3.14	4.72	.15/2.99
	decreased (N=25)	5.42	4.74	3.98	4.80	-.18/2.70
high autonomy (N=127)	increased (N=28)	6.06	5.27	3.92	4.73	-.18/2.60
	maintained (N=73)	6.01	4.99	3.94	4.87	.05/2.62
	decreased (N=26)	5.94	5.25	3.74	4.77	.05/2.79
pretest covariate	F(1,364)	309.21, p < .001	213.65, p < .001	359.17, p < .001	245.97, p < .001	---
autonomy	F(2,364)	3.42, p < .05	2.22, n.s.	2.62, n.s.	.54, n.s.	.00/2.63, n.s.
ch.intrins	F(2,364)	5.82, p < .01	7.13, p < .001	.51, n.s.	3.65, p < .05	.01/.19, n.s.

Figure 1. Mean changes in MSLQ scales, pretest to posttest.

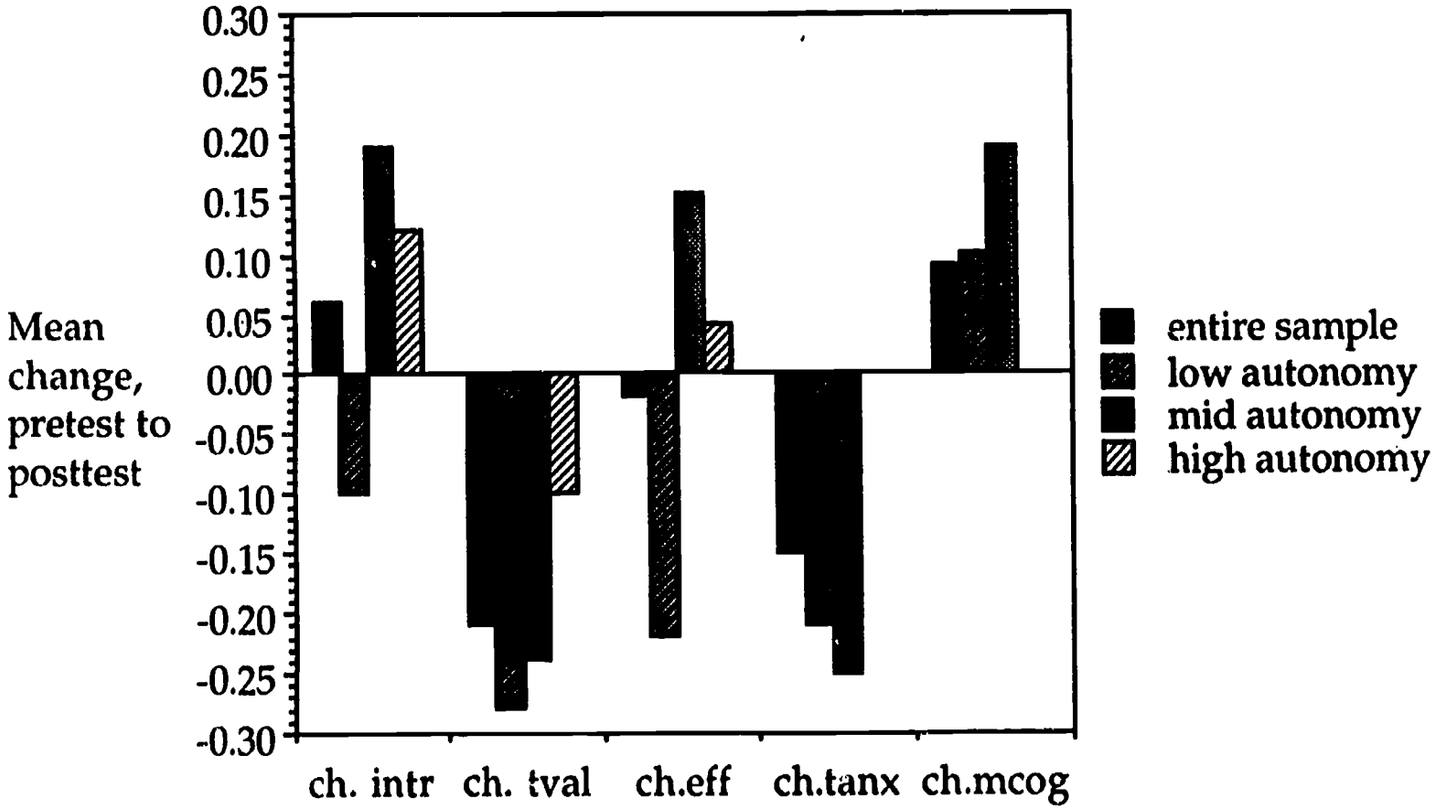

Figure 2. Mean levels of posttest task value (holding pretest value constant), by change in intrinsic goal orientation and level of classroom autonomy.