# *Examining Relationships between Achievement Goals, Study Strategies, and Class Performance in Educational Psychology*

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*This mixed methods study examined the relationships between students' learning goals, performance goals, study strategies, and test performances over a 14-week undergraduate course in educational psychology. Sixty undergraduate students provided goals at the beginning of the semester and reflected on their goals, study strategies, and test performances over the semester. Students' reflections and subsequent performances were observed through four rounds of surveys using open-ended questions and Likert scales. Results show that learning goals remained unchanged over the semester while performance goals changed towards the end of the semester. Students differentiated importance of management, elaboration, and rehearsal strategies and tended to change strategies based on test performances. Relationships were found between goals and test performances, but not between goals and study strategies, nor between study strategies and performances. Both theoretical and practical implications of the results are discussed.*

*Keywords:* self control, goal orientation, motivation, metacognition, study skills, learning strategies, academic achievement, college students, college teaching

Self-regulated learning (SRL) has emerged at the forefront of educational research in recent years (e.g., Boekaerts, Pintrich, & Zeidner, 2000; Pressley, 1995; McCormick, 2003; Schunk & Zimmerman, 1998, 2003; Winne, 1995). SRL refers to learning that results from students' self-generated thoughts and behaviors that are systematically oriented toward the attainment of their learning goals (Pintrich, 2003; Schunk & Zimmerman, 2003). This notion clearly indicates that SRL includes two aspects, motivation and metacognition, which influence each other during the learning process.

According to SRL theory, self-regulated learners rely on systematic internal monitoring and feedback systems (Butler & Winne, 1995; Carver & Scheier, 2000; Winne 1995). They are typically aware "of the strategic relations between regulatory processes or responses and learning outcomes" (Zimmerman, 1990, p. 5). They intentionally regulate, monitor, and control their cognition, even though these functions may not occur at all times. A key feature across various models of SRL points to the importance of students' control of the learning process in relation to achieving their goals of study (Lan, 1996; Pintrich, 2000a, 2000b, 2000c). Much of this control comes from students' desires to learn and to perform well on academic tasks, particularly on tests (Pressley, Van Etten, Yokoi, Freebern, & Van Meter, 1998). These desires are reflected in the goals students select for learning and performance.

## ACHIEVEMENT GOALS

In recent years, considerable research has been conducted on students' achievement goals. In this literature, achievement goals typically refer to cognitive representations of the different purposes students may adopt for their learning in achievement situations (Pintrich, Marx, & Boyle, 1993; Urdan & Maehr, 1995). These purposes would guide and direct students' cognition and behavior as they engage in academic tasks (Bong, 1996; Elliot, 1999; Pintrich, 2000a, 2000c; Ryan & Deci, 2000). This literature also shows that students can and do hold multiple, hierarchically arranged, social and academic goals in academic achievement settings (Dowson & McInerney, 2003), including mastery goals (Ames & Archer, 1988; Butler, 1989; Murphy & Alexander, 2000), performance approach goals (Ames, 1992; Dweck, 1992; Elliot, 1999; Meece, 1994), and performance avoidance goals (Elliot, 1999; Middleton & Midgley, 1997; Pintrich, 2000b).

One aspect of the research on students' motivation focuses on the relationship between goal setting and academic achievement. This research suggests that performance approach and learning goals can elicit students' positive efforts to perform well (Midgley, Kaplan, & Middleton, 2001), aid achievement when these goals are associated with positive expectations of success (Bandura, 1997; Pintrich & DeGroot, 1990; Rawsthorne & Elliot,

1999; Schunk, 1985; Schunk & Swartz, 1983a, 1983b), and predict students' motivation and actual achievement (Midgley et al., 2001). However, this research also suggests that complex relationships exist between the components of students' motivational systems (Blumenfeld, 1992; Jakubowski, 2003; Leach, Oueirolo, DeVoe, & Chemers, 2003; Lemos, 1996). Both performance approach and learning goals can lead to success, but these goals have complex relationships to achievement. For instance, both performance approach goals and learning goals are found to be associated with greater perceived competence and intrinsic motivation, but only performance approach goals predict better achievement (Elliot & Church, 1997; Leach et al., 2003). While learning goals tend to predict greater intrinsic motivation, performance approach goals tend to predict better achievement (Harackiewicz, Barron, Carter, Lehto, & Elliot, 1997; Schraw, Horn, Thorndike, & Brunning, 1995).

## STUDY STRATEGIES

Considerable research has focused directly on students' learning strategies. Learning strategies refer to intentional behaviors or thoughts that facilitate encoding in such a way that knowledge integration and retrieval are enhanced (Weinstein, 1988). These thoughts and behaviors constitute organized plans of action designed to achieve a certain goal (Weinstein & Mayer, 1983, 1986). Research in this field suggests that the use of learning and study strategies is associated with students' perceived and actual ability (Ames & Archer, 1988; Pintrich & De Groot, 1990; Williams & Clark, 2004) and various measures of academic achievement (Bernardo, 2003; Biggs, 1987; Entwistle & Ramsden, 1983; Everson, Weinstein, & Laitusis, 2000; McKeachie, Pintrich, & Lin, 1985; Sinkavich, 1991). Higher achieving students use more learning strategies than do lower achieving students (VanZile-Tamsen & Livingston, 1999; Zimmerman & Martinez-Pons, 1988).

Furthermore, this research distinguishes the effectiveness of different types of learning strategies. For instance, reading and rereading the textbook chapters, the most frequently selected study strategy among students (Cao & Nietfeld, 2005; Carrier, 2003), is considered a relatively ineffective approach to learning, as it is not active (Mackenzie, 1994), involves shallow processing (Craik & Tulving, 1975), and provides no feedback (Winne & Hadwin, 1998). In contrast, the current literature suggests a positive correlation between active strategies and student academic performance (Justice & Dornan, 2001). Active strategies, such as studying lecture notes, making chapter notes, outlining, and seeking professor assistance, involve deep processing and are more likely to promote understanding of the course material.

Classroom observation and studies reported by others (e.g., Peverly, Brobst, Graham, & Shaw, 2003; Pressley et al., 1998) suggest that students believe that the strategies should vary with the characteristics and demands of courses and assignments. Students claim to use a variety of strategies in the pursuit of good grades, including strategies aimed at keeping themselves on task. They report knowing that strategy use is an important factor in preparation for an examination and that some strategies are more beneficial than others as preparation for different types of examinations. However, research shows that students' selections of strategies are not always optimal (Cao & Nietfeld, 2005; Peverly et al., 2003), and that students are sometimes not carrying out effective strategies efficiently (Justice & Dornan, 2001; Pressley et al., 1998; Wilhite, 1990). In order to improve student learning, more research is needed to address the discrepancy between theories that students seem to hold about the selection of study strategies and their actual strategy use in the learning process.

Recent research has begun to address this issue. Numerous programs and courses have been implemented with the goal of increasing awareness of the importance of study strategies and enhancing ability to manage the learning process, in order to improve retention rate and promote academic success, particularly among first-year college students (e.g., Jakubowski, 2003; Smith, 2003). A main focus of many of these programs is teaching students to monitor their selection and use of various learning and cognitive strategies (Albaili, 1997; Curley, Estrin, Thomas, Rohwer, 1987; Derry & Murphy, 1986; Taraban, Rynearson, & Kerr, 2000). Research on such programs has found that, in general, students who use more deep-processing strategies such as elaboration and organization are likely to perform better on assignments, exams, and papers, as well as in overall course grade, than those who do not. Students who work to control their cognition and behavior through the use of planning, monitoring, and regulating strategies also do better on these academic performance measures (Pintrich & Garcia, 1994).

The research described above highlights the importance of systematically identifying and exploring students' motivational goals and strategy use in actual classroom settings. Results of this research demonstrate that complex relationships exist between these variables. For instance, Pintrich and Garcia (1994) found a general positive correlation between self-efficacy and intrinsic goal orientation and cognitive strategy use. However, for certain groups of individuals, self-efficacy and cognitive strategy use are not related to one another. Similarly, Dowson and McInerney (2003) reported that student motivation consisted of a complex and dynamic system of distinct motivational goals that students espoused for academic achievement. For instance, students' goals vary for behaviors, affect, and cognition. These goals interact in conflicting, converging, and compensatory ways to influence students' academic motivation and performance. Despite tremendous efforts, much remains to be known regarding the complex relationships among various forms of motivation and the learning process. In particular, little research exists describing how college students assess and revise achievement goals and how these goals relate to study strategies and classroom performance over time.

The purpose of this study was to gain a better understanding of the degree to which college students attempt to self-regulate the learning process during an educational psychology course. Specifically, we intended to address two research questions: How do students' reported achievement goals and the importance of different study strategies evolve over a 14-week educational psychology course? What are the relationships between three self-regulatory variables—achievement goals, strategy use, and class performance--within the educational psychology course? We used a mixed methods research approach (Creswell, 2003; Tashakkor & Teddlie, 2003) to address these questions because this approach allowed us to use both quantitative and qualitative data to shed light on the complex relationships between achievement goals, study strategy, and class performance. At the beginning of the educational psychology course, students were asked to describe what they expected to learn about the course content and how well they expected to perform on various assessment measures used in the course. During the semester, the students were asked to reflect on their learning, performance, and study strategies after receiving feedback from test performances. This within-subject repeated measure design provided students with opportunities to compare their pre-established goals with their test performances and subsequently adjust their goals and study strategies. This design also allowed for the examination of relationships between students' perceived achievement goals, strategy use, and class performance over time. An increased understanding of these relationships may lead to suggestions for promoting self-regulated learning in the classroom setting.

## METHOD

### *Participants*

Participants in the study included 60 undergraduate college students (80% Caucasian, 15% Africa American, 3.3% Hispanic, and 1.7% Asian American) enrolled in two sections of an educational psychology course at a mid-size university in the Southeastern United States. Their ages ranged from 18 to 43 ($M$=23, $SD$=5.98); there were 49 females (82%) and 11 males (18%). Full institutional review board approval was obtained for the recruitment of students, and an alternative project option was offered in lieu of study participation. All students volunteered to participate in the study and signed the informed consent form. The course was taken during students' junior or senior year after admission to the teacher education program. Two separate instructors each taught a section of the class, but both classes followed an identical class schedule, covered the same course topics, and used the same course materials, including test items. No significant difference was found between students in the two classes on the pre-test of course content, overall GPA, or cognitive abilities. Every attempt was made to create a classroom environment that facilitated students' self-regulation, including the provision of multiple opportunities for written reflection on achievement goals and study strategies, performance feedback, and the coverage during the course of numerous topics related to self-regulation (e.g., study strategies, motivation, and metacognition).

### *Measures and Procedure*

In this exploratory study, both qualitative and quantitative data were collected to document students' goal setting and perception of the importance of study strategies over the semester. In the first class meeting, students were asked to set specific goals for learning outcomes and performance outcomes such as performance on

tests and the course project (see Appendix A). This is done after a thorough discussion of the various course components and the difference between setting learning goals and performance goals. During the semester, students were provided with feedback on their test performance. The tests and answer sheets were returned to students at the beginning of class the week following each test, and students were encouraged to review the test and discuss unclear points. Then they were given the goals and strategies reflection sheet (see Appendix C) to help them assess the extent to which they were meeting their learning goals and performance goals on a five-point Likert scale. In addition, they were asked to provide written responses as to whether they would change their goals after reflecting on the test performance. This review and reflection lasted about 10 to 15 minutes.

In a similar fashion, students were asked to describe specific study strategies they tended to use in order to attain their achievement goals both at the beginning of the course (see Appendix B) and after the first three tests (see Appendix C). In addition to these qualitative measures, students were asked to rate the importance of 12 selected strategies for studying the course material on a six-point Likert scale after reflecting on their performance on each test. Based on the literature (e.g., McKeachie, Pintrich, & Lin, 1985; Pintrich & DeGroot, 1990; Weinstein & Mayer, 1986), these selected strategies were divided into three categories: rehearsal, elaboration, and management strategies. Composite scores for each category were computed after each classroom test as measures of students' perceived importance of these study strategies in learning the course material throughout the semester to observe possible changes in students' perception of each type of study strategy over time. Cronbach Alphas were calculated to assess the internal consistency and reliability of the 12-item survey at each administration. The coefficient alpha was .61 for the Pre-Test, .72 for Test 1, .79 for Test 2, and .76 for Test 3, suggesting acceptable internal consistency of the strategy questionnaire.

Scores on the pre-test were also used to account for students' background knowledge coming into the course. The pre-test consisted of 25 four-option, multiple-choice questions and was untimed. These items covered the full range of topics from the course, including cognitive and behavioral theories of learning, behavior management, motivation, metacognition, instructional strategies, and assessment.

Students' class performance was measured by the number of test items answered correctly on the four tests. The first three tests consisted of 20 four-option, multiple-choice items and the fourth test was a 40-item multiple choice final exam. Each of the first three tests assessed students' understanding of a unit consisting of three or four chapters of course content, while the final exam was a comprehensive measure of all the content covered in the course. The items were a combination of questions created by the instructors and those taken from various textbook item banks. They varied in difficulty from simple identification to more difficult application questions. An example of an identification question was:

*Long term memory contains both:*
*A. Semantic and sensory memory*
*B. Episodic and working memory*
*C. Working and short term memory*
*D. Episodic and semantic memory*

An example of an applied question was:

*At Jefferson High School, students who are tardy to class are given "Yard Patrol" after school. Yard patrol amounts to cleaning up any trash found on the school grounds. The practice of having the students clean up the trash is best described as an attempt to apply which of the following concepts from behaviorism?*

*Negative reinforcement*
*Presentation punishment*
*Removal punishment*
*Positive reinforcement*

***Data Analysis***

Different analysis procedures were used to analyze the quantitative and qualitative data to address the two research questions. First, we used the repeated measures ANOVA procedure of the General Linear Model on SPSS to examine how students' perceived achievement goals and importance of different study strategies evolved over the semester. Second, Chi square procedures were used to examine the extent to which students intended to change their goals and study strategies. Third, Pearson correlation and logistic regression procedures were used to examine the relationships between achievement goals, strategy use, and performance. In addition to the above quantitative procedures, we used a combination of quantitative and qualitative procedures to analyze the qualitative data. First, we followed the grounded theory approach (Strauss & Corbin, 1998) and used open coding to organize students' written responses to

the open-ended questions about their goals and study strategies. Students' responses to whether they intended to change their achievement goals and study strategies were coded, quantified, and then analyzed through quantitative procedures, such as frequency counts and Chi square analyses. Second, we used the constant comparative procedure (Glaser, 1978; Glaser & Strauss, 1967) to identify the types of study strategies students intended to use after reflecting on their goals and test performance. The specific steps of our use of the constant comparative procedure are reported in the results section below.

## RESULTS

### *Perceived Attainment of Learning Goals and Performance Goals*

We first examined students' perceived attainment of learning goals and performance goals over the semester. We examined students' responses to the question: "To what extent are you meeting your LEARNING goal?" and the question: "To what extent are you meeting the goals you set for PERFORMANCE in the class (e.g., tests, focus groups, etc.)?" (Question 1 and 3, Appendix C) after each of the first three tests. Students' responses on the five-point Likert scale to these two questions were analyzed through the repeated measure analyses of the General Linear Model on SPSS. The results show that students' perceived attainment of their learning goals remained the same over the semester ($f$=1.73, $df$=2, 118, $p$=.18). However, their perceived attainment of their performance goals changed towards the end of the semester ($f$=3.06, $df$=2, 118, $p$=.05). This change indicates that students were sensitive to their test performance in relation to their expectation of performance over the semester. While they intended to maintain their learning goals, they became more realistic in estimating their test performance and adjusted their performance goals toward the end of the semester.

### *Intention to Change Learning Goals, Performance Goals, and Study Strategies*

Next, we examined whether students intended to change their learning goals, performance goals, and study strategies over the semester. We analyzed students' verbal responses to the question: "Will you change your learning goals for the course? If so, please describe" and the question: "Will change your performance goals for the course? If so, please describe" (Questions 2 and 4, Appendix C) after each of the first three tests. A negative response to a question was coded as 0 (Do not intend to change=0) while a positive response was coded as 1 (Intend to change=1). Frequency and percentage of the reported intentions to change learning goals, performance goals, and study strategies were examined. In addition, a one-sample Chi square test procedure was used to examine the proportion of the students who intended to change, versus those who intended not to change, their learning goals, performance goals, and study strategies after each of the first three tests. As can be seen in Table 1, only a small proportion of the students intended to change their learning goals (maximum 8%) and performance goals (maximum 7%) over the semester. The majority of students intended to maintain the goals they set at the beginning of the semester. This finding suggests that students' learning goals and performance goals tended to be maintained once they were established.

In contrast to their intentions to maintain their learning goals and performance goals over the semester, some of the students did plan to change study strategies based on their test performance. As shown in Table 1, significantly more students reported an intention to change study strategies after reviewing their performance of Test 1 (60%, $f$ =3.95, $df$=1, $p$=.05), Test 2 (62%, $f$ =9.31, $df$=1, $p$=.002) and Test 3 (57%, $f$ =5.67, $df$=1, $p$=.017) than reported intention to change either type of goals. This finding shows that students were both monitoring their test performance and willing to adjust their study strategies in relation to their performance over the semester.

**TABLE 1**

**FREQUENCY, PERCENTAGE, AND CHI SQUARE TEST RESULTS OF THE OBSERVED AND EXPECTED CHANGE OF LEARNING GOALS, PERFORMANCE GOALS, AND STUDY STRATEGIES BY TEST**

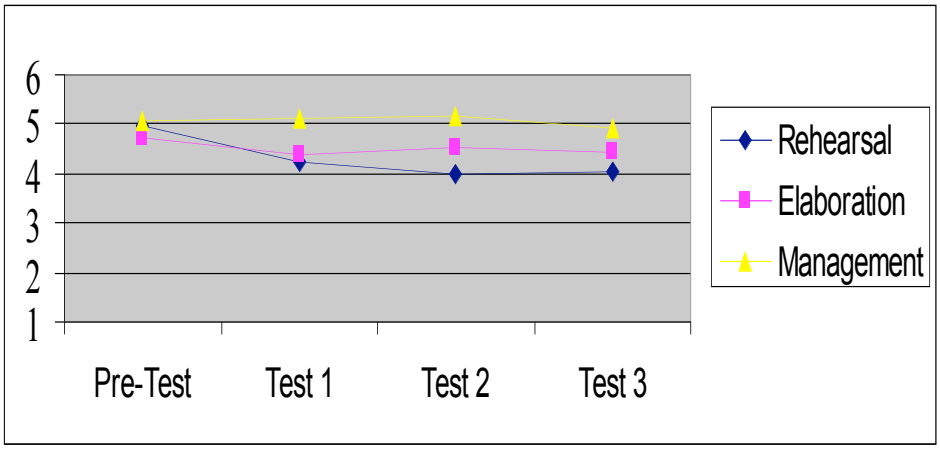
| Variable | Test | Intention to Change | | | |
|---|---|---|---|---|---|
| | | Observed (%) | Expected | Residual | __ |
| Learning Goal | Test 1 | 1 (n=45) (2%) | 21.5 | -21.5 | *.41.09 |
| | Test 2 | 3 (n=47) (6%) | 23.5 | -20.5 | *35.77 |
| | Test 3 | 5 (n=48) (8%) | 24 | -19 | *30.08 |
| Performance Goal | Test 1 | 0 (n=49) (0%) | | | |
| | Test 2 | 1 (n=48) (2%) | 24 | -23 | *44.08 |
| | Test 3 | 4 (n=45) (7%) | 22.5 | -18.5 | *30.42 |
| Study Strategy | Test 1 | 36 (n=57) (60%) | 28.5 | 7.5 | *3.95 |
| | Test 2 | 37 (n=52) (62%) | 26 | 11 | *9.31 |
| | Test 3 | 34 (n=51) (57%) | 25.5 | 8.5 | *5.67 |

Note: * Indicates results significant beyond the .05 level; (*df*=1) for all tests.

***Evolution of the Perceived Importance of Study Strategies over the Semester***

Students' views of the importance of study strategies were examined through their evaluations on a six-point Likert scale of the importance of 12 different study strategies (drawn from the literature, see above) after each of the four tests (see Appendix B). Subscale scores were calculated to assess the importance students assigned to management, elaboration, and rehearsal strategies respectively. Two steps were used to examine differences in students' views of these strategies. First, a series of repeated measures ANOVA procedures was used to examine whether students' views of the importance of one particular study strategy changed over the semester. Results showed that students assigned approximately the same of level of importance to management strategies throughout the semester (see Figure 1).

**FIGURE 1. STUDENTS' PERCEIVED IMPORTANCE OF REHEARSAL, ELABORATION, AND MANAGEMENT STUDY STRATEGIES BY TEST**




Second, a series of ANOVA procedures was used to examine differences among the importance students' assigned to management, elaboration, and rehearsal strategies after each test. Results show (Figure 1) that there were no significant differences among students' views of management (*M*=5.07, *SD*=.67), elaboration (*M*=4.74, *SD*=.66), and rehearsal (*M*=4.87, *SD*=.81) study strategies at Pre-Test. After Test 1, however, students' views of the importance of elaboration (*M*=4.39, *SD*=.84) and rehearsal (*M*=4.22, *SD*=1.13) strategies decreased and were both significantly lower (*F*(2, 116)=28.702, *p*=.001) than the importance assigned to management strategies (*M*=5.14, *SD*=.71). Bonferroni pairwise comparisons found no significant differences between the importance assigned to elaboration and rehearsal strategies at this point. After Test 2, students assigned significantly different levels of importance (*F*(2, 116)=49.51, *p*=.001) to management (*M*=5.15, *SD*=.73), elaboration (*M*=4.53, *SD*=.76), and rehearsal (*M*=4.01, *SD*=1.19) study strategies. This trend continued after Test 3, where again students assigned significantly different levels of importance (*F*(2, 116)=31.11, *p*=.001) to management (*M*=4.94, *SD*=.71), elaboration (*M*=4.44, *SD*=.81), and rehearsal (*M*=4.02, *SD*=1.12) study strategies.

***Relationships between Goal Setting, Strategy Use, and Performance***

Two steps were used to examine the relationships between goal setting, strategy use, and test performance. First, we used the Pearson correlation procedure to examine relationships between students' expected course grade and perceived attainment of their learning goals and performance goals, importance of the study strategies, and actual performance on Tests 1, 2, and 3. As can be seen from Table 2, there are moderately significant relationships within repeated measures of the goals, strategies, and test performance variables (e.g., learning goals attainment Test 1, learning goals attainment Test 2, etc.). However, complex relationships were found between these variables. For instance, students' perceived attainment of their learning goals and performance goals were significantly correlated with their test performances. In addition, students' predicted course grade at the beginning of the semester was significantly correlated with their eventual total class points and their performances on Tests 1 and 3. Nevertheless, no significant relationship was found between either performance or learning goals and the importance assigned to study strategies, nor between the study strategies and the test performances. In particular, students' perceived importance of study strategies appeared to be independent of learning goals, performance goals, and test performances. These findings suggest that complex relationships exist between the cognitive and motivational variables included in this study.

Second, we used logistic regression to identify which of these factors--students' course goals,

perceived goal attainment, importance of study strategies, and test performance--predicted whether students would change study strategies. For this analysis the dependent variable was the response to the question: "Will you change your specific strategies when studying for the course?" (see Section II of Appendix C). Responses to this question were divided into two categories: 0=not change and 1=change, therefore becoming a binary variable. Independent variables included students' expected course grade, perceived attainment of learning goals and performance goals, test scores, and the course grade. With our repeated measure design, we performed this logistic regression procedure after Tests 1, 2, and 3. The results show that test scores were the only significant predictors of students' intentions to change of study strategies after Test 1 (Wald $X\_$=3.98, $df$=5, $p$=.046), but not after Test 2 (Wald $X\_$=3.75, $df$=6, $p$=.287) or after Test 3 (Wald $X\_$=3.75, $df$=6, $p$=.053). This finding suggests that students' intended study strategies may have been more closely related to test performance than to the other variables examined.

**TABLE 2 CORRELATIONS BETWEEN LEARNING GOALS, PERFORMANCE GOALS, STUDY STRATEGIES, AND TEST PERFORMANCES**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| xpected course grade | 1 | .12 | .13 | -.10 | .09 | .30* | .15 | -.05 | .13 | .18 | .08 | .35** | .17 | .42** | .29 |
| earning goals nment Test 1 | | 1 | .45** | .58** | .29* | .39** | .28* | -.22 | -.20 | -.12 | -.25 | .48** | .27* | .26* | .14 |
| erformance goals nment Test 1 | | | 1 | .35** | .42** | .39** | .31* | -.17 | .03 | .08 | .13 | .63** | .25 | .30* | .35* |
| earning goals nment Test 2 | | | | 1 | .59** | .46** | .43** | -.03 | -.08 | -.06 | -.14 | .28* | .56** | .18 | .11 |
| erformance goals nment Test 2 | | | | | 1 | .48** | .50** | -.20 | .10 | .14 | .02 | .35** | .49** | .37** | .23 |
| earning goals nment Test 3 | | | | | | 1 | .77** | -.04 | .09 | .05 | .08 | .36** | .46** | .57** | .37* |
| erformance goals nment Test 3 | | | | | | | 1 | -.09 | -.03 | .08 | .08 | .32* | .52** | .57** | .28 |
| tudy strategy Pre-Test | | | | | | | | 1 | .33** | .38** | .38** | -.25 | -.08 | -.04 | -.05 |
| tudy strategyTest1 | | | | | | | | | 1 | .67** | .63** | -.08 | .03 | .15 | .18 |
| Study strategy Test 2 | | | | | | | | | | 1 | .63** | .03 | .03 | .20 | .15 |
| Study strategy Test 3 | | | | | | | | | | | 1 | -.17 | -.12 | .07 | .07 |
| Test Score Test 1 | | | | | | | | | | | | 1 | .43** | .58** | .58* |
| Test Score Test 2 | | | | | | | | | | | | | 1 | .53** | .39* |
| Test Score Test 3 | | | | | | | | | | | | | | 1 | .57* |
| Total class Points | | | | | | | | | | | | | | | 1 |

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

### *Qualitative analysis of Proposed Changes in Study Strategies after Each Test*

In order to look more deeply at students' proposed changes in study strategies, we followed the grounded theory approach (Strauss & Corbin, 1998) and used an open coding method to analyze students' written responses to the open-ended question: "Will you change your specific strategies when studying for the course? If so, please describe" (see Section II of Appendix C). In this section, we first describe the procedure used in this

qualitative data analysis and then report findings of the analysis. Specifically, we used the following five steps to reduce the data into categories and properties, employing the constant comparative method (Glaser, 1978; Glaser & Strauss, 1967) to identify categories of the study strategies that students intended to change after reflecting on their performance of the first three tests. First, a team of three coders independently read through and coded the first week's data. Each coder independently derived theoretical categories (conceptual elements arising from patterns in the data) and properties (smaller, definable aspects of the categories) based on the data. As the independent coding proceeded, the initial categories and integrated properties were collapsed. The categories were considered saturated when new incidents from the data no longer added new properties to the categories.

Second, after coding the first unit, the team compared and discussed categories and properties generated by each individual coder. Disagreements were resolved through rereading and multiple sessions of discussion of the verbatim data among the team. As a result of the discussion, the initial categories and properties were refined through consensus to better capture the meaning of the transcripts. The team reached an agreement of 95 percent on a code table (Appendix D) of eight kinds (enumerated) of students' proposed strategy change. Inter-coder reliability was calculated by dividing the number of agreement with the combination of the number of agreement plus the number of disagreement (Kirk & Miller, 1986).

Third, after establishing the inter-coder reliability of the code table, the team used the agreed upon categories as a guide and independently coded and numerated student responses to the same question after the first three tests, deliberately searching for disconfirming evidence for each category, which we used to modify and further refine the categories. Fourth, the team compared the coding results again and further modified the categories through consensus until we were satisfied that the categories (see Table 3) and properties reflected our interpretations of the strategies that students intended to use after reflecting on their performance. In the end, the team reached an agreement of 100 percent in this coding exercise. Finally, with this satisfactory consistency of the code table, the first author proceeded and coded the rest of the data. Results of this qualitative data analysis using the constant comparative method are reported in Table 3. Table 3 presents frequency, percentage, and types of study strategies from those students who indicated that they would change their study strategies after reflecting on their test performance. As can be seen in Table 3, more than half of the 60 total participants intended to change study strategies after each test ($n$=37 after Test 1; $n$=31 after Test 2; $n$=38 after Test 3). Among the students who intended to change study strategies, the majority of them (average 75% across tests) felt they simply needed to spend more time on studying. Only a small proportion of the students indicated that they would use higher-level strategies such as elaboration and organization (10%) or practice applying concepts (5%). Four percent of students planning to change reported helplessness in finding strategies that would work for them. More importantly, even fewer students intended to seek peer help (3%), improve their understanding of the class content (1%), or use metacognitive monitoring (1%).

Table 3 also reports different levels of test performance for the students who intended to change study strategies. Overall, there appears to be no significant difference between the students performing at A and B levels and those performing at C and D levels in selecting an alternative study strategy after reflecting on their test performances. In summary, among the students who felt the need to change study strategies, primarily vague (i.e. "study more") rather than specific strategies were provided, and few indicated that they intended to apply higher-order thinking skills to their studying process.

It is important to note that students' views of different study strategies changed significantly after they took the first test five weeks into the semester and then remained relatively stable for the rest of the semester. While a few students mentioned more advanced study strategies such as elaboration, organization, and help seeking, the majority of students described rehearsal strategies, such as going over the class-notes, using flash cards, and reading chapters, as their primary strategies to study throughout the semester.

**TABLE 3 STUDENTS' PROPOSED CHANGE OF STUDY STRATEGIES BY PERFORMANCE LEVEL**

| Strategy Type | Example | Test 1 (n=37)* | Test 2 (n=31) | Test 3 (n=38) | Total (n=106) |
|---|---|---|---|---|---|
| Study more | "I will study more in advance and try to study more each week." | 29 (78%) A=5, B=17, C=6, D=1 | 24 (77%) A=3, B=15, C=6 | 26 (68%) A=5, B=16, C=5 | 79 (75%) A=14, B=48, C=17, D=1 |
| Elaboration / Organization | "yes, read the chapters and either draw out a diagram of how it's all connected or write little paragraph summaries of slides" | 2 (5%) B=2 | 2 (7%) B=1, C=1 | 7 (18.4%) A=2, B=5 | 11 (10%) A=2, B=8, C=1 |
| Apply concepts | "Yes, I will pay attention to detail and try to apply scenarios to concepts learned in class." | 4 (11%) B=3, C=1 | | 1 (2.6%) B=1 | 5 (5%) B=4, C=1 |
| Don't know what else to do | "I studied really, really, really hard for tests 2 and 3 and still came up with a bad grade, however test 1 I studied less for and did better, so I don't know what to do." | 1 (1.4%) B=1 | 3 (9.7%) A=1, B=1, C=1 | | 4 (4%) A=1, B=2, C=1 |
| Seek peer help | "Yes, make people ask me questions" | | | 3 (7.9%) B=2, C=1 | 3 (3%) B=2, C=1 |
| Improve test skills | "more careful answer question" | | 1 (3%) A=1 | 1 (2.6%) A=1 | 2 (2%) A=2 |
| Improve understanding | "Rather than memorize, I will try to actually LEARN the material" | 1 (1.4%) C=1 | | | 1 (1%) C=1 |
| Monitor | "Already have changed goals, try to read material everyday, talk to someone to make sure I understand subjects." | | 1 (3.2%) A=1 | | 1 (1%) A=1 |

Note: * Number of students who reported to change study strategies. Letter grade represents students' overall course grade.

## DISCUSSION

In order to assist students to engage in the self-regulated learning process, it is important to first come to a clearer understanding of the process by which students set and revise goals and implement various study strategies in relation to their test performance. This study sought to develop this understanding by first tracking students' perceptions of goal attainment and the importance of various types of study strategies, and then examining the relationships of these variables to test performance over a 14-week course. Results are discussed in light of theoretical and practical implications. Theoretically, this understanding may help to describe the self-regulated learning process in the classroom setting. Our results contribute to the current literature by describing changes in learning and performance goals and how these achievement goals relate to the selection of study strategies and academic performance over time. Practically, this understanding may lead to classroom interventions that aim at developing metacognitive strategies to help students monitor and regulate the learning process more effectively. Below we discuss our findings in relation to the existing literature and offer suggestions for future research.

This study first examined the evolution of students' perceived attainment of learning goals, performance goals, importance of study strategies, and class performances over a 14-week educational psychology course. Over the course of the semester we found no change in students' perceived attainment of their learning goals. Students seemed willing to maintain the learning goals they set up at the beginning of the semester. Their motivation to learn seemed not to be influenced by their actual test performances. On the other hand, students did report changes in their perceived attainment of their performance goals towards the end of the semester.

When asked if they intended to change their learning and performance goals after reflecting on their test performances, only a small proportion of the students reported an intention to change either learning (8%) or performance goals (7%). For some students, this may indicate a lack of self-regulation with regard to the ability to rely on systematic internal monitoring and feedback systems (Winne, 1995; Butler & Winne, 1995; Carver & Scheier, 2000). Previous research with children has shown that allowing students to set their own goals can lead to greater self-efficacy and achievement (Pintrich & Garcia, 1994) and that process goals plus feedback can improve self-efficacy and achievement (Bandura, 1997; Pintrich & DeGroot, 1990; Rawsthorne & Elliot, 1999; Schunk, 1985; Schunk & Swartz, 1983a, 1983b). However, little research exists informing us how college students assess and revise classroom goals over time. Our results provide some empirical evidence that after they were set up, college students' learning goals and performance goals remained largely unchanged over the semester. However, compared to their learning goals, students' performance goals were somewhat more subject to the influence of actual test performance.

Our findings about the evolution of students' perceived importance of different study strategies (Figure 1) show that the importance of rehearsal and elaboration study strategies decreased significantly after the students reflected on their performance on Test 1. This finding suggests that providing students with opportunities to reflect on their test performance may prompt students to think about the appropriateness of the strategies they used for studying and therefore to adjust their strategies to better fit the class content and the instructor's teaching style. Our qualitative data (Table 3) support this interpretation and show an average of 75% of students reporting an intention to change their study strategies as the semester progressed. This finding suggests that engaging students in reflection on their test performance may raise their awareness of the extent to which selected study strategies worked or did not work and influence their views of strategies for subsequent studying in the course. This metacognitive awareness is important and necessary for promoting self-regulated learning.

Results of the comparisons between the strategies (Figure 1) show that students consistently viewed management strategies as the most important throughout the semester. These strategies include attending class regularly, spacing out study time rather than cramming, and adapting study habits to fit the class or instructor. It is important to note that these management strategies can also be viewed as self-regulatory strategies which help students to regulate their study efforts and the learning process. Their views on the usefulness of elaboration strategies dropped significantly from the beginning to Test 1 and then slightly increased throughout the rest of the semester. Their attitudes toward rehearsal strategies decreased most significantly and remained at a relatively lower level than the other two strategies. These findings suggest that students generally differentiated the importance of different strategies (Cao & Nietfeld, 2005; Craik & Tulving, 1975; Carrier, 2003; Peverly et al., 2003; Pressley et al., 1998). They viewed strategies that help them manage and regulate the study process as more important than strategies that make the content material more meaningful and strategies that help them to remember the information.

The fact that the importance of rehearsal strategies decreased more substantially than the other two strategies suggests that students seemed to understand that higher-level study strategies such as elaboration and management would better improve their performance than the lower-level rehearsal strategies. However, when responding to the open-ended questions about specific strategies they intended to select for further studying, the students reported rehearsal strategies such as going over class notes, using flash cards, and reading chapters as their primary study strategies (Table 3). They responded overwhelmingly with the need to study more (68-78%) while more advanced approaches such as applying concepts (0% - 14%) and elaboration/organization (0% - 10%) lagged far behind. While we chose to examine students' performance only on the multiple-choice tests in this study, students still had the choice of selecting more versus less effective strategies to learn the class material and to improve their test performance. Overall, these findings support the contentions in the current literature that college students do not predominantly select optimal study strategies (Peverly et al., 2003; VanZile-Tamsen & Livingston, 1999) and are not carrying out potentially effective strategies efficiently (Justice & Dornan, 2001; Pressley et al., 1998; Wilhite, 1990). In addition, our results contribute to the literature by providing empirical evidence that, while college students may understand the importance of the self-regulatory strategies, the majority of them did not actually select and use these strategies in learning the class content. Therefore, exploring

ways to narrow the gap between students' perceived importance and their actual use of self-regulatory strategies has a great potential to improve student learning.

Our findings are consistent with the existing literature on the complex relationships between achievement goals, study strategies, and test performance. In particular, we found that achievement goals were significantly related to test performance but not to study strategies and that study strategies were not related to test performances. Nevertheless, we found feedback on test performance was related to changes in students' perceived importance of various study strategies, particularly after the students reflected on their performance on Test 1. It seems that students' views about the relative importance of the study strategies can be influenced by reflection on their test performance.

Based on this observation, we hypothesized a negative relationship between students' intention to change study strategies and test performances, such that students would be more likely to change their study strategies when their test scores decrease. Consequently, we assumed that the students with poorer test scores in our study were more likely to seek out alternative study strategies to address their deficiencies on test performance. However, neither our quantitative nor qualitative data fully supported this hypothesis. First, results of our logistic regression analysis show that test performance was a significant predictor of intent to change study strategies for Test 1, but not for Tests 2 and 3. This result offers limited support to the importance of feedback in raising metacognitive awareness among students and encouraging them to engage in a self-regulated process of learning (Butler & Winne, 1995; Winne & Hadwin, 1998; Zimmerman, 1990). Furthermore, our qualitative data (Table 3) show no clear pattern on the relationships between test performance level and proposed changing of study strategies. In contrast, the majority of the students who intended to change study strategies were those who performed at a higher level on the three tests and achieved an A or B grade for the course. Clearly, motivation and self-expectation play an important role in mediating the relationships between approaches to studying and academic performances (Albaili, 1997; Ames & Archer, 1988; Bernardo, 2003; Biggs, 1987; Blumenfeld, 1992; Pintrich, 2003; VanZile-Tamsen & Livingston, 1999).

To address the complex relationships between goal setting, study strategies, and academic performances, future research needs to tease out the compound effects of motivational variables such as goal orientations (Ames, 1992; Middleton & Midgley, 1997), academic expectations (Ryan & Deci, 2000), self-efficacy of students' learning (Bandura, 1997; Schunk 1985; Schunk & Swartz, 1983a), and their epistemological views of how learning happens (Winne, 1995) on the selection of study strategies (Schraw et al., 1995; Weinstein, 1988, Weinstein & Mayer, 1986) and academic performance (Pintrich, 2003; Pintrich & DeGroot, 1990). More specifically, recent developments in motivation theory suggest that a combination of cognitive, behavioral, and social goals mediate the learning possess (Dowson & McInerney, 2003). These goals interact to influence students' cognitive processes such as goal setting and revising, their behavioral approach to studying, and their interactions with peers and instructors. Addressing these effects would provide a more holistic picture of the dynamic relationships between learning goals, performance goals, strategy use, and academic performance.

The present study used a repeated measure design which provided adequate statistical power to address its research questions. In addition, this study benefited from its mixed method research approach which allowed us to use the qualitative data to triangulate and interpret results of the quantitative analyses. However, in order to address the above multivariate task, future research in this area needs to consider a larger sample size across age groups and from different disciplines in order to develop a more accurate understanding of the relationships between these vital self-regulatory variables. Moreover, both self-report and objective measures need to be considered in research on study strategies. Our study relied solely on self-report data sources. While self-report offers a high degree of utility, its validity remains questionable. For instance, our data represented students' perceived importance of the study strategy rather than the actual use of the strategy. We intend to follow up on these results and explore the relationship between goal setting and actual strategy use during the learning process. Finally, the present study used a correlation approach and offers insights on describing the relationships between goals, strategy, and performance. Future research needs to consider using the experimental approach for interventions to identify effective ways to promote students' motivation and effective strategy use. We intend to follow up on the findings

of this study and explore approaches to influencing students' study strategy use. We are currently conducting a quasi-experimental study to examine the effects of metacognitive skill training on students' goal setting, study strategy regulation and academic performance and hope to glean possible suggestions for promoting better self-regulation in the classroom.

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## APPENDIX A:

## GOALS FOR EDUCATIONAL PSYCHOLOGY CEPD 4101

Below please provide AT LEAST ONE goal for EACH of the assessment measures for the course. Please be as SPECIFIC as possible:

Please provide ONE OR MORE goals related to LEARNING OUTCOMES:

_____

_____

_____

_____

_____

Tests (Quiz 1, 2, & 3):

_____

_____

Final Exam:

_____

_____

Schema Project:

_____

_____

Focus Group Participation:

_____

_____

Overall Performance:

_____

_____

_____

What will be the CAUSE of you either attaining or not attaining your goals for the class?

_____

_____

## APPENDIX B:

## CEPD 4101 EDUCATIONAL PSYCHOLOGY STUDY STRATEGIES QUESTIONNAIRE

1. What specific strategies do you use when studying for an exam?

2. How do you ensure that you remember important information? Describe as specifically as you can.

3. Approximately how much time (minutes, hours) you spend preparing for an exam?

4. Please indicate how important each of the following are with regard to studying course material using the scale provided.

| *Not Important At All* | | | | | *Very Important* |
|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** |

_____ 1. Repeating words/terms in your head to remember them.

_____ 2. Drawing diagrams or pictures to help you remember the information.

_____ 3. Elaborating on the information by creating stories and connecting the information to something you already know.

_____ 4. Asking the professor about concepts you do not understand.

_____ 5. Asking other students about concepts you do not understand.

_____ 6. Attending class regularly.

_____ 7. Determining themes or main ideas in the information

_____ 8. Understanding how you might apply what you are learning.

_____ 9. Spacing out your study time rather than cramming

_____ 10. Reading the textbook

_____ 11. Thinking critically about the material.

_____ 12. Adapting study habits to fit with the class or instructor

## APPENDIX C:

## GOALS & STRATEGIES UPDATE AFTER TESTS 1, 2, AND 3

I. Use the scale below to rate questions 1 and 3. Write down your responses to questions 2 and 4.

| 1 | 3 | 5 |
|---|---|---|
| **Not Meeting Goals At All** | **Meeting Goals Exactly As Predicted** | **Greatly Exceeding Goals** |

_____ 1. To what extent are you meeting your LEARNING goals for the course?

2. Will you change your learning goals for the course? If so, please describe:

_____ 3. To what extent are you meeting the goals you set for PERFORMANCE in the class (e.g., tests, focus groups, etc.)?

4. .Will you change your performance goals for the course? If so, please describe:

II. Reflecting on your performance from the first test, will you change your specific strategies when studying for the course? If so, please describe.

III. Use the scale below to indicate how important each of the following is with regard to studying the course material

| *Not Important At All* | | | | | *Very Important* |
|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** |

_____ 1. Repeating words/terms in your head to remember them.

_____ 2. Drawing diagrams or pictures to help you remember the information.

_____ 3. Elaborating on the information by creating stories and connecting the information to something you already know.

_____ 4. Asking the professor about concepts you do not understand.

_____ 5. Asking other students about concepts you do not understand.

_____ 6. Attending class regularly.

_____ 7. Determining themes or main ideas in the information

_____ 8. Understanding how you might apply what you are learning.

_____ 9. Spacing out your study time rather than cramming

_____ 10. Reading the textbook

_____ 11. Thinking critically about the material.

_____ 12. Adapting study habits to fit with the class or instructor

## APPENDIX: D.

### CATEGORIES OF STUDENTS' PROPOSED CHANGE OF STUDY STRATEGIES

| Code | Type of Strategy | Example |
|---|---|---|
| 1 | Spend more time to study | "yes, study and read the book more, and get more into my notes and stuff." |
| | | "I will study more in advance and try to study more each week." |
| 2 | Elaboration/Organization | "some- last test I thought through more examples and did better on types of quest. I missed this time." |
| 3 | Apply concepts | "apply the concepts" |
| 4 | Don't know what else to do | "I used 3 different strategies during the 3 tests. Obviously none of them worked." |
| 5 | Seek peer help | "yes, make people ask me questions" |
| 6 | Improve test skill | "more careful answer question" |
| 7 | Improve understanding | "yes, read the book about subjects that I do not fully understand" |
| 8 | Monitor | "I will thoroughly read the chapter and not skim through them." |

### ACKNOWLEDGEMENT

We express sincere thanks to Kelley Bennett for her assistance with the data and in establishing the inter-coder reliability of the coding system.